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Characterizing the Low Wage Immigrant Workforce: A Comparative Analysis of the Health Disparities Among Selected Occupations in Somerville, Massachusetts

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Background *This study estimates job-related risks among common low wage occupations (cleaning, construction, food service, cashier/baggers, and factory workers) held by predominantly Haitian, El Salvadorian, and Brazilian immigrants living or working in Somerville, Massachusetts.*

Methods *A community-based cross-sectional survey on immigrant occupational health was conducted between 2006 and 2009 and logistic regression was used to assess the job-related risks among the most common low wage occupations.*

Results *Construction workers reported significantly higher health risks, and lower access to occupational health services than the other occupations. Compared to cashier/baggers, the reference population in this study, cleaners reported significantly lower access to health and safety and work training and no knowledge of workers' compensation. Factory workers reported significantly lower work training compared to cashier/baggers. Food service workers reported the least access to doctors compared to the other occupations.*

Conclusion *We found significant variability in risks among different low wage immigrant occupations. The type of occupation independently contributed to varying levels of risks among these jobs. We believe our findings to be conservative and recommend additional inquiry aimed at assuring the representativeness of our findings.* Am. J. Ind. Med. 57:516–526, 2014. © *2013 Wiley Periodicals, Inc.*

KEY WORDS: immigrant health; occupational health; construction workers; cleaners; factory workers; community based participatory research

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INTRODUCTION

Macro-forces in the political economy of work and other socio-cultural factors have resulted in the creation of a number of ethnic and ''racial job ghettos'' [Murray, 2003]. For minority and immigrant workers these niches have predominantly been in low wage, labor-intensive, high-risk jobs [Brunette, 2005; McCauley, 2005; Lipscomb et al., 2006]. These occupational sectors are relatively ''frictionless space'' based on ethnic background, number of years in the US, English proficiency, education and the presence of social networks [Parks, 2004; Ellis et al., 2007]. Common occupational niches among low-income immigrant workers include cleaning and maintenance, production, transportation, construction, and food service in urban areas and mining and agriculture in non-urban settings [Pransky et al., 2002; Moure-Eraso and Friedman-Jimenez, 2004; Cho et al., 2007; Mulloy et al., 2007].

U.S. Bureau of Labor Statistics (BLS) data show that the number of fatal work injuries for Hispanic or Latino workers rose by 4% and identified manufacturing, construction, agriculture, and service as the most hazardous sector with a higher incidence of non-fatal occupational injuries in the US in 2010 [BLS, 2011]. Many studies have reported similar results that the occupations populated with high concentrations of immigrant workers have greater exposure to physical, chemical, biological, and social hazards in the workplace [Webster, 2001; Pransky et al., 2002; Quandt et al., 2004; Krieger et al., 2006; Barbeau et al., 2007; Dong et al., 2009; Zock et al., 2009].

Low wage occupational groups are difficult to study. National datasets and Workers' Compensation claims often do not report occupational injuries and illnesses among low wage occupational groups [Azaroff et al., 2004]. Many of the low wage immigrant jobs are precarious, decentralized and not concentrated in specific industries that are regulated. Some of the incumbents in these occupations are undocumented and define themselves as either self-employed or unemployed, or working on multiple temporary jobs with long work hours. These workers do not qualify for the benefits of full time employment and work protection and are mostly paid in cash on a weekly or even daily basis [Clinton, 1997; NIOSH, 2002; Tompa et al., 2007; Barten et al., 2008]. The highly fluid work settings among the low wage jobs make occupational monitoring and access to these immigrant workers difficult. This greatly complicates the understanding of the occupational hazards in this workforce. A concurrent analysis of common low wage jobs in a specific social milieu across major immigrant populations has largely been absent from the occupational health literature. Community based study models have shown to offer greater reliability for accessing such hard to reach minority populations by performing research in partnership with community groups that provide services to these populations [Minkler and Wallerstein, 2003; Minkler et al., 2010].

A community-based participatory research (CBPR) model was used in the current work to conduct a cross-sectional occupational health survey among self-identified immigrant workers in Somerville, MA between 2006 and 2009. Common occupations reported in this survey included cleaning, construction work, food service work, cashier/baggers, and factory-related workers. This study is unique in concurrently assessing risks in three predominant immigrant populations, Haitians, Brazilians, and Salvadorian associated with low wage occupations s in Somerville, MA. The identification of self-reported health disparities within and between these low skilled occupations is the main objective of our analysis.

