

Using Community-Based Participatory Research to Design and Initiate a Study on Immigrant Worker Health and Safety in San Francisco's Chinatown Restaurants

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Background Restaurant workers have among the highest rates of work-related illness and injury in the US, but little is known about the working conditions and occupational health status of Chinese immigrant restaurant workers.

Methods Community-based participatory research (CBPR) was employed to study restaurant working conditions and worker health in San Francisco's Chinatown. A community/academic/health department collaborative was formed and 23 restaurant workers trained on research techniques and worker health and safety. A worker survey instrument and a restaurant observational checklist were collaboratively developed. The checklist was piloted in 71 Chinatown restaurants, and the questionnaire administered to 433 restaurant workers.

Results Restaurant workers, together with other partners, made substantial contributions to construction of the survey and checklist tools and improved their cultural appropriateness. The utility of the checklist tool for restaurant-level data collection was demonstrated.

Conclusions CBPR holds promise for both studying worker health and safety among immigrant Chinese restaurant workers and developing culturally appropriate research tools. A new observational checklist also has potential for restaurant-level data collection on worker health and safety conditions. *Am. J. Ind. Med.* 53:361–371, 2010.

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INTRODUCTION

Restaurant workers have among the highest rates of reportable non-fatal work-related injuries in the nation's workforce [Webster, 2001]. Together, eating and drinking establishments account for 5% of all reported injuries and illnesses in private industry, the highest proportion attributable to any one industry. Common physical hazards in this sector include musculoskeletal sprains, strains, tears, cuts, burns, and falls [Webster, 2001]. High levels of psychosocial stress and effort-reward imbalance among restaurant workers

have also been reported [Woo Shinoff and Krause, 2003; Restaurant Opportunities Center of New York, 2005].

Risks of occupational injury and illness in the industry are compounded for immigrant Chinese restaurant workers who often have limited English skills and formal education [Restaurant Opportunities Center of New York, 2005; Smith et al., 2005]. OSHA-reported injuries are believed to significantly underestimate the actual rates of work-related injury and illness among immigrant workers because of these and other barriers to injury reporting in this population [Brown et al., 2002; Scherzer et al., 2005].

Restaurants are the largest employer of immigrant Chinese workers, who in turn are among the largest and fastest growing immigrant populations in the US [U.S. Census Bureau, 2004; Smith et al., 2005]. As such, studying and addressing occupational health and safety in this population is critical. To date, however, research with restaurant workers has been limited [Chung et al., 2000; Goodheart, 2003; Woo Shinoff and Krause, 2003; Restaurant Opportunities Center of New York, 2005] and even less is known about working conditions and occupational health status of immigrant workers in Chinese restaurants.

To help address this gap, we developed a community-based participatory research (CBPR) partnership whose goal was to investigate the health and working conditions of restaurant workers in San Francisco's Chinatown and the restaurant-level determinants of workers' health and occupational injuries and illnesses. We describe tools developed by the partnership to collect data at two levels: a detailed questionnaire to collect restaurant worker data and an observational tool, the Restaurant Worker Safety Checklist, used to collect workplace level data during restaurant inspections. Project goals also included developing a strong community/heath dept/academic partnership; building individual and community capacity in research; organizing and advocacy among restaurant worker partners; widely disseminating study findings and using them to both provide worker education and inform and justify possible later policy or systems level changes to foster improved workers health and safety.

In this paper, we focus, in particular, on the recruitment, hiring and training of immigrant restaurant workers as partners in the research. Restaurant workers' participation in the partnership and their role in designing study instruments are also discussed. Finally, we share preliminary findings from the checklist's application in an initial sample of 71 Chinatown restaurants, discuss the utility of this tool and examine the value added and challenges faced in involving immigrant Chinese restaurant workers as partners in an occupational health and safety study.

Setting

The Chinatown District is a population-dense mixed-use neighborhood to the west of San Francisco's downtown

business district. The two main census tracks comprising Chinatown (114 and 118) are home to approximately 4,700 people [U.S. Census Bureau, 2007] and over 100 restaurants [Personal communication from Alvaro Morales, San Francisco Department of Public Health, July 2008]. The estimated number of employees in these establishments ranges from 920 [Reference USA, 2007] to 2,000 with the higher figure based on data collected in 2007 by interns with the Chinese Progressive Association.

