August, 2013

JANITORS WORKLOAD AND HEALTH AND SAFETY STUDY

Conducted by:

Department of Environmental and Occupational Health Sciences
University of Washington
Seattle, WA

In cooperation with:

Service Employee International Union, Local 6
Seattle, WA

And

CASA Latina
Seattle, WA

UW Authors:
Noah S. Seixas, PI. Carlos Domínguez, MPH; Bert Stover, PhD; Nancy Simcox, MS.

Collaborators:
SEIU Local 6: Sergio Salinas, President; Margaret Way, Coordinator.
CASA Latina: Hilary Stern, Executive Director; Cariño Barragan, Coordinator

Acknowledgments
Funding: SEIU Local 6 and the Department of Environmental and Occupational Health Sciences. We would also like acknowledge the contributions of the 25 workers who participated in our focus groups and conducted the interviews. We are grateful to our OHIP interns, Tori Crain and Jacob Delbridge, who facilitated the interviews and assisted in the development of the questionnaire.

Contents

Executive Summary

Janitorial services work is typically labor intensive, demanding high work rate and musculoskeletal loads. In 2010, janitors and cleaners in the United States suffered more than 46,000 workplace injuries resulting in days away from work, and had the 16th highest injury rate of all occupations. Although the literature demonstrates that janitors have numerous exposures to both chemical and physical risks, and have a high rate of injury and illness, there is a paucity of research addressing the relationships between these exposures and health effects, and documenting changes in the industry over time.

This study addressed exposures and health over the past three years of work among union, and non-union janitors, and security officers using a cross-sectional survey methodology. The analysis compares the experience among these three groups, using the security officers as a comparison group with relatively low physical demands at work. In addition, the study looked at changes in key self-reported exposures and outcomes over the past three years. A range of exposures including musculoskeletal stressors, chemical use, and psychosocial risks and outcomes including injuries, musculoskeletal pain, upper-extremity disability, pulmonary and dermatological symptoms, and stress was administered by trained worker-interviewers. A workload scale was developed to assess changes in work intensity over a three-year period.

Union Janitors reported a higher frequency of pain symptoms in the back, legs, and arms, and showed a clear increase in their frequency over the past three years. A similar but less pronounced trend is seen among the non-union janitors, while no apparent change is seen among the Security Officers. Security Officers do show higher levels of leg pain, consistent with their common standing or walking tasks. Union workers had a 2-fold higher upper extremity disability status as compared to non-union and the general population, and a 4-fold difference compared to the security officers “control” group.

Work intensity was highest among the non-union janitors, but was reported to have increased the most among the union janitors during the past 3 years. There was a strong statistically significant increase in the presence of poor/fair general health, back, leg and arm pain, and work stress with increasing work intensity. This clear trend appears among the union janitors, as well as the whole research sample. These results are highly suggestive that increased workload is contributing to increased rates of injury, illness, musculoskeletal pain and work stress.

Introduction and Goals of the Study

Over the past several years, janitors represented by SEIU Local 6 have noted increased pressure on the job to complete more work in less time or to cover a given amount of cleaning work with fewer workers. The union believed the work speedup in the cleaning industry may be related to greater job stress, injuries, or health consequences, but had no objective documentation that the speed-up had occurred, or that it had resulted in adverse health and safety consequences. At the same time, non-union janitors had come to Casa Latina for assistance with increasing frequency of unpaid work and abusive conditions. Local 6 and Casa Latina requested that the UW conduct a study of working conditions and health and injury outcomes to document whether such workload increases had occurred, and if so, what the health and safety implications were for these structural changes in the industry.

The current study of janitors was the result of this effort. A group of key informants from the union and non-union janitors helped design the study and the specific questions to be asked, and a cadre of workers from each group conducted the interviews. The aims of the study were to evaluate the extent to which the janitors' health is adversely affected by their workloads. In order to evaluate this question, a survey instrument was developed which included information about work pace, and job tasks and demands, psychosocial work conditions, health and injury outcomes, including ergonomic and chemical exposures. In addition to comparing these exposure and health and injury outcomes between the union janitors and non-union janitors conducting similar work, it also compared these experiences with those of union security officers. Security officers were thought to represent a good comparison or control population because of their unionization status, comparable socio-economic status, work in large buildings in the same area, but with different work exposures and physical demands. In order to evaluate changes in work experience over time, we asked questions for key concerns over each of the past three years.

Background

Janitors and building cleaning workers held about 2.3 million jobs in 2010 (4% working population). About 32 percent were employed in the services to buildings and dwellings industry, and another 14 percent were employed in elementary and secondary schools. The remainder were employed throughout other industries. (US BLS, 2012)

Cleaning work is typically labor intensive, demanding high cardio-respiratory output and high musculoskeletal loads (Charles et al. 2009; Zock, 2005). Janitors and cleaners are among the occupations associated with the greatest number of cardiovascular conditions (Leigh & Miller, 1998). Recent studies have quantified tasks and ergonomic exposures to provide insight into the heavy physical demands of custodial work (Village et al., 2009; Cabeccas, 2007; Woods and Bucle, 2006; Zock, 2005; Punnet et al., 2005). The majority of tasks conducted by janitors involve both long-handled equipment, such as brooms or mops, and the emptying of trash, both of which put janitors at risk for musculoskeletal disorders (Zoch, 2005). A study conducted by Woods and Bucle (2006) found that 74% of cleaners report experiencing aches, pain, and discomfort in the last year, while 23% have missed work due to these conditions. Furthermore, workers who are cleaning are at an increased risk for developing both skin and respiratory illness from the chemicals that are used in cleaning agents (Bello et al., 20010;Jaakola & Jaakola, 2006; Medina-Ramon, et al. 2005;Arif et al., 2003;Nielsen, 1996). Little information is available regarding psychosocial risks among cleaners, however, a variety of factors exist in the workplace to warrant further investigation, such as working alone, concern for one's safety, and low status job (Huang, et al., 2013; Charles et al., 2009)

Washington State Department of Labor and Industries tracks injuries and illness for insurance purposes and classifies them by the Occupational Injury and Illness Classification System (OIICS). The most frequent work related injuries from accepted worker's compensation claims for janitors and cleaners in Washington from 2007 through 2011 is shown in Table 1, below. The top claim, Overexertion, is defined as usually non-impact, from free bodily motion, excessive physical effort, repetition of a bodily motion, unnatural position, or remaining in the same position over a period of time. Among the most frequent injury types, three are related to musculoskeletal disorders: Overexertion, Bodily reaction, and Repetitive motion. There are limitations to using accepted claims data for indicators of injury incidence including underreporting, aversion to filing worker's compensation claims, and underrepresentation of illness, especially of illness with long latency.

Table 1. Injury Counts by Type for Janitors in Washington 2007-2011 from accepted Workers' Compensation Claims

Injury Type	Frequency
Overexertion	1856
Fall on same level	861
Struck by object	819
Bodily reaction	707
Struck against object	593
Fall to lower level	412
Caustic, noxious, or allergenic substances	350
Other events or exposures	345
Contact with objects and equipment, unspecified	264
Repetitive motion	169
Rubbed or abraded by friction or pressure	105

In 2010, janitors and cleaners in the United States suffered more than 46,000 workplace injuries resulting in days away from work, and had the 16th highest injury rate of all occupations (US BLS, 2012). Furthermore, janitors and cleaners are two of the occupations associated with the greatest number of cases of permanent partial disability (Leigh & Miller, 1998). In one study, janitors were paid $8.35 hourly and earn an average annual income of $8,684 for cleaning commercial buildings (Kaufman, 2012).

Although the literature demonstrates that janitors have numerous exposures to both chemical and physical risks, and have a high rate of injury and illness, there is a paucity of research addressing the relationships between these exposures and health effects, and documenting changes in the industry over time. As a result, specific directions for intervention to prevent ill health and injury are lacking.

Methods

The workload study for janitors addressed exposures and health over the past three years of work among union, and non-union janitors, and security officers using a cross-sectional survey methodology. Janitors, regardless of their union affiliation, shared similar work characteristics (e.g., work schedules, tasks, exposures, health concerns, physical demands, and injuries) but differ in terms of pay, work benefits, and job security. Security officers on the other hand shared with janitors the work hours and place of work (e.g., office buildings, shopping malls, movie theaters) but not the specific work tasks and exposures. The analysis compares the experience among these three groups, and looked at changes in key self-reported exposures and outcomes over the past three years. We use the term workload interchangeably with work intensity or work pace, all meaning how hard and fast a worker moves on average across a work-shift, and would be expected to correlate well with total metabolic output.

Study Development

During the planning phase, an advisory group was formed among with worker representatives and organizers from SEIU Local 6 and Casa Latina with the research team. The group provided input on the structure of janitorial work, aims of the study, the methodology used, the questionnaire, and helped with interviewer coordination.

The research team developed the questionnaire and tested it for accuracy and content with commercial janitors. In the formative phase of the study, four commercial janitors who were part of the advisory group were recruited as key informants with the purpose to elicit specific information about the characteristics of the typical work activities of janitors, specifically those that describe the type of tasks and time spent during a regular schedule. After incorporating the information generated from the interviews, a draft of the questionnaire was developed. The final version of the questionnaire was translated into Spanish and Vietnamese. Janitors contributed feedback to ascertain completeness of all the specific tasks performed routinely (i.e., mopping, window cleaning, vacuuming, etc.) over a regular eight hour shift, and for language accuracy of the translations. The research team tested the final version by administering the questionnaire among janitors to determine the time of the interview, as well as the accuracy of the professional translations. On average the questionnaire took between 20-30 minutes to complete.

The research team transferred the questionnaire onto tablet computers using Open Data Kit technology (ODK). ODK is a free and open-source set of tools which help organizations manage mobile data collection. ODK facilitated direct data entry and allowed for data to be sent to a remote server using any WI-FI connection. The use of ODK technology also allowed for establishing restrictions throughout the questionnaire requiring all questions to be answered before moving to the next questions or sections, this assured completeness of the data captured during the interviews. Tracking of the data collected was possible through a remote server that allowed the research team to keep track of the interviews completed by the interviewers.

Training

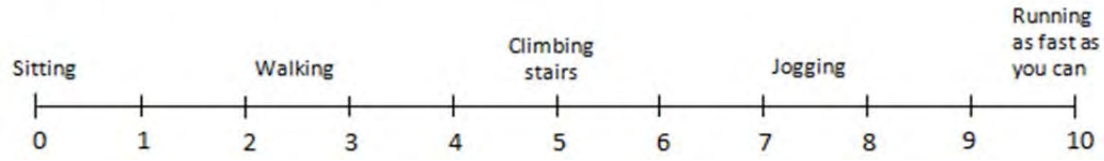
We recruited union and non-union janitors and security officers as interviewers. Twenty-two workers received a four-hour training. We trained a total of 15 union janitors, five non-union janitors, and two security officers. Union janitors included two Vietnamese, two Somali, and one Spanish native speaker. All others were English speakers. The training for janitors was delivered in English and translated into Spanish and Vietnamese using simultaneous interpretation. The two security officers were trained on a different date in English. The training structure was the same for both janitors and security officers and included: 1) an overview of the collaboration among the three study partners; 2) the rationale and aims of the study; 3) a review of human subjects research requirements; 4) recruitment and approach of participants; 5) development and content of the questionnaire; and 6) the use of tablets for data collection.