METHODS

Study Setting

This study estimates job-related risks among the most common low wage immigrant occupations as represented in our survey responses conducted in Somerville, Massachusetts; a ''continuous gateway community'' where roughly a quarter of the population is composed of immigrants [US Census, 2010]. Massachusetts is more dependent on new immigrants for population and labor force growth than the nation as a whole [Sum et al., 2006]. New immigrants in Massachusetts are employed in professional and scientific work and in occupations such as cleaning, food service work, personal care, and sales work to a greater extent than found in the rest of the nation [ILC, 2009]. Nearly, a quarter of the new immigrants in Massachusetts work in the service industry [Sum et al., 2006]. The Immigrant Learning Center ILC [2009] report shows that new immigrants are over three times more likely to be represented in cleaning occupations, and over two times more likely to be in food service occupations, construction, and production-related jobs than the native born population. Hunt et al. [2005] shows that the most common immigrant jobs reported in Massachusetts are construction, cleaning, restaurant work, cashiers, nursing aides, and machine operators.

Study Design and Data Collection

We employed a survey instrument developed and administered by bilingual Teen Educators to assess occupational health risks among self-identified immigrants living or working in Somerville, Massachusetts [Panikkar et al., 2012]. The Teen Educators were a group of 22 middle and high school students who were bi-lingual in the target

languages [Spanish and Haitian Creole], trained in occupational health and safety principles and interview technique, and supervised by staff of our community partners. Surveys for respondents requiring Portuguese were performed by Tufts University students.

The survey comprised 23 questions that assessed socio-demographic details of the participants, their occupational backgrounds and the self-perceived and self-reported health outcomes and hazard details related to employment. The demographic variables included country of birth, years in the US, English proficiency, sex, and age. The occupational variables included type of work, and occupational classification. Access to health variables included work training, health and safety training, knowledge of the existence of Workers' Compensation, as well as having health insurance and a doctor. The health risk variables were all self-reported and included hazards at work, injuries suffered at work, and health problems due to work.

The study participants were 18 years of age or older. The surveys were administered in conjunction with events sponsored by partnering community-based organizations [the Haitian Coalition, the Immigrant Service Providers Group/Health (ISPG/H) and the Community Action Agency of Somerville (CAAS), or at health fairs held in Somerville]. A total of 405 surveys were completed between 2006 and 2009. In this study we examined the most common low wage occupations as reported by the survey participants. The majority of the respondents (80%) disclosed their occupation. A few people (3%) did not disclose what their primary or secondary occupation was and 17% reported being unemployed. We used the 2007 Bureau of Labor Statistics (BLS) Occupational Classification System to code the occupational title. The coding of occupation posed certain challenges. Some of these challenges are generic to the process and some of which are more specific to immigrant working populations. Generic issues were found in how respondents answered open-ended questions such as, ''What is your primary job?' Some survey respondents only identified the name of the company, restaurant, or the task they did such as ''waiting on tables'' or ''washing.'' The occupation was ascertained, in those cases, through the use of additional detail captured in other occupation-related questions as well as by benefitting from the local knowledge supplied in part by the community partners to identify named business organization as to type and industry. Although the occupational classification system offered an exhaustive range of categories, it was necessary to create an additional set of a priori project-specific codes to capture the desired information. For example, in the occupational classification system devised by the BLS no codes were found for baggers. Since most of the baggers work in retail industry and also work as cashiers, we have grouped them with cashiers, although these two occupational titles comprise different work tasks. Respondents who specified working in a packaging company as packers were categorized under the category of ''factory workers'' as they work in factory and production settings.

We also combined occupations that are related and have similar job-related exposures such as construction and maintenance work related to construction; and factory-related work and machine related in production-based work. Additionally, over 20% of the workers reported having more than one employer or reported a secondary occupation. We also observed that some who work as day laborers also reported being unemployed, some who worked as cleaners reported it as a self-employment. We have categorized the occupation based on the primary occupation reported by the participants.

We also coded the open-ended question of self-reported hazards at work and health problems due to work to be included in our descriptive analysis and these were grouped together into the following categories: allergies, physical, chemical, musculoskeletal, and psychological hazards. Further categorization of variables can be found in Table I.