Chinatown has the highest concentration of immigrants in the San Francisco Bay Area (84%), and three-quarters of households have limited English proficiency [Dube, 2003]. In 2000, the average annual income for Chinese workers in the food services industry in Chinatown was less than half of the median income of \$28,038 for all Chinese workers in the city, and less than a quarter of the \$42,450 median income for all city workers [U.S. Census Bureau, 2007]. Almost one-third of Chinatown residents 16 years old and older (32%) are employed in the leisure and hospitality industry [U.S. Census Bureau, 2000], with most working in small, low-end restaurants or in "back of the house" positions (e.g., as cooks and dishwashers) in mid- to high-end restaurants [Smith et al., 2005]. Work in these establishments frequently is characterized by long work hours, physically demanding tasks, and low pay [Woo Shinoff and Krause, 2003; Lashuay and Harrison, 2006]. Like other immigrant restaurant workers, few Chinese restaurant workers have health insurance or are unionized [Lashuay and Harrison, 2006].

Although research is needed to document and characterize the occupational health and safety status of this high-risk worker group, aspects of traditional expert-driven research approaches may be ill-suited to the task. First, immigrants are often excluded from occupational health statistics. Second, actual disease and injury rates are difficult to estimate due to the lack of routinely collected administrative data including incomplete payroll data, lack of health insurance data, and the common underreporting of injuries and illnesses to the OSHA [Oleinick et al., 1993; Brown et al., 2002; Scherzer et al., 2005].

A substantial body of research suggests that OSHA-recordable injuries probably underestimate the true injury rate by a factor of 2–4 [Oleinick et al., 1993; Leigh et al., 1997; Krause et al., 2001]. Injury rates among immigrant workers are likely to be even more underestimated due to underreporting. Immigrant workers may have limited knowledge of labor protections and benefits under workers' compensation laws [Teran et al., 2002; McCauley, 2005] and may be more hesitant to report injuries and illness due to fear of retribution by employers [Brown et al., 2002; McCauley, 2005; Scherzer et al., 2005]. Such factors in turn can increase barriers to ensuring healthy and safe conditions in the restaurant workplace.

Finally, traditional ways of identifying, contacting, and enrolling worker participants in a research study are

challenged by language and cultural barriers, the lack of a union presence for Chinatown restaurant workers, high job turnover rates, and labor management relations strained by problems with unpaid or delayed wages [Chu and Cooper, 2005; Hua, 2006; San Francisco Office of the City Attorney, 2006]. Restaurant jobs remain one of the few employment options open to Chinese immigrant workers in San Francisco due to the persistent loss of manufacturing jobs [Egan, 2006; Wildermuth, 2007]. This environment may create ethical concerns regarding the safety of restaurant workers who could face negative employment consequences because of their participation unless their anonymity is safeguarded.

Given such obstacles and limitations, alternative approaches to inquiry may be needed to better understand and document occupational health and injury among immigrant worker populations such as the Chinatown restaurant workers in this study. CBPR, in which members of the population being studied are equitably involved throughout the research process [Green et al., 1995; Israel et al., 1998; Minkler, 2005], has shown promise for studying occupational health and safety among low-wage, immigrant and/or minority workers in other contexts and sectors [Israel et al., 1989, 2005a; Arcury et al., 1999, 2001; Lee et al., 2008]. A key characteristic of CBPR is the co-production, ownership, and use of knowledge for education and action [Green et al., 1995] with co-learning and capacity building among partners being an additional goal and by-product of the collaboration [Israel et al., 1998, 2008; Minkler, 2005].

We turn now to a discussion of the methods involved in the initiation of our CBPR study of occupational health and safety in San Francisco's Chinatown District. We focus in particular on the training of workers as partners; their initial contributions in working with other project partners on the design of the study's survey instrument and restaurant-level observational tool, and the methodology involved in pilot testing the latter tool in Chinatown restaurants ($n = 71$).

METHODS

Research Orientation

CBPR is defined as "systematic investigation with the collaboration of those affected by the issue being studied, for the purpose of education and taking action or effecting social change" [Green et al., 1995]. As described by Israel et al. [1998, 2008], CBPR principles stress that this approach "recognizes community as a unit of identity," is an empowering, co-learning and participatory process that contributes to community capacity building and balances research and action [Israel et al., 2005a,b].

To design and conduct a CBPR study of the relationships between Chinatown restaurant workplace hazards (e.g., ergonomics, chemical exposures, job stress, discrimination), and worker health and safety (e.g. general physical and

mental health, musculoskeletal disorders, work-related injuries, disability), a partnership was created in 2007 that included a community-based organization, the Chinese Progressive Association (CPA); the University of California, Berkeley School of Public Health; UC Berkeley's Labor Occupational Health Program; the University of California San Francisco School of Medicine; and the San Francisco Department of Public Health's Occupational and Environmental Health Section.