The training included a practice component that gave interviewers a first-hand experience using the questionnaire, as well as practicing saving and sending the collected data after completing questionnaires. In addition, all interviewers were given instructions in how to collect additional comments from participants, and to offer participants a $20 gift card for completing the questionnaire. The research team made available a kit containing copies of all the training materials, copies of the questionnaires, as well as a Samsung Galaxy Tab 2 tablet.

Questionnaire

The questionnaire was designed to measure work-related exposures by asking janitors to account for all tasks associated with their daily work such and the average time spent performing them during a regular work week (e.g., dusting, window cleaning, polishing, moving furniture, sweeping, buffing floors, vacuuming, trash collection, etc.) The work intensity section ask participants to rank experiences for the past three years using a continuous 10-point scale (0=sitting to 10= running as fast as you can), as illustrated, below.

20. Please place an X on the line that you think best describes the intensity of your work in a typical week last year.



Chemical exposures were assessed by asking questions about the regular use of chemicals for cleaning during a regular work week. Health, pain and injury-related questions asked participants to recall experiences in the present, past year and two years prior. For assessing upper extremity disability and symptoms the "Quick DASH" outcome measure standard tool was used. The questionnaire also included a measurement of psychosocial stressors adapted from the Job Content Questionnaire.

The questionnaire contained 126 questions divided into eight sections: 1) General Work Information (e.g., shift hours, type of building, other jobs); 2) Cleaning Tasks (e.g., dusting, window cleaning, pushing, buffing, vacuuming, etc.) ; 3) Work Intensity (e.g., three year comparisons); 4) Chemical Exposures (e.g., cleaning products); 5) Ergonomic Exposures (e.g., lifting, pulling, pushing, etc.); 6) Injuries and Health (e.g., general health, skin conditions, respiratory symptoms, etc.) ; 7) Psychosocial Stressors (e.g., supervisory style, family/work balance, job demands, decision latitude) ; and 8) Demographics.

Key aspects of the questionnaire required recalling work-related experiences over a period of three years (current year, one year ago, and two years ago). The questions that considered these changes were work intensity, injuries at work, stress at work, pain at work and general overall health). The questionnaire was approved by Institutional Review Board (IRB) at the UW and was designed to be anonymous and confidential. Participants were asked for general demographic information such as age, gender, country of origin, and the highest level of formal schooling completed. The English language version of the questionnaire is attached as an Appendix.

Recruitment

The union janitors were identified through their union organization. All Somali participants were interviewed by native Somali speakers, but the English language questionnaire was used. Union janitors were either interviewed at their workplaces during working hours or during off hours at different locations including the Union offices.

Recruitment of non-union janitors was coordinated by staff at Casa Latina, with assistance of non-union janitors associated with Casa Latina. They were recruited at multiple locations and all interviews were scheduled during off hours and conducted by native Spanish speaker interviewers. Recruiting non-union janitors was challenging and time consuming. Unlike union janitors, recruitment for this group required interviewers to develop a strategy for recruiting potential janitors that involved traveling to multiple locations throughout the city at different hours of the day. The outreach effort led interviewers to

places such as shopping malls movie theaters, office buildings, and large chain stores. The participants were identified through leads as an unintended snowball sampling generated from personal acquaintances, but in many instances, participants provided leads that helped contact fellow janitors.

Security officers were selected from the union roster to participate in the study. Interviewers identified and contacted peers from the list of union members. Most participants were interviewed at their work site during working hours in the evening, and at the union offices during off hours.

Interviews

The questionnaire was administered by interviewers after explaining in detail the background and aims of the study. A copy of the IRB informed consent statement was given to participants after agreeing to participate in the study. All participants were offered a $20 gift card at the end of the interview. The questionnaire was administered in three languages, but the consent information and consent form was done in English. Union janitors' interviews were completed within a three month period. Although the start of security guard interviews was delayed by contract negotiations, they were completed within a month of beginning the interviews.

The completion the non-union janitors' interviews took four months due to the challenges presented by the outreach effort. Participants were selected according to language groups, interviews were carried in the language of preference. Additional comments by participants were documented in a separate form, there were only a few extra comments provided, mostly in Spanish. Tracking of the interviews and a tracking report shared with the Union was performed daily.

Tracking and support

Tracking of data collection progress was done using ODK technology installed in a portable tablet that allows the capturing and sending of the completed data to a central server. The research team's access to a remote server provided all the information required for tracking, such as the date, time and the unique identifier of the tablet and user. After the completion of the study all tablets were returned to the research team.

Coordination and feedback to the research team was provided by a designated contact partner at the union and non-profit locations. Daily communication with partners provided real-time feedback on completeness of the data collected and allowed for troubleshooting any problems encountered with the use of the tablets. In a few occasions the research team had to meet in person with interviewers to provide technical support.

Analysis

The three language-specific datasets were merged and data were checked for completeness and out of range values. Primary results compared the three study groups. Security guards were not asked about specific tasks or ergonomic and chemical exposures because it was assumed that they would have completely different tasks, and minimal exposures, and so these sections are only presented for the two janitors groups. Categorical responses were generally made binary and presented as the number and percent positive. Some categorical questions used the midpoint of the category to calculate a numeric response, and were presented as means and standard deviations. Several scales combined the responses to multiple related questions and a summary score (e.g., mean) or percent of highest possible score was presented as a continuous variable.

The association between work intensity and selected outcomes was conducted by stratifying by tertiles of the work intensity scale, and evaluating the trend in outcome frequency across these groups. Additional analysis of work intensity includes the recoding of work intensity and other variables using

the median score as the cut-point or dichotomizing categorical variables. Prevalence ratios were used to assess the likelihood of subjects experiencing negative outcomes or poor working environments being associated with high work intensity.

Results

Demographics

Two hundred seventy six union janitors, 78 non-union janitors and 76 security officers were interviewed for the study. Table 1 presents their demographic characteristics. Both groups of janitors were about half female in contrast to the 91% male population of the security workers. The non-union janitors were about 7 years younger (mean age 36 $\pm$9) than union janitors (mean age 43 $\pm$13) and 3 years younger than security workers (mean age 39 $\pm$13). The oldest worker interviewed was an 80 year old union janitor.

While all groups had a high proportion of high school graduation, 75% for non-union, 61% for union, and 82% for security. However, the security workers had a higher rate of college of trade school education with 48% compared to 4% and 16% for non-union and union janitors respectively.

Overall the workers in this project were from 33 countries with the largest number from Mexico. Among non-union janitors 82% were from Mexico, 5% from El Salvador, 4% from Honduras and other countries represented less than 3% and only one reporting being born in the US. For union janitors, 15% were born in the US, 22% were from Somalia, 20% from Mexico, 18% from the USA, 15% from Ethiopia and less than 6% from any other country. Over 80% of security workers were born in the USA. Non-union and union janitors have lived in the USA for just over 12 years on average with non-union workers living in the USA for about 1 month longer. Only 18% of security workers were foreign born and they have lived in the USA for an average of 13 years. Non-union and union janitors were not as comfortable speaking English, 69% and 59%, respectively, compared to security workers where 92 % were very comfortable speaking English.

To provide some assessment of the financial pressure under which the three groups worked, the number of individuals living in the respondents' household and the number of residents with jobs was assessed. Table 2 gives the mean (SD) residents and workers by group, and further stratified by gender, nativity and education. Non-union janitors had the highest number of residents per household and the highest number of workers within each household. If one calculates the number of residents supported by each worker (number of residents divided by number of workers in household), the union janitors are supporting the highest number (2.1 residents/worker), followed by non-union janitors (1.8 residents/worker) and security officers (1.6 residents/worker).

Table 1. Worker Characteristics

	Non-Union Janitor	Union Janitor	Security Officers
Number of workers	78	276	76
Age, mean (SD)	36 (9)	43 (13)	39 (13)
Gender (% male)	47%	50%	91%
Education			
Less than Highschool	26%	39%	17%
Highschool graduate	71%	45%	34%
College or Trade	4%	16%	48%
Language			
English	4%	81%	100%
Spanish	95%	10%	0%
Vietnamese	1%	8%	0%
Other	0%	1%	0%
Speaking English			
Not at all, somewhat	69%	59%	3%
Comfortable	24%	22%	5%
Very comfortable	6%	19%	92%
Years in the USA (if foreign born), mean (SD)	12.4 (6.1)	12.2 (7.2)	13.4 (10.2)
Country of Origin			
USA	1	42	62
Mexico	64	56	-
Somalia	-	60	1
Ethiopia	-	40	-
El Salvador	4	16	-
Vietnam	-	20	-
Other	9	42	13

SD: Standard Deviation

Table 2. Worker Household Characteristics

	Non-Union Janitor	Union Janitor	Security Officers	All Worker Groups
Number in household, All mean (SD)	4.26 (1.39)	3.86 (1.87)	2.28 (1.56)	3.65 (1.86)
Number in household, Male	4.28 (1.49)	3.66 (1.89)	2.17 (1.52)	3.33 (1.89)
Number in household, Female	4.24 (1.32)	4.06 (1.83)	3.29 (1.70)	4.07 (1.73)
Number in household, US born	3.00 (-)	2.55 (2.03)	2.24 (1.60)	2.37 (1.78)
Number in household, Foreign born	4.28 (1.39)	4.09 (1.74)	2.43 (1.45)	4.07 (1.69)
Number in household, < HS education	4.50 (1.43)	3.90 (1.80)	- (-)	3.99 (1.76)
Number in household, High School education	4.20 (1.41)	4.00 (1.75)	2.54 (1.20)	3.95 (1.66)
Number in household, > HS education	3.67 (0.58)	3.37 (2.26)	2.22 (1.63)	2.72 (1.96)
Jobs in household, All	2.42 (0.99)	1.84 (1.16)	1.47 (0.62)	1.88 (1.09)
Jobs in household, Male	2.53 (1.06)	1.64 (1.10)	1.42 (0.58)	1.71 (1.03)
Jobs in household, Female	2.32 (0.93)	2.05 (1.19)	2.00 (0.82)	2.11 (1.13)
Jobs in household, US born	1.00 (-)	1.31 (0.64)	1.47 (0.62)	
Jobs in household, Foreign born	2.43 (0.98)	1.94 (1.21)	1.50 (0.65)	
Jobs in household, < HS education	2.40 (0.94)	1.75 (1.11)	- (-)	1.86 (1.11)
Jobs in household, High School education	2.44 (1.02)	1.92 (1.22)	1.80 (0.73)	2.06 (1.16)
Jobs in household, > HS education	2.00 (1.00)	1.77 (1.09)	1.41 (0.59)	1.57 (0.84)

Work Characteristics and Tasks

General characteristics of work are given in Table 3 and time spent in specific tasks in Table 4 for the two janitor groups. On average, union janitors have been in the trade for about twice as long as their non-union counterparts, with security officers intermediate (average of 6 years). For all workers a small proportion worked multiple jobs between 8 and 10%, they also work a similar number of hours per week between 35 and 40. There was little difference between hours worked and hours paid, with non-union janitors suggesting that they were paid for slightly more hours than they worked. As an indicator of work pressure, we also asked about the frequency with which workers skipped scheduled breaks or lunch. Union janitors skipped their break most frequently with 58% skipping their break daily or weekly. Comparatively 32% of non-union janitors skipped their break at least weekly, and for security workers 22%.