The analysis reported here are based on a sample of 212 workers after excluding: respondents who reported being born in the United States (N = 54) and all occupations besides cleaning, construction work, food service work, cashier/baggers, and factory related workers (n = 132). All questions reported here are based on this sample of 212, except the variable ''Do you have a doctor?'', which is based on a sample of 127 responses. This question was added at the end of the second year of survey administration to assist in the planning of the occupational health fairs and since it is pertinent to understanding the participants' access to health services, we have included it in this analysis.

The survey questionnaires and all study procedures were reviewed and approved by the Tufts University Social, Behavioral and Educational Institutional Review Board (IRB). All participants in the survey provided oral consent to participate. No names were ascertained nor was documentation status asked.

Data Analysis

The survey data were analyzed using the statistical software, SPSS 17.0. Descriptive analysis consisted of cross tabulations and chi square statistics, to explore the patterns of occupational health risk in each of the occupational groups of cleaning, construction work, food service work, cashier/baggers, and factory workers.

Further, a series of logistic regressions to determine odds ratios (ORs) and 95% confidence intervals (95%CIs) were conducted to assess predictors of health outcomes

TABLE I. Analysis of Low Wage Occupations and Demographics, Occupation, Access to Occupational Health and Safety and Health Outcomes

	Cashier/bagger (%)	Cleaner (%)	Construction worker (%)	Factory worker (%)	Food service (%)
Country of birth (n = 212)					
Haiti	10 (36)	13 (21)	2 (4)	6 (17)	10 (32)
El Salvador	3 (11)	16 (26)	4 (7)	21 (60)	9 (29)
Brazil	4 (14)	30 (48)	43 (77)	2 (6)	0
Other-Hispanic	3 (11)	2 (3)	4 (7)	3 (9)	6 (19)
Other	8 (29)	19 (2)	3 (5)	3 (9)	6 (19)
Years in the US					
1–3 years	5 (18)	9 (15)	24 (44)	1 (3)	2 (7)
4–9 years	18 (64)	26 (42)	25 (46)	11 (31)	10 (33)
10–15 years	4 (14)	17 (27)	4 (7)	10 (29)	13 (43)
>15 years	1 (4)	10 (16)	1 (2)	13 (37)	5 (17)
English skill					
Yes	18 (64)	28 (45)	21 (37)	17 (49)	23 (74)
Sex					
Male	10 (36)	10 (16)	54 (96)	13 (42)	20 (69)
Age					
<45	26 (93)	42 (68)	47 (87)	22 (63)	22 (71)
Who do you work for?					
One regular employer	19 (70)	37 (62)	27 (48)	22 (67%)	21 (70)
Many employers	7 (26)	5 (8)	17 (30)	3 (9)	7 (23)
Self employed	1 (4)	16 (27)	7 (12)	2 (6)	0
Unemployed	0	2 (3)	5 (9)	6 (18)	2 (7)
Work training					
Yes	24 (86)	27 (48)	16 (30)	20 (59)	23 (74)
Health and safety training					
Yes	18 (67)	23 (40)	13 (25)	15 (44)	23 (74)
MA Workers' Compensation laws					
Yes	17 (68)	20 (33)	10 (20)	13 (41)	17 (55)
Health insurance					
Yes	17 (63)	33 (57)	9 (17)	20 (57)	15 (58)
Access to doctor (n = 127)					
Yes	19 (95)	24 (77)	9 (38)	22 (81)	12 (60)
Hazards at work					
Yes	9 (38)	30 (52)	31 (60)	16 (47)	15 (54)
Health problems due to work					
Yes	2 (10)	11 (35)	10 (40)	7 (27)	2 (10)
Injuries at work					
Yes	2 (8)	20 (34)	24 (44)	9 (28)	9 (31)

and access to occupational health services between these occupations. Three health outcomes variables were assessed: (1) Self perceived and reported hazards at work, (2) Self perceived and reported health problems due to work, (3) Self reported injuries suffered at work. The access to occupational health variables included: (1) Work training, (2) Health and safety training, (3) Knowledge of the Massachusetts Workers' Compensation Law, (4) Presence of health insurance, and (5) Having a doctor. These analyses were controlled for years in the US (if they are recent or established immigrants), English proficiency, age (workers under the age of 45 vs. older than 45), and sex. A recent immigrant is an immigrant who has been in the United States for <10 years and an established immigrant is an immigrant who has been in the US for 10 years or more.