A 12-member Steering Committee, comprised of members from each partner organization, was formed to make collective decisions for the project. A six-member Restaurant Worker Leadership Group (RWLG) was also formed to facilitate the active participation of workers in the research process. Participatory evaluation of the project is being undertaken to explore the effectiveness of the partnership and research process according to CBPR principles [Israel et al., 2005a,b] and will be described in future manuscripts, as will our analytical methods and findings. Although as noted above, we are focusing in particular here on the contributions of immigrant restaurant workers as partners in the research, it should be noted that these contributions occurred in the context of a strong community-based organization/university/health department partnership and that all partners were critical to the development of the methods and co-generation of knowledge discussed.

Ecological Design

Based on the premise that individuals cannot be considered separately from their context and social-environmental milieu, CBPR is supported by ecologic conceptualizations of health [Israel et al., 1998; Minkler and Wallerstein, 2008]. Such models examine the interactions between nested sets of factors, from individual traits, such as age, race, sex, and biological factors, to social and community networks, living and working conditions, and, at the outermost level, the broad socioeconomic, cultural, and environmental conditions and policies that help shape and determine health status and behaviors [Gebbie et al., 2003; Sallis et al., 2008]. In grounding this CBPR study within a socio-ecological framework, we sought to examine the effects of multiple levels of influence on Chinatown restaurant workers' health.

Figure 1 adapts a traditional socio-ecological model to focus in particular on the levels of the individual worker, the restaurant (organizational) level, including physical and social environments and work-related events (such as "slow pay, no pay"), as well as relevant community and policy factors (e.g., scope and enforcement of workplace safety regulations; immigration issues) as these may impact on occupational health. The partnership's development and use of a survey instrument to study health and safety experiences at the individual restaurant

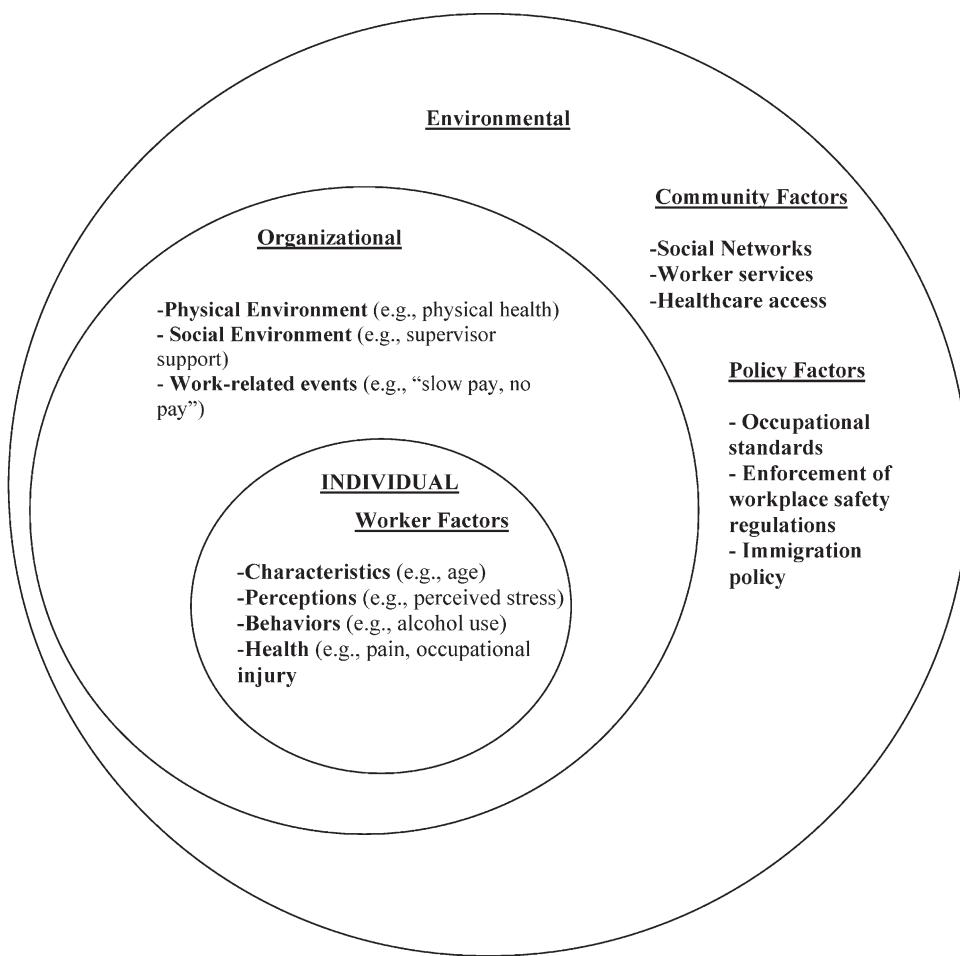


FIGURE 1. Socio-ecological framework applied to worker health and safety.

worker level, and a third-party observational tool for collecting environmental hazard data at the restaurant level were designed to help gather data that could help inform and justify potential interventions to address the outer, environmental ring of the model.