Table 3. Work characteristics

	Non-Union Janitor	Union Janitor	Security Officers
Number of workers	78	276	76
	mean (SD)	mean (SD)	mean (SD)
Years in trade	4.0 (3.5)	7.9 (6.7)	6.1 (4.2)
Hours worked	34.01 (10.63)	38.07 (7.50)	40.49 (8.86)
Hours paid	34.63 (11.20)	38.09 (7.86)	40.38 (8.81)
Skip Breaks* n (%)			
Never	53 (68%)	95 (35%)	56 (74%)
Monthly	0	20 (7%)	3 (4%)
Weekly	15 (19%)	87 (32%)	8 (11%)
Daily	10 (13%)	73 (27%)	9 (12%)
Work multiple jobs, n (%)	7 (9%)	22 (8%)	8 (10%)

*The survey asked, "How often do you skip breaks or lunch because otherwise you will not get your work done?"

Table 4. Time (hours) in last week spent on specific tasks

	Non-Union Janitor	Union Janitor	Chemically exposed task
Number of workers	78	271-276	
Tasks	mean (SD)	mean (SD)	
Dusting	2.58 (1.93)	4.64 (5.52)	
Window	2.58 (2.74)	2.46 (3.72)	Yes
Polish	0.90 (1.54)	2.89 (3.57)	
White board	0.27 (0.86)	1.94 (3.65)	Yes
Clean furniture	3.02 (3.21)	4.78 (5.55)	Yes
Moving furniture	1.08 (3.55)	2.46 (5.11)	
Sweeping/Mopping	4.58 (5.13)	7.67 (7.94)	Yes
Buffing Floor	1.27 (2.79)	1.08 (3.53)	
Carpet Shampoo	1.75 (6.12)	0.51 (2.64)	Yes
Vacuuming	4.42 (5.70)	8.18 (8.57)	
Trash Only	2.44 (2.24)	7.54 (8.79)	
Collecting Trash/Recycle/Compost	1.44 (3.95)	6.46 (7.76)	
Sorting Trash/Recycle/Compost	0.44 (1.26)	2.29 (4.28)	
Bathrooms	4.50 (5.50)	6.26 (8.73)	Yes
Floor Stripping/Waxing	0.50 (1.46)	0.90 (3.38)	Yes
Office Kitchen	1.21 (2.70)	4.07 (6.40)	

The most common tasks were vacuuming, trash and recycling work, sweeping and mopping, and bathroom cleaning. Union janitors tended to report more task-specific time overall.

Of the 16 tasks asked about, 7 are considered chemically exposed. The chemically exposed tasks are cleaning windows, cleaning white boards, cleaning furniture, sweeping and mopping, carpet shampooing, cleaning bathrooms, and floor stripping. On average the percent of total task time that is spent in chemically exposed tasks by non-union janitors was 54% (SD 19%) and union janitors reporting 40% (SD 19%).

The percent of time spent by task and janitor group is shown in Figure 1. For both janitor groups combined the most common chemically exposed tasks are: sweeping and mopping 13% (SD 12) of total task time, cleaning bathrooms 11% (SD 14), cleaning furniture 8% (SD 9), cleaning windows 5% (SD 5), with the other tasks representing less that 3% of task time.

Figure 1 Chemical Exposure by Janitor Group

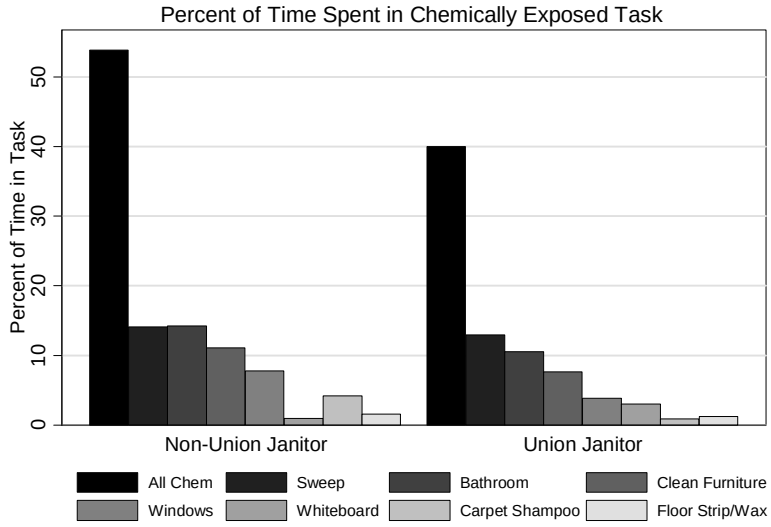


Table 5. Glove and Mask use

	Non-Union Janitor	Union Janitor
Use gloves		
Never, n (%)	3 (3.8)	18 (6.5)
Some time	9 (11.5)	18 (6.5)
Most time	13 (16.7)	27 (9.8)
Always	53 (67.9)	212 (77.1)
Missing	0	1
If yes, are they Latex		
Yes	69 (93.2)	160 (82.1)
No	5 (6.8)	35 (17.9)
Missing	1	63
Use mask		
Never	72 (92.3)	187 (68.0)
Some time	5 (6.4)	59 (21.5)
Most time	1 (1.3)	17 (6.2)
Always	0 (0.0)	12 (4.4)
Missing	0	1
If yes, mask type		
Dust	5 (83.3)	88 (91.7)
N-95, duckbill	1 (16.7)	6 (6.3)
Respirator	0	1 (1.0)
Bandana	0	1 (1.0)

Survey questions are: In the last week, how often did you use gloves when you were cleaning or disinfecting surfaces?
In the last week, how often did you use a face mask, respirator, or bandana when you were cleaning or disinfecting surfaces?

Glove usage was common while cleaning or disinfecting surfaces, with 85% of non-union workers and 87% of union janitors using them most of the time, or more (Table 5). However respiratory protection was rarely used, with 8% of non-union and 32% of union janitors using them at least some of the time.

Table 6 reports the types of building in which the two groups of janitors worked. Because many workers reported working in multiple types of building, these data are difficult to interpret. However, union janitors were almost uniformly working in offices, while non-union janitors worked in many different settings, including hospitals, construction sites, etc.

Table 6. Type of Building

	Non-Union Janitor	Union Janitor
Office	12 (15)	228 (82.6)
Large retail	14 (18)	7 (2.5)
Educational building	3 (3.8)	4 (1.4)
Hospital	8 (10.3)	2 (0.7)
Construction sites	9 (11.5)	1 (0.4)
Parking lots	2 (2.6)	0 (0.0)
Other	11 (14.1)	6 (2.2)
Mulitple	11 (14.1)	13 (4.7)
Missing	8 (10.3)	15 (5.4)

Survey question is: In what kinds of buildings do you work?

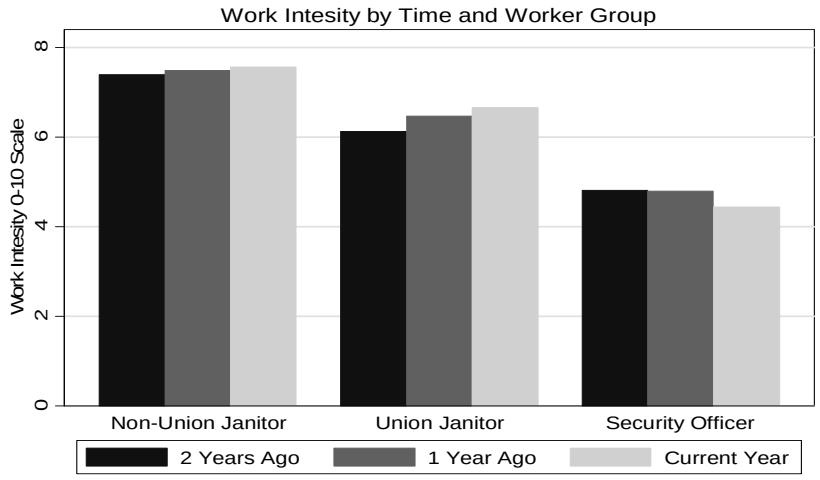
Work Intensity

Work intensity was measured on a line scale of 0 to 10 with 0 indicating sitting, and 10 representing running as fast as you can. The average reported intensity is reported by group and year in Table 7 and in Figure 2. This intensity question was asked about current experience, 1 year ago, and 2 years ago. Work intensity was highest among the non-union janitors, but was reported to have increased the most among the union janitors over the past 3 years. Work intensity increased by 2.3% among non-union janitors, 8.6% for union janitors, and was steady, or even declined slightly among security workers over the past two years.

Table 7. Work Intensity

	Non-Union Janitor		Union Janitor		Security Officers	
Work intensity scale	n	mean (SD)	n	mean (SD)	n	mean (SD)
Present year	62	7.56 (2.19)	256	6.66 (2.75)	68	4.44 (2.84)
1 year ago	62	7.48 (2.19)	256	6.46 (2.74)	68	4.79 (2.85)
2 years ago	62	7.39 (2.18)	256	6.13 (2.86)	68	4.81 (3.30)

Figure 2. Work Intensity by Group and Year



The number and percent of Non-Union and Union Janitors reporting use of various chemical types at least weekly is reported in Table 8, and mechanical and natural ventilation is reported in Table 9. Non-union janitors report working with better ventilation and operable windows more frequently than the union janitors or security officers, likely reflecting the type of building they work in.