Cashier/baggers are the reference group in each model. This selection is predicated on the observation that the occupational category of cashier/baggers had the least occupational health burden as demonstrated in our descriptive analysis (Table I).

RESULTS

A total of 212 cases were coded for this occupational comparative analysis. The five most common low wage occupations among immigrants were cleaning (n = 62, 29%), construction (n = 56, 26%), food service (n = 31, 15%), factory and machine workers (n = 35, 16%), and cashiers and baggers (n = 28, 13%).

Cashier/Baggers

The subjects who are listed as cashier/bagger described themselves as either cashiers, taking care of customers, as working at the cash register, or as a bagger or packer in a retail sector. Some of the respondents performed both activities. In this study most of the cashier/baggers were from Haiti. Cashier/baggers had better English proficiency than cleaners, construction workers, and factory workers. Over half of the cashier/baggers were proficient in English, were female and young with 61% of this group between the ages of 18–20.

The majority of the cashiers worked for one regular employer (70%). Cashier/baggers reported the most access to occupational health services (work training, knowledge of Workers' Compensation, health insurance, and having a doctor) and the least occupational health risks (Hazards at work, health problems due to work and injuries related to work) compared to other occupations in this analysis (see Table I). However the cashier/baggers reported receiving slightly lower health and safety training than food service workers. Descriptions of hazards at work among cashiers/baggers included heavy lifting. Self reported health problems included musculoskeletal problems such as wrist pain and back pain, and allergies (Table II).

Cleaners

Those who reported cleaning as their primary occupation in the survey cleaned in a variety of settings such as homes, hospitals, hotels, offices, restaurants, laboratories, and construction sites. A large portion of the respondents in the cleaning industry were from Brazil (48%). Women (84%) dominated the job category. There was also a gender difference in the cleaning operations performed by males and females. While more women cleaned homes and offices, men worked as janitors and also did cleaning related to construction work. It is not unusual to find construction workers in cleaning jobs in the winter when construction work is slow.

While most of the cleaners had a single employer, over a quarter of the cleaners were self employed. Some of the cleaners also had a second job, most commonly in construction, and as a baby sitter. Cleaners were less likely to have received work training, health and safety training, have knowledge of Workers' Compensation, health insurance or access to a doctor compared to cashiers, food service workers and factory workers (see the demographic, occupational and health characteristics of cleaners in Table I).

About half of the cleaners reported hazards at work, 35% reported health problems due to work, and 34% reported injuries at work, higher than the reports among cashiers, factory workers and food service workers. Reported hazards at work included exposure to chemicals, musculoskeletal problems from lifting beds and heavy objects, and other physical hazards including slips and falls from wet floors or needles in the trash. The self-reported health problems among cleaners included back, neck and shoulder pain, body pain, skin rash, nose bleeds, depression, stress, and throat irritation. Table II shows that half of the chemical hazards reported were among cleaners. Highest reports of allergies, musculoskeletal problems and psychological hazards were also reported by cleaners. Cleaners reported the least physical hazards compared to other occupations.

TABLE II. Prevalence of the Major Self Reported Hazards Among Self-Identified Immigrant Workers: Somerville, Massachusetts 2006–2009

Occupation	Physical hazards (%)	Chemical hazards (%)	Musculoskeletal problems (%)	Psychological hazards (%)	Allergies (%)
Cashier/bagger	11	4	21	0	14
Cleaner	4	49	40	40	43
Construction worker	39	25	33	25	29
Food service worker	30	5	21	20	0
Factory worker	15	16	38	40	14

Construction

Construction workers included respondents who worked in such job categories as carpentry, construction, painting, cutting wood and metal, manual labor, maintenance, and demolition. Over 75% of the respondents in the construction sector were from Brazil. The majority of these workers were recent immigrants, only 9% of the construction workers have been in the US for over 10 years. Construction respondents were largely male (97%) and spoke little English (37%).