Restaurant Worker Recruitment and Training

Central to the CBPR process was the hiring, training, and involvement of members of the Chinatown restaurant worker community. Thirteen current and former restaurant workers were recruited as potential community members of the research team. Recruitment was conducted by the community partner (CPA) through other vocational training and education programs it sponsors as well as by word of mouth. Interested individuals were told about the study and our desire to conduct the research in partnership with a core group of restaurant workers who would be trained and paid an hourly rate for their participation as “staff interns” or in other

capacities. The trainings and recruitment took place in several stages during which the importance of taking cultural beliefs and attitudes into account was underscored even in the naming of these sessions. The workers thus were interested in participating in “seminars,” which connoted the learning of useful life skills, as opposed to “trainings” which had a less positive connotation.

Between 10 and 13 workers participated in one or more of three initial seminars, in which they learned about worker health and safety, workers’ rights, the differences between direct service, advocacy and organizing, and about community involvement in scientific research. Although many of the initial seminar participants were interested in being part of the forthcoming CBPR study, conflicting or uncertain work schedules meant that only four of these individuals were able to continue. In order to maximize opportunities for community participation, those unable to attend the subsequent, more in-depth seminars were told that they would be able to participate later in the process as recruiters, survey administrators, or in other capacities.

Two additional members were later recruited to join the four initial members of the RWLG, which ultimately included five women and one man, all of whom were in their early 30s to 40s and each of whom currently or previously worked in restaurants. Each attended an afternoon seminar session once weekly for eight consecutive weeks at CPA headquarters in Chinatown. Conducted in Chinese with simultaneous English-language translation for Steering Committee members in attendance, the RWLG training covered topics such as workplace health and safety, workers' rights, study goals and objectives, and research-related topics such as confidentiality and informed consent, validity and reliability, and survey design and administration. Modules featuring risk mapping [Mujica, 1992; Brown, 1995, 2008], neighborhood mapping, and mock food inspections in a simulated kitchen also were included to help participants identify issues that should be taken into account in the study and the research instruments. These exercises helped the RWLG partners describe with greater specificity occupational hazards they faced, such as pieces of cardboard being insufficient to address wet and greasy floors, cuts coming from not just knives but also from broken cups and dishes, and workers often having to supply their own band-aids and gloves.

In both small groups and dyad exercises, participants reviewed early drafts of the questionnaire and checklist tool and practiced using these instruments by taking the survey themselves and using recall to "test" the checklist by thinking back to their current or most recent restaurant workplace and responding to the 13 yes/no items. They engaged in in-depth discussions with the lead epidemiologist on concerns and suggestions related to question prioritization, wording, and missing topics. With the help of a translator, they also shared their lay knowledge of health and work in Chinatown restaurants with several members of the Steering Committee in the seminars and brainstormed related topics about which they wished to learn more.

Following a "graduation ceremony" at the end of the eighth seminar session, participants continued meeting on a weekly to biweekly basis with CPA staff and the project coordinator to develop in more detail a recruitment plan for the survey. Members of the RWLG then underwent a new round of advanced seminar sessions, and engaged in a 2-month outreach campaign, talking to workers in coffee shops and other venues about new wage and hour laws. They also pretested the survey instrument with 15 restaurant workers within their personal networks, and began serving as members of the project Steering Committee.

In addition to the RWLG, 17 community members were hired and trained as outreach workers and surveyors. Their training focused in particular on the purpose of the research, informed consent procedures and protocols, role plays on appropriate subject recruitment, and related issues. RWLG

members and the 17 surveyors were each paid a scholarship amounting to \$10.00 per hour.

Data Collection

As mentioned previously, the main data collection activities for this study included a survey of Chinatown restaurant workers and the collection of observational data in Chinatown restaurants using the Restaurant Worker Safety Checklist, a tool developed by this collaborative to these ends. All procedures for this study were reviewed and approved by the Committee for the Protection for Human Subjects at the University of California Berkeley. All partners completed Ethics Training at the onset of the study and all staff were trained on approved protocols and procedures prior to initiating data collection.

Worker survey

Sample. Due to the residential dispersion of Chinatown restaurant workers and the sensitive nature of the topic that would preclude worksite recruitment, the study aimed to recruit a convenience sample of 400 respondents for the worker survey. Restaurant workers who were at least 21 years old and who were currently working or had worked in a Chinatown restaurant within the past 2 years were eligible to participate. Respondents were recruited through the networks of the RWLG and surveyors and a variety of venues such as local community-based organizations, including the CPA, English as a Second Language courses, churches, popular parks and community gathering areas, hospitals and clinics. An outreach program for residents of the neighborhood's single room occupancy hotels where approximately one-third of Chinatown residents live, also was utilized in recruitment. Finally, respondent referrals and flyering proved particularly effective in helping to broaden and increase the sample. No recruitment or publicity about the study was done in restaurants or other places of work.