Table 8. Chemical exposures

	Non-Union Janitor	Union Janitor
Number of workers	78	276
Chemical Exposures	n (%)	n(%)
Multi-use cleaning (liquid)	74 (94.9)	215 (78.5)
Spray cans (furniture, oven, fresheners)	40 (51.3)	166 (60.1)
Bleach	24 (30.8)	54 (19.6)
Ammonia	38 (48.7)	69 (25.5)
Acids (toilet bowl)	50 (64.1)	100 (36.9)
Solvents/stain removers	26 (33.3)	104 (37.8)
Floor care products	22 (28.2)	25 (9.1)
Disinfectants	55 (70.5)	197 (71.6)

Table 9. Ventilation

	Non-Union Janitor	Union Janitor	Security Officers
Number of workers	78	276	76
Work areas: Most/all areas	n (%)	n (%)	n (%)
Air movement	65 (83.3)	184 (68.9)	47 (61.8)
Ventilation On	67 (85.9)	172 (67.5)	38 (51.3)
Windows can open	20 (26.3)	11 (4.0)	7 (9.5)

The frequency of work with ergonomically stressful actions is reported in Table 10. Union janitors report a higher frequency of working with hands above the head, squatting, lifting and lowering objects, frequently lifting of 10 pounds or more and pushing or pulling heavy loads. It is assumed that the frequency of these actions is rare for Security Officers.

Table 10. Ergonomic Exposures

	Non-Union Janitor	Union Janitor
Number of workers	78	276
Ergonomic exposures (most /all days)	n (%)	n (%)
Work with hands above head*	15 (19.2)	158 (57.4)
Work with neck/back bent*	46 (58.9)	154 (56.6)
Work squatting*	11 (14.1)	66 (24.2)
Work repeating same motion*	64 (82.1)	205 (78.8)
Lift/lower objects or twisting*	14 (18.0)	122 (46.2)
Lift 10 pounds*	12 (15.4)	137 (50.7)
Lift 50 pounds**	26 (33.4)	101 (36.0)
Carry heavy loads >30 pounds***	12 (15.4)	55 (20.0)
Push/pull heavy loads	44 (56.4)	234 (84.8)

*More than 2 hours total per day

**At least once per day

***7 feet or more

General health, sleep quality, pain, and upper extremity disability (QuickDASH) is reported by the three groups in Table 11. Both general health and pain in the back, leg or upper extremities is reported for the

past three years. While the security officers rated their overall health highest, there was a striking decrease in the reported health over the past three years among the union janitors.

The sleep score is an average of four questions, the questions were constructed so a higher score is a poor outcome, and this is a measure of the average of four questions: scale range of 4 to 16 which is a combination of four, 4-point questions. Non-union janitors had the highest score and security officers the lowest, indicating relatively poor sleep among the non-union janitors.

The QuickDASH score for upper extremity disability was much higher (about two times) among the union janitors than either of the other groups, and significantly higher than a general population normal score of 10.1. A QuickDASH score of 0 indicates no disability while the highest disability score of 100 indicates the person cannot perform activities of daily living like dressing, opening a jar, or shopping, etc. This scale is sensitive to age, and gender, and the adjusted score is also shown. The results indicate a significant level of physical pain and disability among this group. This finding is further supported by a higher reported level of back, and upper extremity pain among the union janitors, and a rapidly increasing pain score over the three years. This trend is most pronounced among the union janitors but also appears present among the non-union group.

After adjusting for age and gender, the contrast in upper extremity disability is similar. The non-union janitors are slightly more disabled than the population norm, with a mean adjusted Quick DASH of 10.8; union janitors have the highest disability score of 20.0 and security officers the lowest with a mean of 5.6.

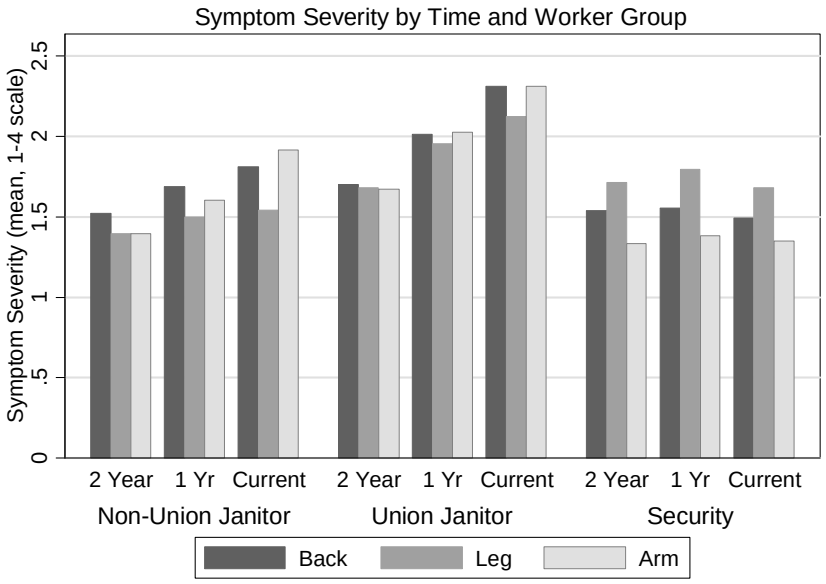
The frequency of working with pain in the back, legs and arms is also presented in Figure 3. Union Janitors report a higher frequency of these symptoms, and show a clear increase in their frequency over the past three years. A similar but less pronounced trend is seen among the non-union janitors, while no apparent change is seen among the Security Officers. Security Officers do show higher levels of leg pain, consistent with their common standing and walking tasks.

Table 11. General Health, Pain and Upper Extremity Disability

	Non-Union Janitor	Union Janitor	Security Officers
Number of workers	78	276	76
General health (1 Poor-5 Excellent)	mean (SD)	mean (SD)	mean (SD)
Present Year	2.74 (0.86)	2.70 (0.97)	3.21 (1.02)
1 year ago	2.82 (0.80)	3.11 (0.99)	3.21 (1.00)
2 years ago	2.91 (0.74)	3.38 (1.03)	3.28 (1.09)
Sleep adequacy (sum of score for 4 questions)	12.47 (2.42)	10.21 (2.85)	9.92 (2.88)
Upper Extremity Disability (QuickDASH) *			
Raw Score	11.7 (11.7)	21.1 (18.4)	6.2 (10.6)
Age and gender adjusted	10.8 (7.8)	20.0 (12.9)	5.6 (4.4)
N (%) Score >18	19 (25%)	119 (49%)	8 (11%)
Severity of Pain			
Back			
Last week	1.81 (0.73)	2.31 (0.98)	1.49 (0.78)
1 year ago	1.69 (0.66)	2.01 (0.95)	1.56 (0.96)
2 years ago	1.52 (0.68)	1.70 (0.88)	1.54 (0.96)
Leg			
Last week	1.54 (0.68)	2.12 (1.02)	1.68 (0.86)
1 year ago	1.50 (0.68)	1.96 (0.96)	1.79 (0.97)
2 years ago	1.40 (0.74)	1.68 (0.90)	1.71 (0.97)
Arm, Shoulder, or Hand			
Last week	1.92 (0.68)	2.31 (0.98)	1.35 (0.60)
1 year ago	1.60 (0.61)	2.03 (0.97)	1.38 (0.63)
2 years ago	1.40 (0.57)	1.67 (0.88)	1.33 (0.65)

*The general population would score 10.1 on the QuickDASH with a standard deviation of 14.68. Score range is 0-100 with an 8 point change considered clinically significant. Thus the percent greater than 18 is also presented.

Figure 3. Pain Symptoms



Specific health symptoms

Smoking rates and symptoms of skin, allergies and respiratory conditions are presented in Table 12. Skin symptoms were reported more frequently among the non-union janitors and lowest among security offices, however the respiratory symptoms were higher among union janitors or security officers. On the other hand, union janitors and security officers reported respiratory symptoms more often than non-union janitors while smoking was much more common among the security officers. Given the low smoking rates among janitors, the high prevalence of respiratory symptoms, especially among the union janitors, is striking.

Table 12. Symptoms of skin, allergy and respiratory conditions by group

		Non-Union Janitor	Union Janitor	Security Officers
	Number of workers	78	276	76
		mean (SD)	mean (SD)	mean (SD)
Skin Conditions		**n (%)**	**n (%)**	**n (%)**
	Rashes	20 (25.6)	70 (25.5)	6 (7.9)
	Chapping	44 (56.4)	97 (35.5)	6 (7.9)
	Hives	32 (41.0)	57 (20.9)	12 (15.8)
Respiratory				
	Cough	15 (19.2)	95 (34.8)	30 (39.5)
	Chest tightness	8 (10.3)	85 (31.4)	17 (22.4)
	Wake up coughing	8 (10.3)	74 (27.0)	17 (22.4)
	Wheezing	6 (7.7)	48 (17.6)	16 (21.1)
	Asthma	1 (1.3)	24 (8.8)	15 (19.7)
Allergies/Sinus				
	Nasal Allergies	24 (30.8)	112 (40.9)	25 (32.9)
	Sinus	8 (10.3)	59 (21.9)	25 (33.3)
Smoking				
	Never	59 (76)	217 (79)	31 (41)
	Ever	9 (12)	24 (9)	23 (30)
	Current	10 (13)	35 (13)	22 (29)

Injuries

The number of workers who reported an injury at work that required medical attention or time away from work is given in Table 13. The proportion of security officers reporting work related injuries has remained steady over the past three years between about 10 and 15%. Non-union janitors reported a similar frequency of injury two years ago, but lower levels since, while union janitors have reported a steady increase from about 6% up to 13.5% in the past year.

Table 13. Injuries

	Non-Union Janitor	Union Janitor	Security Officers
Number of workers	78	276	76
Number of workers with one or more Injuries	n (%)	n (%)	n (%)
Present year	3 (3.9)	37 (13.5)	10 (13.3)
1 year ago	5 (6.5)	33 (12)	8 (10.7)
2 years ago	9 (11.8)	17 (6.3)	11 (14.9)

Job Security and Psychosocial Stressors

Two questions concerning job security are presented in Table 14. Among non-union janitors only 22% felt they would not lose their job in the next year, while over 60% of union janitors said that were fairly likely to lose their job, indicating a very low level of job security among the union group. About 20% of both janitors groups felt they would have a somewhat easy time finding a new job.

Table 14. Job Security

	Non-Union Janitor	Union Janitor	Security Officers
Number of workers	78	276	76
Likely to Lose Job in 12 months	n (%)	n (%)	n (%)
Very/fairly Likely	6 (7.9)	163 (60.8)	19 (25)
Not too/not at all Likely	60 (79)	94 (35.1)	46 (60)
Leave in next 12 months	10 (13.2)	11 (4.1)	11 (14.5)
Ease in finding new job			
Very/Somewhat easy	14 (19.2)	52 (20.2)	33 (44.0)
Not easy	59 (80.8)	205 (79.8)	42 (56.0)

Responses to a series of questions on the psychosocial work environment are summarized in Table 15 and Figure 4. Individual questions (reported in Table 16) are presented as summary scales for questions that address how supervisors are perceived, the extent of job demands, the conflicts between work and family demands, and the degree of decision latitude perceived on the job. The responses for each of these scales is the average of several questions with responses on a Likert scale from 0 (strongly disagree) to 4 (strongly agree). In addition, a single question on overall stress at work was asked for this year, last year and two years ago.