Close to half of the construction workers had a single employer, 30% reported having multiple employers, 12% reported being self employed and 9% reported being unemployed but still indicated working in construction. Construction workers in this survey also received the lowest amount of work training, health and safety training, had little knowledge of Workers' Compensation, health insurance and access to a doctor compared to other occupations analyzed in this survey. The few (17%) who reported having health insurance reflected a range of specific types of access ranging from MassHealth to free care.[1]

Construction workers reported the highest health risks (self-reported hazards, health problems, and injuries related to work) than other occupations analyzed in this survey. Hazards at work ranged from working in high places (elevation), exposure to paints/chemicals, cutting tools, falls from ladders and roof, heavy lifting, and shoulder pain. Health problems reported as due to work included allergies, back pain, high blood pressure, breathing problems, and cuts that required surgery because of failure to treat them in a timely manner. Other health issues included emotional problems, headaches, and jaw and tooth pain. Construction workers reported more physical hazards than other occupations as well as reporting higher levels of chemical hazards and allergies than food service workers, cashiers, and factory workers (Table II). In addition a greater number of emergency department visits were noted among construction workers than reported among the other occupations.

Food Service

The major work tasks of respondents in this industry included baking, cooking, serving, and waitressing in a variety of locations including restaurants, hotels, hospitals, and school cafeterias. The majority of food service workers in the study were Haitians (32%) and Salvadorians (29%). The majority of the respondents in the food service industry (60%) have also been in the US for over 10 years. Close to three quarters of the food service workers were proficient in English and this population was largely male (69%; Table I).

The majority of the food service workers had a single employer, 23% had many employers, a slightly larger percentage than for the cleaners and factory workers. Food service workers reported better work training, health and safety training, knowledge of Workers' Compensation, after cashiers. However, the food service workers had comparable levels of health insurance to cleaners and factory workers and had the lowest access to a doctor than the other groups.

Over half of the participants in the food service industry reported hazards at work, roughly equal to the reports among construction workers. Only 9% of the food service workers reported health problems due to work, which was just slightly lower than the cashiers, but 31% of the food service workers reported injuries comparable to the other occupations such as cleaners and factory workers. The food service respondents described a variety of job-related hazards including cleaning products and physical hazards such as burns, cuts, exposure to cold temperatures, hazards related to operating machines, fire, hot oil, and wet floor. Food service workers reported a high prevalence of physical hazards compared to cleaners, factory workers, and cashiers. They also reported musculoskeletal problems and psychological hazards but these were lower than reports from other occupations except cashiers/baggers (Table II).

Factory- and Machine-Related Work

The respondents who are listed as factory-related workers described doing machine work, working for large packaging companies, recycling companies, or doing repetitive work such as separating or folding clothes at commercial laundries. Over half of the factory workers were from El Salvador (60%) and 17% were from Haiti. Factory workers, as a group, reported being in the US the longest as compared to the other groups of workers. However, only half of the factory related workers (49%) were proficient in English, while 74% of the food service workers and 64% of the cashiers who are more recent immigrants were proficient in English. The majority of factory-related workers were female (58%).

Most (67%) of the factory-related workers had a single employer or a single job. The factory workers reported better work training, health and safety training, and knowledge of Workers' Compensation than cleaners and construction workers and comparable health insurance as

[1] MassHealth is a program that provides free health insurance to eligible low and moderate income families and individuals. The national health insurance program called Medicaid, and the Children's Health Insurance Program (CHIP) are combined in one program in Massachusetts called MassHealth. The Federal government pays half of the cost of MassHealth and the state government pays most of the rest. Proof of immigration status is required to obtain MassHealth. Non immigrants and undocumented may obtain MassHealth Limited which covers only emergency medical expenses (MassResources, 2011).

cleaners. Close to half (47%) of the factory workers reported hazards at work, 27% reported health problems at work, and 28% reported injuries at work. Hazards at work included work pressure, injury from sharp objects, bleach, and other cleaning chemicals. Factory workers, like cleaners, reported the highest prevalence of psychological hazards resulting from stress, and work pressure. They also reported higher musculoskeletal problems than construction workers, food service workers, and cashier/baggers (Table II). The self reported health problems ranged from back pain, to skin problems, stress, headaches, foot problems and aches, and high blood pressure.