Instrument. We collaboratively developed a standardized questionnaire to assess Chinatown restaurant workers' work experiences, health, and demographic characteristics. A draft questionnaire was created by the academic, community, and health department partners and then adapted and revised based on feedback from the RWLG and piloted with restaurant workers as described below (see Results). The draft questionnaire drew in part on an instrument developed and used by several of the partners in previous CBPR studies of predominately low-wage, immigrant hotel room cleaners in San Francisco and Las Vegas [Lee and Krause, 2002; Krause et al., 2005; Lee et al., 2008]. Scales used in these prior studies, including the Short-Form-36 questionnaire for measuring general health, functioning, and 1-month

prevalence of bodily pain [Ware, 1993], a 12-item Musculoskeletal Symptom Index measuring regional musculoskeletal pain over a 1-month period [Krause et al., 2005], the CES-D for measuring depression [Radloff 1977], measures of job strain [Karasek et al., 1998] and effort-reward-imbalance [Siegrist et al., 2004] and selected items from a physical workload index [Krause et al., 2005], were also included in the questionnaire for the present study. As discussed below, restaurant workers themselves also played a key role in helping to develop and refine the questionnaire.

Data collection. As noted above, RWLG members and surveyors recruited respondents in a wide variety of venues. The worker questionnaire administration began in October 2008, following pilot testing. Well over the target number of surveys was completed ($n = 433$), in part due to word of mouth and flyering which reached a large cross-section of workers. The instrument was administered one-on-one or in small groups at a place of the participant's choosing, with surveyors helping by reading question items where literacy was a problem.

All participants prior to filling out the questionnaire gave verbal consent, and although we could not guarantee complete anonymity, confidentiality of responses was assured in accordance with our IRB policy.

Restaurant Worker Safety Checklist

Sample. Restaurant level data were collected using a newly developed Restaurant Worker Safety Checklist. All of Chinatown's restaurants, (defined by the health department as those establishments that have a kitchen and sell prepared, non-prepackaged food, whether or not seating space is available) were included in the sample ($n = 106$).

Instrument. To facilitate the study of the impact of organizational factors on working conditions and worker health, observer-based restaurant-level data on health and safety conditions was collected by health department personnel using the Restaurant Worker Safety Checklist (http://www.sfphe.org/publications/SF_Chinatown_Restaurant_Health_and_Safety.pdf). The 13-item checklist was designed to serve as a potential supplement to the food safety checklist already used during routine restaurant inspections by the San Francisco Department of Public Health, adding new items related specifically to worker health and safety. Initial checklist items had been developed the previous summer by Occupational Health Internship Program interns working at CPA based on a literature search and discussions with restaurant workers. Using these items as a starting point, the checklist was developed under the leadership of the health department partner and underwent several iterations as restaurant worker interns and Steering Committee members offered their input.

Data collection. Data collection using the Restaurant Worker Safety Checklist began in February 2008 and was used in a total of 71 Chinatown restaurants. Ten of the 71 visits were completed by the health department partner while accompanying city food inspectors on regular morning rounds during February. The remaining 61 restaurants were visited independently by the health department partner with the assistance of an interpreter.

To round out our data collection on restaurant conditions relevant to occupational health, the team will also access existing data collected by various city agencies and departments. These include health and safety data from food inspections, OSHA complaints, fire safety inspection data, and compliance with the city's minimum wage ordinance.

RESULTS

RWLG Contributions to Instrument Design

As noted above, 17 restaurant workers received some initial training, with 6 completing an eight-session seminar preparing them to become core members of the project's RWLG. The five individuals who subsequently joined the RWLG have had a noticeable influence on the work of the project, particularly in the area of instrument design and refinement.

Worker contributions to questionnaire development

Workers offered suggestions on the cultural adaptation of existing scales and also introduced important new areas of inquiry. When reviewing the validated scales included in the draft questionnaire, for example, RWLG members noted that "stomach aches," included as a symptom of stress, are also often associated by workers with irregular break schedules which cause them to go for long periods of time without eating. Additionally, RWLG members were highly amused by the Chinese translation of the idiom, "butterflies in your stomach" which appeared as part of the CES-D scale measuring depression and anxiety. Their own first reactions led them to emphasize to academic and health department partners that such a phrase would make little sense to Chinese-speaking survey takers.