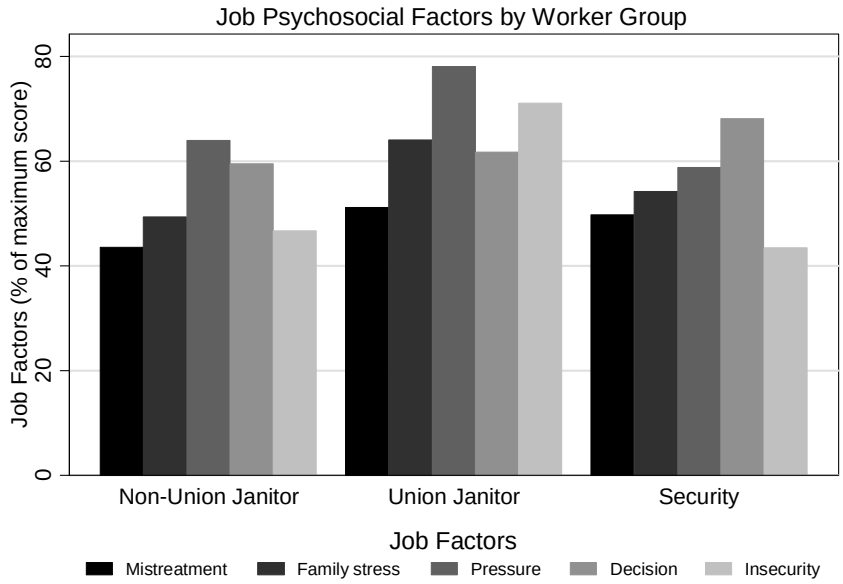
Union janitors have the highest level of supervisory mis-treatment, job demands and work/family conflict, while security officers have a greater degree of decision latitude (a positive outcome). Overall stress declined over time slightly for the security officers, while there was a strong increased level of stress for non-union and a very strong increase for union janitors over a three year period.

Table 15. Psychosocial Stressors & Stress

	Non-Union Janitor	Union Janitor	Security Officers
Number of workers	78	276	76
Psychosocial Stressors	mean (SD)	mean (SD)	mean (SD)
Supervisory Mis-Treatment (Mistreatment)	2.18 (0.48)	2.56 (0.72)	2.48 (0.94)
Family Stress	2.46 (0.84)	3.20 (0.87)	2.71 (1.03)
Job Pressure	2.55 (0.53)	3.12 (0.57)	2.35 (0.51)
Decision Latitude	2.38 (0.39)	2.46 (0.50)	2.72 (0.65)
Stress			
Present Year	2.08 (0.82)	2.40 (1.08)	2.33 (1.02)
1 year ago	1.88 (0.57)	2.14 (1.03)	2.43 (1.00)
2 years ago	1.69 (0.69)	1.89 (0.98)	2.48 (1.11)

**All scales except decision latitude are high score for bad conditions.*

Figure 4. Psychosocial Factors



Additional detail of the individual questions for these psychosocial outcomes is provided in Table 16.

Table 16. Psychosocial Factors (Management Mis-treatment Questions)

	Non-Union Janitor	Union Janitor	Security Officers
Management places safety before production			
Strongly disagree n (%)	10 (13)	28 (10)	18 (24)
Disagree	31 (40)	63 (23)	6 (8)
Neutral	19 (24)	65 (24)	15 (20)
Agree	18 (23)	100 (37)	31 (41)
Strongly agree	(0)	13 (5)	6 (8)
Missing		7	
My boss ridicules me			
Strongly disagree	20 (26)	25 (9)	12 (16)
Disagree	49 (63)	138 (50)	36 (47)
Neutral	9 (12)	48 (18)	9 (12)
Agree	(0)	52 (19)	15 (20)
Strongly agree	(0)	12 (4)	4 (5)
Missing		1	
My boss tells me my thoughts or feelings are stupid			
Strongly disagree	22 (29)	42 (16)	18 (24)
Disagree	49 (64)	160 (60)	45 (59)
Neutral	6 (8)	24 (9)	4 (5)
Agree	(0)	34 (13)	3 (4)
Strongly agree	(0)	6 (2.3)	6 (8)
Missing	1	10	
My boss tells me I'm incompetent			
Strongly disagree	21 (27)	36 (14)	20 (26)
Disagree	50 (65)	153 (60)	41 (54)
Neutral	6 (8)	29 (11)	2 (3)
Agree	(0)	33 (13)	6 (8)
Strongly agree	(0)	5 (2)	7 (9)
Missing	1	20	
Your race/ethnicity is a factor in how you are treated at work			
Strongly disagree	19 (25)	24 (10)	18 (24)
Disagree	47 (61)	121 (48)	28 (37)
Neutral	6 (8)	38 (15)	5 (7)
Agree	1 (1)	52 (21)	15 (20)
Strongly agree	4 (5)	17 (7)	10 (13)
Missing	1	24	

Table 16 (con't.)Psychoscial Factors (Job Pressure Questions)

	Non-Union Janitor	Union Janitor	Security Officers
I do not have enough time to get my job done			
Strongly disagree, n (%)	9 (12)	9 (3)	18 (24)
Disagree	39 (50)	56 (20)	38 (50)
Agree	23 (30)	133 (48)	8 (11)
Strongly agree	7 (9)	78 (28)	11 (14)
Missing	0	0	1 (1)
My job requires very fast work			
Strongly disagree	3 (4)	5 (2)	5 (6.6)
Disagree	17 (22)	16 (6)	38 (50.0)
Agree	46 (59)	136 (50)	29 (38.2)
Strongly agree	12 (15)	117 (43)	4 (5.3)
Missing	0	2	0
My job requires very hard work			
Strongly disagree	3 (4)	4 (2)	12 (16)
Disagree	18 (23)	29 (11)	44 (58)
Agree	47 (60)	132 (48)	15 (20)
Strongly agree	10 (13)	109 (40)	3 (4)
Missing	0	2(1)	2 (3)
My job requires excessive work			
Strongly disagree	3 (4)	4 (2)	5 (7)
Disagree	29 (37)	33 (12)	51 (67)
Agree	39 (50)	142 (51)	13 (17)
Strongly agree	7 (9)	58 (21)	4 (5)
Missing	0	39 (14)	3 (4)
My job involves conflicting demands			
Strongly disagree	10 (13)	6 (2)	6 (8)
Disagree	52 (67)	79 (29)	27 (36)
Agree	13 (17)	100 (36)	21 (28)
Strongly agree	3 (4)	27 (10)	22 (29)
Missing	0	64 (23)	0

Associations of Work Intensity with Key Outcomes

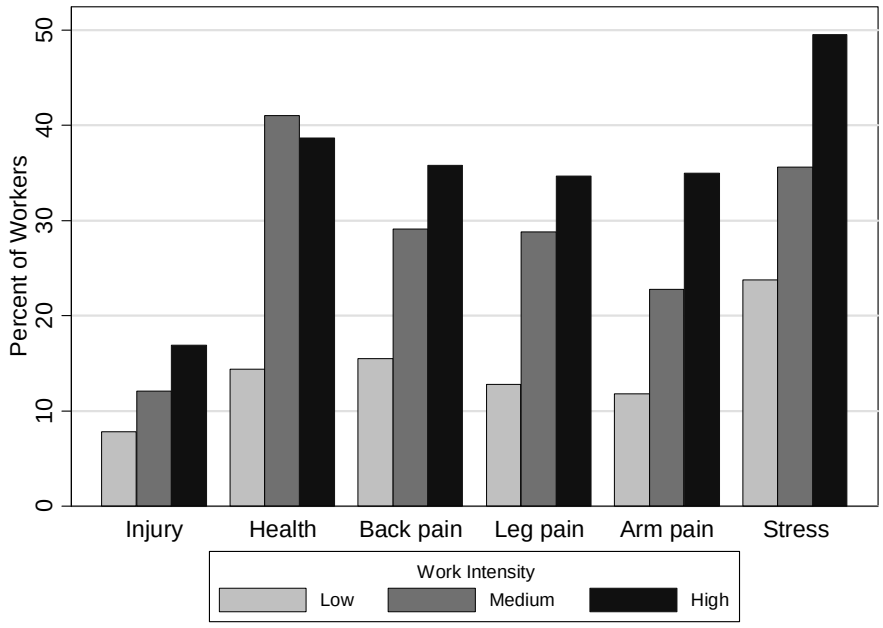
The self-reported work intensity scale was approximately divided into tertiles (one third of the respondents in each group), and selected injury, health, pain and stress outcomes were examined by these groups. Table 17, and Figure 6 presents these six outcomes by work intensity, first considering only the response of union janitors in the current year, and then all respondents for all three years. There was a strong statistically significant increase in the presence of poor/fair general health, back, leg and arm pain, and work stress with increasing work intensity. This clear trend appears among the union janitors, as well as the whole research sample. These results are highly suggestive that work intensity is contributing to increased rates of injury, illness, musculoskeletal pain and work stress.

Table 17. Selected Outcomes by Work Intensity, All groups and years, and Union Janitors in Current Year

Work Intensity	Injury in Year	General Health Poor-Fair	Back Pain Moderate-Severe	Leg Pain Moderate-Severe	Arm Pain Moderate-Severe	Work Stress Moderate-Severe
Union Janitors only, current year only	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Low	6 (6.7)	11 (12.1)	20 (22.0)	13 (14.3)	19 (20.9)	23 (25.3)
Medium	5 (11.4)	17 (38.6)	24 (55.8)	19 (43.2)	17 (38.6)	25 (56.8)
HIgh	26 (18.6)	75 (53.6)	72 (53.3)	63 (46.3)	69 (51.5)	77 (57.0)
P-value*	.031	<.001	<.001	<.001	<.001	<.001
All work groups, all 3 years						
Low	30 (7.85)	55 (14.4)	59 (15.5)	49 (12.8)	45 (11.8)	91 (23.8)
Medium	37 (12.1)	126 (41.0)	89 (29.1)	88 (28.8)	70 (22.8)	109 (35.6)
High	52 (16.9)	118 (38.7)	106 (35.8)	104 (34.7)	104 (35.0)	148 (49.5)
P-value	0.001	<0.001	<0.001	<0.001	<0.001	<0.001

* Fishers exact test P-value

Figure 6. Injury, Health, Pain and Stress Outcomes by Work Intensity (All years, all groups)



Prevalence ratios were used to assess the likelihood of subjects experiencing negative outcomes or poor work environments being associated with high work intensity. Work intensity categories were re-defined for this analysis as higher than the median vs. lower than the median. A QuickDASH upper extremity disability score 8 points above the population average could be considered a clinically identifiable disability and thus those with a QuickDASH score above 18 were considered to have a disability in this analysis. Using work intensity and injury as an example, a prevalence ratio of 0.5 indicates the a subject with high work intensity is one-half as likely to have an injury, a prevalence ratio of 1 indicates no effect of work intensity on injury, and a prevalence ratio of 2 indicates a subject with high work intensity is twice as likely to have an injury. For example, among all subjects in the study,

those rating their work as high intensity (above the median) were 2.17 times (p=0.007) as likely to report an injury than those reporting relatively low work intensity subjects. Among Security Officers, there was almost a five-fold increased risk of injury. Similar risks were associated with many, but not all outcomes, and years for each group (Table 18). Additional work is needed to fully understand the relationships between work intensity and risk while controlling for year and work group.