Multivariate Analysis

Access to occupational health services by occupation

Construction workers, cleaners, and factory worker had significantly lower access to occupational health services than cashier/baggers. Construction workers had the least access to occupational health services. The observed health disparities persisted even when the results below were controlled for number of years in the US, English proficiency, sex, and age.

No work training. Table III shows that compared to cashiers/baggers, cleaners (OR: 8.3, 95% CI: 2.4–29.0) were 8 times, construction workers were 14 times (OR: 13.9, 95% CI: 3.3–57.8), and factory related workers were 5 times more likely (OR: 5.0, 95% CI: 1.3–19.5) to have had no work training.

No health and safety training. Table III shows that after controlling for the number of years in the US, English proficiency age, and sex the odds of not receiving health and safety training were three times higher for cleaners (OR: 3.0, 95% CI: 1.1–8.5) and over six times higher for construction workers (OR: 6.4, 95% CI: 1.8–22). Food service workers were more likely to have received health and safety training than cashiers/baggers.

No workers' compensation. Table III shows that Construction workers were over seven times more likely (OR: 7.3, 95% CI: 1.9–27.2), and cleaners were over four times more likely to not know about Workers' Compensation than cashiers/baggers (OR: 4.5, 95% CI: 1.5–13.5).

No health insurance. Table III shows that construction workers were over six times more likely (OR: 6.2, 95% CI: 1.8–21.4) to have no health insurance than cashiers/baggers.

No access to doctor. Table III shows that construction workers were 14 times (OR: 14.4, 95% CI: 1.4–144.1) and food service workers were 17 times (OR: 17.0, 95% CI: 1.7–172.7) more likely to have no doctor than cashiers/baggers.

Occupational health risks by occupation

Table III shows that after controlling for years in the US, English proficiency, sex, and age construction workers were over nine times more likely to report health problems due to work (OR: 9.0, 95% CI: 1.2–71.1) and over nine times more likely (OR: 9.8, 95% CI: 1.7–57.3) to report injuries at work than cashiers/baggers. No other statistically significant difference in health problems were noted among other occupations. There were also no significant differences observed for hazards at work between occupations.

DISCUSSION

The study provides a cross-sectional assessment of the five predominant low wage occupations performed by self-identified immigrant workers for three ethnic sub populations living and working in Somerville, MA. We consider the results reported here to be exploratory in nature. This study's strength is found in its concurrent descriptive analysis of the five dominant low wage occupations in one

TABLE III. Logistic Regression Results of Access to Occupational Health Services and Health Outcomes Among Low Wage Occupations Among Immigrant Population in Somerville, MA

	Cashier/bagger	Cleaner	Construction worker	Factory worker	Food service
No work training	Ref	8.3 (2.4–29.0)	13.9 (3.3–57.8)	5.0 (1.3–19.5)	1.5 (0.36–6.5)
No health and safety training	Ref	3.0 (1.1–8.5)	6.4 (1.8–22.1)	2.5 (0.79–8.2)	0.66 (0.19–2.3)
No knowledge of workers comp	Ref	4.5 (1.5–13.5)	7.3 (1.9–27.2)	3.0 (0.9–10.3)	2.1 (0.63–6.9)
No health insurance	Ref	2.1 (0.73–5.8)	6.2 (1.8–21.4)	2.1 (0.64–6.7)	1.7 (0.53–5.9)
No access to doctor	Ref	5.0 (0.52–48.8)	14.4 (1.4–144.1)	3.1 (0.289–34.8)	17.0 (1.7–172.7)
Hazards at work	Ref	1.5 (0.52–4.0)	3.0 (0.88–10.3)	1.3 (0.41–4.3)	2.2 (0.64–7.7)
Health problems due to work	Ref	3.9 (0.70–21.6)	9.0 (1.2–71.1)	3.3 (0.54–20.7)	1.2 (0.13–11.6)
Injuries at work	Ref	3.9 (0.80–19.4)	9.8 (1.7–57.3)	3.5 (0.62–19.9)	4.4 (0.76–25.6)

Note: All analyses control for English language skill, sex, age, and years in the US.

city that included the major immigrant populations. Such a perspective carries real benefit in informing the design of appropriate interventions at the community scale.