Experiences such as these provided co-learning opportunities between academic researchers and the RWLG members. They discussed tradeoffs between retaining certain validated scales in their original format to allow for the comparability of findings and adapting the scales to be more culturally and linguistically appropriate. As a result of these exchanges, a few of the standardized scale items were

changed. The RWLG also suggested a number of important new survey areas and questions which are described below.

Leafleters. During a risk-mapping exercise [Brown, 1995, 2008; Mujica, 1992], RWLG members noted the position of outdoor leafleters who experience their own set of occupational health and safety risks, especially in bad weather. This common worker function had not been included on the original survey list of restaurant positions and was added based on the workers' input.

Tips. Workers raised the important issue of tip distribution in Chinatown restaurants and suggested adding questions that would ask respondents how tip money was allocated at their restaurants. Based on their experiences, RWLG members reported that particularly when credit card transactions took place, a "common practice" was for some restaurant owners to claim that credit card companies charged up to a 15% fee on transactions which would then be deducted from workers' tip earnings. Another practice mentioned was for employers to simply keep most or all of the tips themselves, thus cheating workers out of this important part of their income. The workers believed that learning more about how widespread these practices were would be an important contribution, so the following three questions were added: "How are tips distributed in your restaurant? Check all those who get part of the tips (cook; waiter/waitress; boss; company; busser; cook's helper; cashier; dim sum server; janitor/other workers; fund for staff party)"; "Does the following happen at the restaurant where you work? (check all that apply): (1) boss takes a deduction from credit card tips, (2) credit card slips taken out of tip pool, (3) "don't know," and (4) "Do you feel tips distribution at your restaurant is fair?"

Smoking and breaks. Participants recalled that workers who smoked were often allowed to complete their breaks while non-smokers were called back in, a practice that inadvertently could encourage smoking. A new question was added as a result: "During breaks, a worker who is smoking is less likely to be interrupted (true/false)."

Harassment and violence. Workers also sought the inclusion of new items about violence and harassment in the workplace. One worker shared a harrowing story of a friend who had seriously injured her head on the job after slipping on a wet floor. Her co-workers, unable to find the boss, took the individual to the hospital. Upon their return, the co-workers were berated by their supervisor for having left without permission, and when the injured worker returned she was fired. Examples such as this one prompted workers to bring up related issues including concerns about violence in the workplace. Three new questions were added, "How often have you seen any violence at work in the past 12 months?"

"In the past 12 months, have you been inappropriately touched by another person at work? (If yes, who touched you?)" and, "In the past 12 months, has someone at work yelled at you? (If yes, who yelled at you?)" Worker input on this topic also led to an option being added to the list of trainings that workers might be interested in receiving: "What to do in case of violence or harassment at work." Finally, and in response to the strength of RWLG members' concerns in this area, information about handling violence was included in a handout for workers entitled "frequently asked questions," under the heading, "What do I do when an act of violence occurs in the restaurant." Several other items on this handout also came from the seminar discussions, and the short document will be used subsequently in worker education and outreach. Bullying and harassment also will be incorporated in future trainings and educational sessions.

Background questions. The CPA also proposed a series of questions that would help the organization to better understand the background and context of workers' lives and health. Questions on demographics, housing conditions, wages, utilization of existing welfare programs, the perceived need for new training and community services, and civic engagement were also added.

Worker contributions to the checklist

Worker input also helped improve the Restaurant Worker Safety Checklist. For example, workers recommended that an observational item on the presence of a visible first aid kit be changed to indicate that the kit was both visible *and fully stocked*, since in their experience the kits usually contained little beyond band aids. They also suggested that early questions on the presence and visibility of posters (e.g., on OSHA regulations and the city's minimum wage ordinance) be amended to ask whether these posters were not only visible but also written in Chinese.

Preliminary Checklist Findings

As noted above, the Restaurant Worker Safety Checklist was used in 71 Chinatown restaurants from February through early July 2008 by a health department partner of the project Steering Committee. The 13-item observational tool took 10–15 min to administer. A total of 552 workers were employed in the 71 restaurants observed, 55% of whom were male and 45% female. The majority of workers were employed in the kitchen area (n = 307) and 72% of these workers were males, while in the customer contact restaurant area (n = 245), 57% were females and 43% were males.