Table 18. Prevalence ratio for Selected Outcomes by Work Intensity

Outcomes RR (P-value for Chi square)	**All Groups**	**Non-union Janitors**	**Union Janitors**	**Security Officers**
Injury current year	2.17 (.007)	- (-)*	2.03 (.036)	4.75 (.004)
Injury 1 year ago	1.85 (.033)	0.81 (.810)	2.03 (.042)	2.95 (.090)
Injury 2 years ago	2.12 (.019)	5.22 (.064)	1.99 (.154)	2.25 (.136)
QuickDASH Disability	2.05 (.001)	1.24 (.465)	2.33 (.001)	0.81 (.652)
Back Pain current year	1.75 (.001)	0.52 (.211)	1.82 (.001)	1.29 (.750)
Back Pain 1 year ago	1.42 (.060)	0.11 (.012)	1.81 (.005)	1.33 (.600)
Back Pain 2 years ago	2.01 (.002)	0.42 (.192)	2.14 (.004)	5.71 (.001)
Leg Pain current year	1.80 (.001)	0.37 (.120)	2.43 (.001)	1.34 (.528)
Leg Pain 1 year ago	1.99 (.001)	0.75 (.687)	2.55 (.001)	2.10 (.080)
Leg Pain 2 years ago	2.22 (.001)	1.04 (.944)	3.18 (.001)	1.71 (.220)
Arm Pain current year	2.04 (.001)	0.55 (.318)	2.07 (.001)	2.15 (.375)
Arm Pain 1 year ago	2.31 (.001)	0.14 (.034)	2.56 (.001)	3.00 (.236)
Arm Pain 2 years ago	2.24 (.002)	0.17 (.067)	2.15 (.001)	1.71 (.575)
Stress current year	1.63 (.001)	1.01 (.980)	1.86 (.001)	2.20 (.003)
Stress 1 year ago	1.61 (.001)	0.40 (.078)	2.16 (.001)	2.33 (.001)
Stress 2 years ago	1.47 (.022)	0.58 (.325)	2.08 (.001)	1.43 (.173)
General Health current year	2.40 (.001)	1.60 (.175)	2.96 (.001)	1.22 (.667)
General Health 1 year ago	1.85 (.002)	1.31 (.524)	2.85 (.001)	0.75 (.618)
General Health 2 years ago	2.65 (.001)	1.62 (.245)	3.97 (.001)	1.50 (.379)
Management Mistreatment	0.92 (.453)	1.23 (.732)	0.89 (.353)	1.53 (.145)
Family/Job Balance	1.10 (.369)	1.20 (.721)	1.01 (.949)	2.01 (.029)
Decision Latitude	1.39 (.003)	1.69 (.177)	1.71 (.001)	1.51 (.032)
Job Pressure	1.02 (.881)	2.76 (.111)	0.82 (.022)	2.15 (.193)

* *No cases in low intensity jobs, therefore unable to compute.*

Conclusions

Commercial janitors are a large group of low wage, often immigrant workers who face significant risks at work. This is the first study to evaluate the extent to which janitors' health is adversely affected by their workload over time. The study design was novel in that it compared self-reported occupational exposures and outcomes among union janitors, non-union janitors and security officers, and assessed changes in key exposures and outcomes over the past three years. Our results indicate that all three groups have significant problems with health, pain and injury; however, specific issues differ for each group. Self-reported work intensity appears to be strongly associated with health, injury, pain and stress, a trend observed across all three groups.

Janitorial work is high paced, and has numerous physical and psychosocial challenges. These challenges have increased substantially in recent years, especially among the union janitors. Our study indicates that union janitors have increasing frequency of injury, poor and declining overall health, a very high level of upper extremity disability, and a high and increasing level of musculoskeletal pain. In addition to adverse health outcomes, union janitors report a higher frequency of ergonomic exposures, such as working with hands above the head, squatting, lifting and lowering object, frequently lifting of 10 pounds or more and pushing or pulling heavy loads.

The degree of disability in simple tasks using the upper extremities found among janitors as compared to our study groups and the normal population is striking. The QuickDASH is a standardized survey that asks about a janitor's ability to perform certain activities (e.g. using a knife to cut food) in addition to symptoms. The QuickDASH disability scores illustrates that union workers are at a 2-4 fold risk of a clinically identifiable disability of the upper extremity.

Of the three groups, work intensity among union janitors increased the most during the past three years. In addition, fifty-eight percent of union janitors skipped their breaks daily or weekly, and this indicates that janitors are not receiving sufficient recovery time for preventing injuries and illnesses. Union janitors also reported the highest level of supervisory mis-treatment, job demands and work/family conflict. Most notably, there was a very strong increase level of stress among union janitors over a three-year period as compared to non-union janitors and security officers. Our results are consistent with previous occupational studies related to physical workload and ergonomic factors among cleaners in which musculoskeletal pain and muscle complaints were significantly associated with a fast work pace, job dissatisfaction, and job-related worry and tension. The combination of increased work intensity, insufficient recovery time due to fewer breaks, and psychosocial stressors are most likely contributing to the increase level of disability and injury among union janitors. Additional research is needed to fully understand the implications of these findings.

In general, non-union janitors experience similar pain and injury as union janitors but to a lesser degree. These findings are not what we expected, and more work is needed to better understand this. Non-union janitors do have higher frequency of skin symptoms, moderate but increasing levels of back and extremities pain. There was a strong increased level of stress for non-union janitors as well. Approximately twice as many non-union janitors use more hazardous cleaning agents, such as acids, ammonia and bleach as compared to union janitors, as well as less personal protective equipment during the use of cleaning agents. Differences in work organization and employment characteristics between the two groups differ, and help explain our findings. Janitorial company supervisors are generally not present at sites as they tend to manage multiple buildings. Union companies employ a "foreman" who is also a janitor but additionally assists with supervision of the workers and acts as a messenger for the supervisor. Non-union janitors do not have "foremen or supervisors", and appear to have more control over establishing their work pace and activities and less job pressure.

The inclusion of the security officers as a control group increased the reliability of our study, especially as they relate to changes over the three-year period. Security officers, who share the same work hours and place of work (e.g., office buildings, shopping malls, movie theaters) as janitors but not the specific work tasks and exposures was an important element of the study design for understanding our results. As expected by the tasks and their type of work, the security officers had the lowest disability score (mean adjusted Quick DASH score 5.6), even lower than the general population. However, security officers have a relatively high injury rate, relatively high rates of sinus symptoms, low job decision latitude and report being abused by their supervisors. As expected some of these adverse health outcomes (e.g. injury rates) remained the same over time or slightly decreased over time. Although stress is high among security officers, the overall stress declined over time slightly. Twenty-nine percent of security officers currently smoke, whereas only 13% of janitors smoke, and this may explain the high rate of respiratory symptoms.

Limitations

Despite the intriguing findings, a number of significant limitations of the study must be recognized. Even though we were interested in changes in work and health over time, we were only able to ask the questionnaire at one point in time (a cross-sectional retrospective study). As a result, the data reported for earlier years may be less accurately reported, and could be subject to reporting bias. Those reporting recent problems may be more likely to report more past problems, too. However, the fact that the changes in workload were not uniformly reported among the three groups provides some assurance that the reported changes over time are real.

A major weakness is that both exposures (work pace and other exposure factors), and outcomes (health, stress, pain, etc.) were self-reported, provides for significant opportunity for information bias. Those that report symptoms may be more likely to also report higher levels of exposure as a way of explaining those symptoms. Evidence that this could be a factor comes from the very similar pattern of relationships between work intensity and several different outcomes. However, this pattern was not uniformly seen among the different groups. For instance non-union janitors reported less back pain with increased work intensity while union janitors had about a two-fold increased risk, and security officers had a strong increased risk 2 years ago but less since (Table 18). Additional work is needed to determine the extent to which this bias is present.

Despite these limitations, the data indicate an increase in workload especially for union janitors over the past few years, and a concomitant increase in a variety of health and safety outcomes. The contrast of the findings within the union janitors compared to the other two groups gives a level of assurance that the patterns observed are real and meaningful.

Recommendations

- Determine the pace and work intensity for commercial janitors that will reduce the injury and illness rates. Review industry staffing guidelines used to meet targeted cleaning standards, such as the custodial staffing guidelines for educational institutions, and determine if these guidelines are effective in preventing injury and illness. For example, the Association of Physical Plant Administrators of Universities and Colleges (APPA) provide guidance and software tools for janitorial staffing in educational institutions (https://www.appa.org/fourcore/maintenance/main.cfm).
- The work-related issues for security officers as a group should be further explored in order to implement appropriate interventions.

- Identify administrative measures to reduce work intensity, monotonous work, etc (e.g. work flow improvements, team work and job rotations). Ensure that workers understand the importance of taking their rest periods to prevent injury and illness. The Washington Administrative Code 296-126-092 requires that employees be given a paid rest period of at least ten minutes for each four hours of working time (WAC 296-126-092).
- Training is needed at both supervisory and worker levels (e.g. stress management, workers rights, injury reporting, and effective management styles). These should be available in appropriate languages.
- Additional studies should be mounted to test the effectiveness of reduced work pace, improving supervisory attitudes and safety climate, and increasing worker involvement in safety and health management. Research using validated scales and objective measures of work exposures and health outcomes would enhance these initial findings.

References

Association of Physical Plant Administrators of Universities and Colleges (APPA). (2012). Facilities Performance Indicators Report 2010-2011. APPA, Alexandra Virginia.

Arif A, Delclos GL, Whitehead LW, Tortolero SR, and Lee ES. (2003). Occupational Exposures associated with work-related asthma and work-related wheezing among US workers. *American Journal of Industrial Medicine,44:368-376.*

Bello A, Quinn MM, Perry MJ, and Milton DK. 2010). Quantitative assessment of airborne exposures generated during common cleaning tasks: pilot study. Environ Health, 9:76 (1-10).

Bureau of Labor and Statistics. (2010).Nonfatal occupational injuries and illnesses requiring days away from work, 2010. *Economic News Resease.* Retrieved from http://www.bls.gov/news.release/osh2.nr0.htm

Bureau of Labor and Statistics. (2012). Occupational employment and wages. *Occupational Employment Statistics.* Retrieved from http://www.bls.gov/oes/current/oes372011.htm.