Our data finds that 44% of construction workers self reported injuries. Corresponding results were 34% among cleaners, 28% among factory workers, and 31% among food service related workers. This overall result was consistent with the Collaboration for Better Work Environment for Brazilians [COBWEB, 2007] workers study conducted in Massachusetts, which showed that construction workers were the most affected by work-related injuries and diseases accounting for 45% of the cases. Janitors and housecleaners, landscapers, and food and restaurant workers (cooks, dishwashers, and bakers) represented 26.5% of the work-related injuries cases in this study which is comparable to our results. The lack of factory related workers in the COBWEB report is also consistent with the smaller number of Brazilians working in this occupation in the Somerville sample.

The results in our study show that construction related occupations are a high-risk category [Panikkar et al., 2012]. Many of the comparative occupational studies that record fatal occupational injuries show that construction workers suffer a larger number of occupational injuries, illness, and fatalities as compared to other industrial sectors [Buskin and Paulozzi, 1984; Ringen et al., 1998]. Sorock et al. [1993] reported a threefold increase of fatal injury in the construction industry compared to all the other industries. The highest risk was found to be among Hispanic construction workers when compared to other ethnic/racial groups [Sorock et al., 1993; Anderson et al., 2000; Fabrega and Starkey, 2001; Brunette, 2004]. Other studies have shown that Hispanic construction workers are more likely to be male, of relatively younger age on average, and more recently arrived in the US [Fabrega and Starkey, 2001; Dong and Platner, 2004]. These findings were also reached by our study. Also consistent with our study Waehrer et al. [2007] showed that the construction sector demonstrated a high percentage of temporary or contract workers.

Previous studies have also suggested that language barriers and training may be significant factors that contribute to the burden of occupational risks seen among immigrant construction workers [Sorock et al., 1993; Platner and Dong, 2001; Dong and Platner, 2004]). In our sample, Brazilian men, who were the most recent immigrants and were the least proficient in English, dominated the construction industry a finding that is consistent with the COBWEB study [2007], Marcelli et al. [2009], and Siqueria and de Lourenco [2006].

Equally important are alternative observations of poor access to occupational health services (work training, health and safety training, knowledge of workers compensation) among cleaners in this study compared to cashiers/baggers. In Massachusetts, cleaning has been identified as one of the leading occupations among both Brazilians and Hispanics [Panikkar et al. 2012; Hunt et al., 2005; COBWEB, 2007; MADPH, 2007]. Higher rates of cleaners in either self employment or working on a contract basis with multiple employers and self reported high health risks among cleaners have been observed in other studies by Mattingly [1999]; Lee and Krause [2002, 2010]; and Buchanan et al. [2009]. The self reported major hazards in our study included exposure to chemicals, musculoskeletal problems and psychological hazards which were also recorded in Buchanan et al. [2009] and Ahonen et al. [2010]. Self reported use of bleach and Clorox in our study is also shown by Zock et al. [2007, 2009] to be associated with respiratory tract symptoms. Consistent with this observation, a few cases of breathing problems, allergies and skin problems were also noted in our study. Studies show that access to occupational health resources such as work training, health and safety training, knowledge of Worker's Compensation, are generally lower in service workers, machine operators and laborers as the population in our study [COBWEB, 2007; MADPH, 2007]. However, cleaners in our study had better access to doctors than construction workers and food service workers which could be because the cleaning industry is dominated by women who, in general, access health services more than men [Kosiak et al., 2006].

Studies conducted among food service workers are few. Most food service workers in this study were from Haiti and El Salvador as was also reported by Hunt et al. [2005]. Previous reports concerning immigrant restaurant workers show musculoskeletal sprains, strains, numbness, tears, cuts, burns, and falls as in our study [Webster, 2001; Tsai, 2009]. An interesting finding that was not statistically significant was that food service workers received better health and safety training (74%) than the rest of the low wage occupations. This may be due to the strict sanitation codes and routine health inspections by the local health departments in Massachusetts at retail and food service establishments. However food service workers were less likely to report having a doctor, only 60% of this group had a doctor compared to 95% of cashiers, 81%, of factory workers, and 77% of cleaners. Poor access to doctors despite better work and health and safety trainings among food service workers compared to the other occupations in this study warrants further investigation.