Table I summarizes checklist findings from the 13 yes/no observational items for the 71 restaurants. Six to 16 restaurants complied with the required visible posting of posters

TABLE I. Observational Health and Safety Checklist Summary
San Francisco's Chinatown Restaurants—2008 (n = 71)

	Yes (%)	No (%)	N/A (%)
SF minimum wage ordinance ^a	23	77	
SF paid sick leave ^a	18	82	
Worker's compensation information ^a	8	92	
Potholders, gloves, mitts, or rags to prevent burns ^b	97	3	
Cooks wearing long-sleeved shirts or cook jackets	7	93	
Range tops overcrowded with cookware	76	24	
Sufficient quality non-slip mats	49	51	
Wet and greasy floors	70	30	
Proper storage of knives	14	86	
Footstools or ladders to reach food in storage area	6	11	83
Restaurant's exits unblocked	93	7	
Adequate ventilation	59	41	
Adequate lighting	68	32	
Fully stocked first aid kits	86 ^c	14	
Slicing, grinders and food processors guards	3	20	77

^aPosters visible where employees can read them.

^bAll restaurant visited use only rags to prevent burns.

^cThirteen percent were fully stocked. Seventy-three percent contained only band aids.

regarding Worker's Compensation or city policies on sick leave and the Minimum Wage Ordinance. All 16 minimum wage ordinance posters were posted in Chinese, but only 11 of the 13 paid sick leave posters, and 4 of the 6 workers' compensation posters. Only 7% of cooks wore long-sleeved shirts or jackets to prevent burns and other injuries, and fully 76% of range tops were overcrowded with cookware. Proper storage for knives was observed in just 14% of restaurants, and only 2 of the 16 establishments with slicing machines, grinders or food processors had machine guards.

While 97% of restaurants appeared to have dry potholders, gloves, mitts, or rags to prevent burns, virtually all workers observed used only rags for burn prevention, and these were usually wet. Seventy percent of floors were wet or greasy, and over half (51%) of restaurants lacked sufficient quality mats to prevent falls. Of the 49% of restaurants that had non-slip mats, half used wooden pallets, and the use of loose cardboard as mats on the floor was frequently observed as a tripping hazard. Seventeen percent of restaurants had blocked emergency exits.

Worker contributions to interpreting checklist findings

The input of RWLG members was again helpful in adding meaning to several of the above findings. Workers suggested that the low percentage of cooks who wore long sleeve shirts or jackets, while in part no doubt reflecting comfort issues given high temperatures in the kitchen, also might hold an important cultural meaning. Among Chinese

male cooks, they explained, burns and cuts incurred while cooking were "badges of honor" which act as a disincentive to wearing long sleeves.

Similarly, as noted above, the workers' reminder to observe not only the visibility of first aid kits but also their contents proved important: Nine (13%) of these kits were found to be fully stocked, but 10(14%) restaurants had no kits at all and 52 restaurants (73%) had first aid kits containing only band aids.

DISCUSSION

The results described here are preliminary and are used in this article to provide an illustrative look at some of the challenges and potential value added when a community-based participatory approach was used in the initial stages of an ecological occupational health and safety study with a low-wage immigrant population. Limitations of the project include the fact that it is impossible to determine the full benefits and challenges associated with worker involvement, and with the use of the CBPR approach more generally, without the benefit of a comparison group. A related limitation involves the fact that the workers hired and trained as members of the RWLG were self-selected and then underwent a further selection by the community partner organization; those selected were seen as being well suited for working on the occupational health study but also for potential longer-term organizing and leadership work with the CPA.

Finally, we could not discuss in-depth in a paper of this length the full process of partnership formation and evolution, the role of other key partners, nor the dynamics (e.g., strong mutual trust; tensions over time table and task vs. process needs) that a more nuanced and in-depth discussion of the project would require.

Despite these limitations, however, and the fact that our findings are not generalizable to other populations, our initial results tend to underscore the findings of earlier studies concerning the utility of a CBPR approach in occupational health research with largely immigrant worker populations [Israel et al., 1989, 2005c; Arcury et al., 1999, 2001; Lee and Krause, 2002; Lee et al., 2008]. In our study, weekly training sessions (renamed "seminars") were conducted which included content on occupational health and safety, health surveys, and research topics such as validity and informed consent. In particular, the use of interactive methods such as risk mapping [Brown, 1995, 2008; Mujica, 1992] and role playing (e.g., to practice using a recruitment script) resulted in high-level participation and were well-received by the participants. Providing monetary compensation for participants' time also helped with both recruitment and retention of RWLG members.

Community perspectives shared as part of the seminars appear initially to have improved the survey instrument,

increasing the relevance of existing items, and adding important new questions and topics that addressed critical community-identified problem areas. In the latter regard, questions on potentially unfair tip policies, the role and particular hazards faced by leafleters, and perceived differential treatment of smokers while on breaks were among those topic areas that would have been missed without the workers' insider knowledge. Our findings in this regard too support those of several earlier studies with low-wage, largely immigrant populations. Lee et al. [2008] and Lee and Krause [2002] thus found that a core group of hotel workers in both San Francisco and Las Vegas added important new question areas, for example, concerning occupational hazards related to the weight of linen cards and the amount of garbage left by hotel patrons. Similarly, in an early study of occupational stress in a components-part plant in Michigan by Israel et al. [1989], worker members of a Stress and Wellness Committee emphasized the importance of adding questions on stressors outside work and the extent to which work and non-work related issues impact on one another.