Cabeccas, JM. (2007). The risk of upper limb disorder in cleaners: modified application of the Strain Index method. *International Journal of Industrial Ergonomics*, 27(3):177-187.

Charles L, Loomis D, and Demissie Z. (2009). Occupational hazards experienced by cleaning workers and janitors: A review of the epidemiologic literature. Work 34:105-116.

Huang Y, Zohar D, Robertson M, Garabet A, Lee J, and Murphy L. (2013). Development and validation of safety climate scales for lone workers using truck drivers exemplar. Transportation Research 17:5-19.

Jaakkola J, & Jaakola M. (2006). Professional cleaning and asthma. *Current Opinion in Allergy and Clinical Immunology.* 6, 85-90.

Kaufman, G. (2012). This week in poverty: Janitors' strike goes citywide. *The Nation.* Retrieved from http://www.thenation.com/blog/168870/week-poverty-houston-janitors-strike-goes-citywide#

Leigh JP, Miller T. (1998). Job related diseases and occupations within a large workers' compensation data set. *American Journal of Industrial Medicine,* 33, 197-211.

Medina-Ramon M, Zock JP, Kogevinas M, Sunyer J, Torralba Y, Borrell A, Burgos F, Anto JM. (2005). Asthma, chronic bronchitis, and exposure to irritant agents in occupational domestic cleaning: a nested case-control study. Occupational and Environmental Medicine, 62:598-606.

Nielsen J. (1996). The occurrence and course of skin symptoms on the hands among female cleaners. Contact Dermatitis 34:284-291.

Punnet L, Ustun A, Nelson DI, Fingerhut M, Leight J, Tak SW, Phillips S. (2005). Estimating the global burden of low back pain attributable to combined exposures. *American Journal of Industrial Medicine, 48:459-469.*

Village J, Koehoorn M, Hossain S, and Ostry A. Quantifying tasks, ergnonomic exposurs and injury rates among school custodial workers. Ergonomics, 52:6, 723-734.

Washington State Administrative Code 296-126-092. Accessed on July 30, 2013,http://apps.leg.wa.gov/wac/default.aspx?cite=296-126-092

Woods, V, & Bucle P. (2006). Musculoskeletal ill health amongst cleaners and recommendations for work organisational change. *International Journal of Industrial Ergonomics*, 36, 61-72.

Zock, J. P. (2005). World at work: Cleaners. *World at Work*, 581-584.

Appendix: English Janitor Questionnaire

SCHOOL OF PUBLIC HEALTH
UNIVERSITY of WASHINGTON

Department of Environmental and Occupational Health Sciences

Please answer the following questions to the best of your ability. Your answers are confidential and will not be shared with your coworkers or supervisor. You can choose not to answer specific questions. For questions about your work activities and behavior, please tell us what you actually do, not what you are supposed to do.

Today's Date: _____/_____/_____

Time:

Interviewer:

JANITORS WORKLOAD AND HEALTH & SAFETY STUDY

WORK INFORMATION

1.

What is your job? ☐ janitor

2. How many years have you worked at this job?_____Years

3. Which of the following best describes your work schedule at this job?

- ☐ Regular Daytime Schedule
- ☐ Regular Evening Shift
- ☐ Regular Night Shift
- ☐ Rotating Shift (Changes regularly from days to evening or nights)
- ☐ Split Shift (One consisting of two distinct periods
- ☐ Variable Schedule (Changes from day to day)each day)
- ☐ Other

4. Currently, how many jobs do you have as a janitor? _____ jobs

5. Please specify which companies you currently work for.

- ☐ A&A Maintenance Enterprise
- ☐ Able Building Maintenance
- ☐ ABM –King County
- ☐ ABM-Pierce County
- ☐ Allied Building Services
- ☐ Capitol Building Maintenance
- ☐ Cascadian Building Maintenance
- ☐ Evergreen Building Services
- ☐ GCA Services Group
- ☐ Harvard Clean/Maintenance
- ☐ ICTS/Huntleigh
- ☐ Innovative Facility Services
- ☐ MBM (Metropolitan Building)
- ☐ Nationwide Janitorial Services
- ☐ Pacific Building Service
- ☐ Quality Janitorial Services
- ☐ SBM Site Services
- ☐ Seattle Building Maintenance
- ☐ Seattle Maintenance Services
- ☐ Service Point of Seattle
- ☐ Unico Services Co
- ☐ Varsity Contractors

☐ OTHER (please specify names)

_____ _____

_____ _____

6. In what kind(s) of building(s) do you work?

- ☐ Office Buildings
- ☐ Restaurants
- ☐ Large Retail Stores
- ☐ Apartment buildings
- ☐ Small Retail Stores
- ☐ Movie Theaters
- ☐ Educational Buildings
- ☐ Malls
- ☐ Other _____

7. How many janitors currently work in your building(s)? _____ _____ _____ _____ OR

☐ Don't Know

8. Did you work in the same building (s) last year? ____ Yes ____ No IF NO, SKIP to Question 11.

9. How many janitors worked in your building last year? _____ _____ _____ _____ OR

☐ Don't Know

10. Did you work in the same building 2 years ago? ____ Yes ____ No IF NO, SKIP to Question 12.

11. How many janitors worked in your building (s) 2 years ago? _____ _____ _____ _____ OR

☐ Don't Know

12. Do you have another job that is not related to janitorial services? ____ Yes ____ No

13. Are you a member of a union? ____ Yes ____ No

14. If yes, which union?

- ☐ SEIU Local 6
- ☐ WFSE/AFSCME Council 28
- ☐ Other
- ☐ Don't Know

Now we would like to ask questions about your work hours and tasks.

15. How many hours did you get paid for last week? _____ hours

16. How many hours did you work last week? _____ hours

17. How often do you skip breaks or lunch because otherwise you will not get your work done?

- ☐ never or almost never
- ☐ at least once per month
- ☐ at least once per week
- ☐ every day

18. We would like to learn more about the tasks you do at work and the amount of time you spend doing them. Here is a list of tasks. During last week, how many hours did you spend doing the following tasks? We may start with the task that you spent the most time on LAST WEEK.

Cleaning Task	
Dusting and Ledging	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Cleaning Windows	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Polishing Stainless Steel or Brass	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Cleaning White/Chalk Boards	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Cleaning Furniture (tables, desks, chairs)	☐ Zero Hours ☐ 1 to 5 Hours

	☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Moving furniture	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Sweeping/Mopping	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Buffing Floor	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Carpet Shampooing	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Vacuuming	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Collecting Trash Only	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours

	☐ 10 to 20 Hours ☐ More than 20 Hours
Collecting Trash, Recyclables, and Compost	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Sorting Trash,Recyclables, and Compost	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Cleaning Bathroom (sinks, toilets, mirrors, counters, walls)	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Floor Stripping or Waxing	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Office Kitchen Cleaning (e.g., dishes, appliances)	☐ Zero Hours ☐ 1 to 5 Hours ☐ 5 to 10 Hours ☐ 10 to 20 Hours ☐ More than 20 Hours
Other tasks	_____ hours

WORK INTENSITY

We want to ask questions about the intensity of your work.

This number line represents the intensity of janitorial work. It ranges from 0 to 10 with the intensity at 0 being comparable to sitting in a chair, and the intensity at 10 being comparable to running as fast as you can.

19. Please place an X on the line that you think best describes the intensity of your work <u>last week</u> <u>(or the last week that you worked)</u>?

Sitting		Walking			Climbing stairs		Jogging			Running as fast as you can
0	1	2	3	4	5	6	7	8	9	10

20. Please place an X on the line that you think best describes the intensity of your work in a typical week <u>last year</u>.

Sitting		Walking			Climbing stairs		Jogging			Running as fast as you can
0	1	2	3	4	5	6	7	8	9	10

21. Please place an X on the line that you think best describes the intensity of your work in a typical eek 2 's agc

Sitting		Walking			Climbing stairs		Jogging			Running as fast as you can
0	1	2	3	4	5	6	7	8	9	10

CHEMICAL EXPOSURES

W ant t n abo he ch al exp es th e a re r part our j nd th unt t you p m th DURI HE L VEEK mar ys di use llow eani products? Answer each question with the appropriate response: never, less than one day per week, 1-3 days per week, 4-7 days per week.

	Never	Less than one day per week	1-3 days per week	4-7 days per week
22. Liquid multi-use cleaning products	☐	☐	☐	☐
23. Are these chemicals considered “green”, in other words good for the environment and health?	____ Yes	____ No	____ Don’t Know	
24. Sprays from cans for furniture, carpets, oven, air fresheners	☐	☐	☐	☐
25. Bleach	☐	☐	☐	☐
26. Ammonia	☐	☐	☐	☐
27. Acids (toilet bowl cleaners)	☐	☐	☐	☐
28. Solvents, Stain removers	☐	☐	☐	☐
29. Floor Care Products (waxes, polishers)	☐	☐	☐	☐

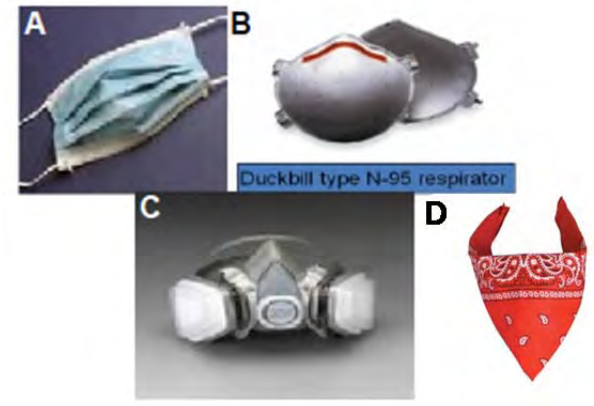
30. Disinfectants (Products that kill germs)	☐	☐	☐	☐

Answer each question with the appropriate response: none, some areas, most areas, all areas.

In how many of your work areas is:	None	Some Areas	Most Areas	All Areas	Don't Know
31. Air movement is good.	☐	☐	☐	☐	☐
32. The ventilation system is turned on when I am in the area.	☐	☐	☐	☐	☐
33. There are windows that can be opened.	☐	☐	☐	☐	☐

Answer each question with the appropriate response: always, most of the time, some of the time, and never.