Little is known about immigrant factory/machine workers and cashier/baggers in Massachusetts which makes it difficult to compare our results with other occupational groups. Contrary to what one might think, factory workers had poor work training and less knowledge of workers compensation compared to cashiers, a finding that requires further investigation. Cashiers within this group

had better access to occupational health services and lower injuries and hazards than the other occupations. It is possible that the ethnic makeup (largely Haitians and Asians) or age (predominantly under 18 population) of this occupation may explain this distinction.

While all the jobs observed here are low income jobs, this comparative study shows that there are significant differences between low wage occupations in their occupational health experiences. We recommend further research among these less studied occupations such as food service workers, cashiers, cleaners, and factory workers.

Limitations of Study

This pilot study has some major shortcomings due to small sample size and the accompanying lack of precision. The width of 95% CIs complicates the interpretation of some of the results. However, this study represents a group of low income jobs that has been traditionally hard to access and research as most of these jobs are unstable and are seldom permanent. Many of these jobs are primarily composed of newer immigrants, some of whom are undocumented. Under these circumstances, obtaining a representative sample of the population in these small scale low wage industries such as cleaning, construction, food service, cashiers and baggers and factory, machine and maintenance workers is a challenge. Another problem that is inherent in studying such groups where the workers are easily replaced is that it is hard to associate a particular risk to an occupation unless you also capture occupational history. Between 20% and 50% of the respondents in these occupations have multiple employers. Some of the workers do perform different kinds of jobs, and often do not have one primary occupation or there is little distinction between their secondary occupation and primary occupation. We noted that some people who worked as day laborers were not entirely sure how to list their occupational status and in a number of places listed themselves as either unemployed or self employed. These occupations are also highly cyclical and dependent on the economy and season of the year. Hence associating a particular occupation to specific health outcomes is difficult particularly for immigrant workers because of the number of jobs they perform and the transitory nature of their jobs.

The results in this study may be interpreted as conservative for a number of reasons. Some members of the immigrant communities we interacted with did not necessarily make a clear distinction between a health issue and an occupational health issue unless there was a broader awareness of occupational hazard such as exposure to lead in painting, etc. We also realized that some of the participants were reluctant to disclose their work details in a survey even with the protection of anonymity and not being asked about legal status.

Selection bias is inevitable in community-based study that is based on a convenience sample. We administered surveys at public events sponsored by our community partners to access this population. Such a strategy may limit the inclusion of certain immigrant populations who do not have time for such gatherings due to the multiple jobs they perform or due to them being unaware of such events. Hence, we speculate that our results should likely be considered as conservative in that they reflect the experiences of a more established portion of the immigrant population in Somerville. The use of Teen Educators in the field to conduct the occupational health and safety surveys may also have lead to an additional source of selection bias. The Teen Educators may be more comfortable approaching respondents in an age profile similar to their own thus perhaps accounting, in part, for the finding that 61% of the cashiers reported ages between 18 and 20. Alternatively, this finding may reflect the demographics for this job in our study area.

As our sample was derived from a series of convenience samples a potential problem is found in the possibility of duplicate responses being provided by the same respondent at different times. Based on our field observations we are unaware of individual respondents indicating that they had previously completed the survey. As an additional process step we inspected our data for duplicate responses in the fields of country of origin, age, and sex and found no answers suggestive of duplicate responses. In conclusion we believe that our sampling procedures generated conservative estimates of risk which serve as valuable points of departure for additional research.

Strengths of Study

This study is a valuable initial step in characterizing occupational health risks for the commonly held low wage occupations among immigrant workers in Somerville, MA. We also believe that the concurrent assessment of the three predominate immigrant groups in Somerville, MA is an important strength of our approach. Our survey sheds light on this hard to reach population and difficult to document low wage occupations.

The use of the Teen Educators may have contributed to potential selection bias but an offsetting strength was found in our ability to overcome the tremendous gaps in trust and cultural competence which more traditional adult surveyors may have encountered. The Teen Educators also greatly contributed to our ability to reach the immigrant populations which we sought.

CONCLUSION

The concurrent analysis of common low wage jobs across major immigrant populations in a specific social

milieu has largely been absent from the occupational health literature. We found significant differences in access to occupational health services and health risks among these common low wage immigrant occupations. We also found that the occupational differences alone contribute to the high risks present in these jobs, especially in construction, cleaning and factory work. More studies are needed on these immigrant occupations to validate these results.

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