A more difficult question methodologically involved how to address worker input concerning validated scale items. Worker feedback on the phrase "butterflies in your stomach," which made no sense in Chinese, was important but difficult for academic researchers to hear, since changing that phrase meant altering a validated stress scale and thus lessening the potential for comparing findings across studies. Our decision to exclude this particular item was important, however, both in increasing the cultural appropriateness of the scale and in demonstrating to the RWLG members that their lay knowledge was indeed respected and valued. Scholars in the field of CBPR increasingly are discussing such trade-offs, and emphasizing the need to carefully balance attention to research rigor with the need for increasing the relevance, accessibility and cultural sensitivity of the instruments and interventions developed [Buchanan et al., 2007; Flicker et al., 2007; Minkler and Wallerstein, 2008].

Our findings concerning the development and piloting of the Restaurant Worker Safety Checklist also were illuminating. As with the survey, worker perspectives improved the checklist instrument by adding and refining areas reflecting their intimate knowledge of the environmental risks and circumstances of their workplaces. Additionally, their discussion of some of the initial findings (e.g., that the observed very low rates of wearing long sleeve shirts among cooks may reflect in part the custom of proudly displaying cuts and burns) was helpful in reminding the outside researchers of another way in which local expert knowledge may enrich our understanding.

Preliminary testing of the checklist in 71 restaurants was helpful in demonstrating that this instrument could be administered by a health department staff member in a reasonably short time frame (10–15 min). The feasibility of

using the checklist needs to be further explored in relation to inspector time and DPH management commitment, the time needed for employer education, legal constraints such as pre-emption, food operator attitudes and so forth. Should feasibility in these various areas be affirmed, the tool might then profitably be examined in terms of its potential use among food safety inspectors in other geographic areas.

The fact that all 71 observations occurred before noon—a period during which there tends to be lower levels of activity as restaurants begin preparing for lunch—may well have skewed the findings on several items (e.g., wet or greasy floors) in a conservative direction. To better test the instrument, administration at different times of day ideally should be conducted and the results compared.

Some of our initial findings also suggested possible new or revised observational items. For example, since virtually all cooks were observed to use rags to pick up hot pots and pans, despite the availability of potholders or mitts, a related question might be added on whether the rags were wet or greasy—factors that could limit their utility for burn prevention. Similarly, the frequently observed use of wooden floor pallets which may get slippery after long exposure to oil and water was suggestive of another possible area for an expanded observational checklist item. Input from the RWLG partners should again prove useful as we consider these and other issues in subsequent testing of the checklist.

CONCLUSION

Although occupational health has a long and varied tradition of worker participation [Wallerstein and Weinger, 1992; Rasmussen et al., 2006], the involvement of workers as genuine research partners tends to be more recent [Israel et al., 1989]. Yet as several earlier studies [Israel et al., 1989; Arcury et al., 1999, 2001; Lee and Krause, 2002; Lee et al., 2008] have suggested, CBPR with low-wage, largely immigrant, or minority workers may improve the quality of our research by complementing academic concerns with rigor and reliability with community concerns about the local relevance and coherence in all stages of the research, including the development of the research question, the appropriateness of sampling, recruitment and instrument design, and the interpretation, dissemination and use of findings.

Although our study is still in progress, we have observed substantial benefits from the hiring and training of Chinatown restaurant workers as partners working collaboratively with health department and university partners, particularly in the area of instrument design and survey administration. Both the worker partners and the trained surveyors helped expand the base of workers involved in the project and prepared to engage in subsequent work with the community partner organization.

Led by the health department partner, the partnership's design and pilot testing of a new observational instrument that gathers restaurant-level data to complement individual-level survey data also appeared to show promise. As occupational health increasingly expands its attention to new ecological frameworks and methods for studying worker health and safety, the Checklist, pending much further testing, may prove a useful method for gathering restaurant level data that can help frame and inform worker survey and other individual level data.

As the population of low-wage immigrant workers in the restaurant sector continues to climb, and as restaurants remain among their largest employers, the utility of an approach to research that can combine the insights of workers with those of occupational health specialists and other professionals is deserving of much more careful attention. We hope that this study will provide the foundation for a continuing collaborative effort between community, health department and university partners to improve working conditions and health and safety for this growing immigrant worker population.

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