	Never	Some of the time	Most of the time	Always
34. In the last week, how often did you use gloves when you were cleaning or disinfecting surfaces?	☐	☐	☐	☐
35. If yes, are they latex?	☐ Yes ☐ No ___ don't know			
36. In the last week, how often did you use a face mask, respirator, or bandana when you were cleaning or disinfecting surfaces?	☐	☐	☐	☐
37. If yes, please select the letter that corresponds to the kind you use.	____ A ____ B ____ C ____ D			



ERGONOMIC EXPOSURES

We want to learn about the movements and postures that are a regular part of your job, and the amount of time you perform them. DURING THE LAST WEEK, answer each question with the appropriate response: always, most of the time, some of the time, or never:

	Never	Some of the Days	Most Days	All Days
38. How often do you work with your hands above the head or the elbows above the shoulder for more than 2 hours total per day?	☐	☐	☐	☐
39. How often do you work with your neck or back bent (without support or ability to vary posture) for more than 2 hours total per day?	☐	☐	☐	☐
40. How often do you work squatting or kneeling for more than 2 hours total per day?	☐	☐	☐	☐
41. How often do you work repeating the same motion with your hands, wrists, arms, or shoulders for more than 2 hours total per day?	☐	☐	☐	☐
42. How often do you lift or lower objects above the shoulders or below the knees or while twisting for more than 2 hours total per day?	☐	☐	☐	☐
43. How often do you lift 10 pounds (4.5 kilos) more than twice per minute for more than 2 hours total per day?	☐	☐	☐	☐
44. How often do you lift 50 pounds (22.7 kilos) at least once per day?	☐	☐	☐	☐
45. How often do you carry heavy loads greater than 30 pounds over a distance of 7 feet or more?	☐	☐	☐	☐
46. How often do you push or pull heavy loads?	☐	☐	☐	☐

HEALTH

We would like to ask you some questions about your health. Please answer each question with the appropriate response: excellent, very good, good, fair or poor.

	Poor	Fair	Good	Very Good	Excellent
47. In general, would you say your health is…?	☐	☐	☐	☐	☐
48. In general, how would you say your health was last year?	☐	☐	☐	☐	☐
49. In general, how would you say your health was 2 years ago?	☐	☐	☐	☐	☐

Please rate your ability to do the following activities in the last week by answering the appropriate response. Answer each question with the appropriate response: no difficulty, mild difficulty, moderate difficulty, severe difficulty, or unable.

	No difficulty	Mild Difficulty	Moderate Difficulty	Severe Difficulty	Unable
50. Opening a tight or new jar?	☐	☐	☐	☐	☐
51. Do heavy household chores (e.g., wash walls, floors)	☐	☐	☐	☐	☐
52. Carry a shopping bag or briefcase	☐	☐	☐	☐	☐
53. Wash your back	☐	☐	☐	☐	☐
54. Use knife to cut food	☐	☐	☐	☐	☐
55. Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g., golf, hammering, tennis, etc.)	☐	☐	☐	☐	☐
	Not at all	**Slightly**	**Moderately**	**Quite a Bit**	**Extremely**
56. During the past week, *to what extent* has your arm, shoulder, or hand problem interfered with your normal social activities with family, friends, neighbors or groups?	☐	☐	☐	☐	☐
	Not limited at all	**Slightly limited**	**Moderately limited**	**Very limited**	**Unable**

57. During the past week, were you limited in your work or other regular daily activities with family, friends, neighbors or groups?	☐	☐	☐	☐	☐

Please rate the severity of the following symptoms in the last week.

	None	Mild	Moderate	Severe
58. Arm, shoulder or hand pain	☐	☐	☐	☐
59. Tingling (pins and needles) in your arm, shoulder or hand	☐	☐	☐	☐

Answer each question with the appropriate response: none, mild difficulty, moderate difficulty, severe difficulty, or so much difficulty that I can't sleep.

	No difficulty	Mild difficulty	Moderate difficulty	Severe difficulty	So much difficulty that I can't sleep
60. During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand? (circle one)	☐	☐	☐	☐	☐

Please rate the severity of symptoms at the time you most feel the pain during a typical week. We would like to know if you had these symptoms one week ago, one year ago and 2 years ago. Answer each question with the appropriate response: none, mild, moderate, and severe..

	None	Mild	Moderate	Severe
61. Please rate the severity of back pain in the last week.	☐	☐	☐	☐
62. Please rate the severity of back pain last year.	☐	☐	☐	☐
63. Please rate the severity of back pain 2 years ago.	☐	☐	☐	☐
We will now ask about the pain in your legs.				
64. Please rate the severity of leg pain in the last week.	☐	☐	☐	☐
65. Please rate the severity of leg pain last year.	☐	☐	☐	☐
66. Please rate the severity of leg pain 2 years ago.	☐	☐	☐	☐
We will ask now about the pain in your arm, shoulder, or hand				
67. Please rate the severity of arm, shoulder or hand pain in the last week.	☐	☐	☐	☐
68. Please rate the severity of arm, shoulder or hand pain last year.	☐	☐	☐	☐
69. Please rate the severity of arm, shoulder or hand pain 2 years ago.	☐	☐	☐	☐
We would like to know about the severity of stress you feel at work during a typical week.				
70. Please rate the severity of stress in the last week.	☐	☐	☐	☐
71. Please rate the severity of stress last year.	☐	☐	☐	☐
72. Please rate the severity of stress 2 years ago.	☐	☐	☐	☐

We would like to ask you questions about your health.
In the last 12 months, have you had . . .

	Yes	No	Don't Know
73. Skin rashes, itching, or redness on hands or arms that last more than one week?	☐	☐	☐
74. Skin chapping or cracking on hands or arms that last more than one week?	☐	☐	☐
75. Ever gotten hives (red or white bumps) that itch?	☐	☐	☐
76. Any nasal allergies, including hay fever?	☐	☐	☐
77. Sinusitis or sinus problems?	☐	☐	☐
78. Cough?	☐	☐	☐
79. Chest tightness?	☐	☐	☐

80. Woken up with coughing or feeling tightness in your chest or shortness of breath?	☐	☐	☐
81. Wheezing or whistling in your chest?	☐	☐	☐
82. Have you ever been told by a doctor, nurse, or other health professional that you had asthma?	☐	☐	☐
83. Do you currently smoke cigarettes?	☐	☐	
84. Have smoked 100+ cigarettes in your lifetime?	☐	☐	

Answer each question with the appropriate response: never, rarely, sometimes, often or very often.

	Never	Rarely	Sometimes	Often	Very Often
85. How often during the past 4 weeks did you get enough sleep to feel rested upon waking up?	☐	☐	☐	☐	☐
86. Over the past 4 weeks, what time did you usually turn the lights off to go to sleep?	_____ ☐ am ☐ pm				
87. Over the past 4 weeks, what time did you usually get out of bed?	_____ ☐ am ☐ pm				

Answer each question with the appropriate response: never, less than once a week, once or twice a week, or three or more times a week.

	Never	Less Than Once a Week	Once or Twice a Week	Three or More Times a Week
88. During the past 4 weeks, how often could you not get to sleep within 30 minutes?	☐	☐	☐	☐
89. During the past 4 weeks, how often did you wake up during your sleep?	☐	☐	☐	☐
90. During the past 4 weeks, how often did you take naps during your waking period?	☐	☐	☐	☐

We would like to learn more about any injuries and accidents you have had at work.

91. How many times were you injured at work <u>this year</u>? (An injury is when you had first aid or time off from work even if you didn't tell anyone)	☐ 0 ☐ 1 ☐ >2 _____don't know
92. How many days total did your injury or injuries this year affect your ability to do your work?	_____days _____don't know
93. How many times were you injured at work <u>one year ago</u>? (An injury is when you received first aid or time off from work even if you didn't tell anyone)	☐ 0 ☐ 1 ☐ >2 _____don't know

94. How many days total did your injury or injuries one year ago affect your ability to do your work?	_____days _____don't know
95. How many times were you injured at work 2 years ago? (An injury is when you received first aid or time off from work even if you didn't tell anyone)	☐ 0 ☐ 1 ☐ >2 _____don't know
96. How many days total did your injury or injuries 2 years ago affect your ability to do your work?	_____days _____don't know

PSYCHOSOCIAL STRESSORS

We would like to learn more about the interaction you have with supervisors, your job requirements, and how your job impacts time with your family or personal duties. Answer each question with the appropriate response: strongly disagree, disagree, neutral, agree, or strongly agree:

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
97.	**Management places safety before production**	☐	☐	☐	☐	☐
98.	**My boss ridicules me.**	☐	☐	☐	☐	☐
99.	**My boss tells me my thoughts or feelings are stupid.**	☐	☐	☐	☐	☐
100.	**My boss tells me I'm incompetent.**	☐	☐	☐	☐	☐
101.	**Your race/ethnicity is a factor in how you are treated at work.**	☐	☐	☐	☐	☐
102.	**The demands of your work interfere with your family or personal time.**	☐	☐	☐	☐	☐
103.	**The amount of time your job takes up makes it difficult to fulfill your family or personal responsibilities.**	☐	☐	☐	☐	☐
104.	**Things you want to do at home do not get done because of the demands your job puts on you.**	☐	☐	☐	☐	☐
105.	**Your job produces strain that makes it difficult to fulfill your family or personal duties.**	☐	☐	☐	☐	☐
106.	**Due to your work-related duties, you have to make changes to your plans for family or personal activities.**	☐	☐	☐	☐	☐

	Strongly Disagree	Disagree	Agree	Strongly Agree

107. I do not have enough time to get my job done.	☐	☐	☐	☐
108. My job requires very fast work.	☐	☐	☐	☐
109. My job requires very hard work.	☐	☐	☐	☐
110. My job requires excessive work.	☐	☐	☐	☐
111. My job involves conflicting demands.	☐	☐	☐	☐
112. On my job, I have very little freedom to decide how I do my work.	☐	☐	☐	☐
113. I have a lot of say about what happens on my job.	☐	☐	☐	☐
114. My job allows me to make a lot of decisions on my own.	☐	☐	☐	☐

115. Thinking about the next 12 months, how likely do you think it is that you will lose your job or be laid off?

- ☐ Very likely
- ☐ Fairly likely
- ☐ Not too likely
- ☐ Not at all likely
- ☐ Will voluntarily leave company in next 12 months

116. How easy would it be for you to find a job with another employer with approximately the same income and fringe benefits as you have now?

- ☐ Very easy
- ☐ Somewhat easy
- ☐ Not easy at all

DEMOGRAPHICS

117. In what year were you born? Year: _____

118. In what country were you born? _____ _____

119. How many years have you lived in the United States? _____ years

120. How would you describe your race?	☐ Hispanic ☐ Asian Indian ☐ White ☐ Other Asian ☐ American Indian or Alaskan Native ☐ Black or African American ☐ Other Pacific Islander ☐ Other Race If other, please specify: _____
121. What is your gender?	☐ Male ☐ Female
122. What is the highest level of formal schooling you have completed?	☐ Less than high school ☐ Finished high school or GED ☐ Some college ☐ Finished college ☐ Trade/vocational school
123. How many people live in your home (adults and children)?	_____
124. How many people have jobs that live in your home?	_____
125. What language do you commonly speak at home?	☐ English ☐ Spanish ☐ Russian ☐ Vietnamese ☐ Other_____
126. How comfortable are you <u>speaking</u> English?	☐ Not comfortable at all ☐ Somewhat comfortable ☐ Comfortable ☐ Very comfortable

THANK YOU VERY MUCH FOR YOUR PARTICIPATION!