
Original Article

Engaging Small Residential Construction Contractors in Community-Based Participatory Research to Promote Safety

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Submitted 4 December 2017; revised 24 March 2018; editorial decision 29 March 2018; revised version accepted 24 May 2018.

Abstract

Construction is a large employment sector with a high prevalence of small businesses. Despite the high injury rates reported for employees of small construction firms, these firms are under-represented in occupational safety research studies. Such studies are needed to understand barriers experienced by these firms and to examine ways to overcome them. However, challenges accessing and recruiting this hard-to-reach population are frequently reported. Traditional approaches of recruiting through unions or workers' compensation insurers may not be appropriate or effective for small construction businesses. Previous studies have demonstrated the value of academic collaborations with community-based organizations for recruiting participants from hard-to-reach populations for research studies. In accordance with the principles of Community-Based Participatory Research (CBPR), we formed a recruitment team comprised of staff from a local union, a community organization, and a community outreach team to recruit small construction contractors in Lawrence, MA. Media marketing strategies, participation in community events, exploring neighborhoods in search of ongoing residential projects, and partnership with vocational training institutions and building trade associations were some of the strategies implemented during this project. We recruited 118 contractors, supervisors, and foremen from more than 50 construction firms across the Greater Lawrence area to participate in an intervention project to reduce falls and silica exposure. The CBPR approach facilitated the development and implementation of recruitment strategies that resulted in the participation of a significant number of hard-to-reach small construction contractors.

Keywords: hard-to-reach; Hispanic workers; participant recruitment; promotores; small business

Introduction

Construction is a large employment sector with a high prevalence of small businesses. In 2015, construction firms with fewer than 20 workers accounted for 92% of the total construction companies in the United States and 36.5% (2,195,139 workers) of the population employed in this sector (United States Census Bureau, 2015). Residential construction is dominated by small-sized construction businesses, including those with fewer than 10 employees. During 2015, 11% of the fatalities in the construction sector occurred in residential construction; 58% of them due to falls (Bureau of Labor Statistics, 2017). Non-fatal injury rates in residential construction were 3.8 per 100 full-time workers (Bureau of Labor Statistics, 2017). However, these rates may, in fact, be an underestimate. Dong *et al.* (2011) estimated that every year more than 42,000 injuries resulting in days away from work are not reported in small construction companies. According to CPWR (2018), from 1992 to 2015, 7,235 construction deaths occurred in establishments with 10 or fewer employees; and in just 2015, 57% of construction deaths occurred in establishments with fewer than 20 employees.

Despite the high injury rates reported for employees of small construction firms, these firms are under-represented in occupational safety research studies. Involving small construction firms in intervention studies is important order to gain an understanding of the challenges experienced by these types of businesses, as well as to test strategies to overcome them and positively affect their workers' safety and health. However, researchers have often reported challenges accessing and recruiting this population and identify such firms as 'hard-to-reach' (Harrington *et al.*, 2009; Hasle *et al.*, 2010; Ozmec *et al.*, 2015).

Small construction firms face a myriad of worker-, work organization-, and system-level barriers that may contribute to the difficulties of involving them in research studies. It is more challenging to recruit workers from these firms because they are less likely to belong to unions and more likely to change employers frequently. Indeed, many people who work for small construction firms fall into the most vulnerable segments of the non-union labor force, such as temporary workers, day laborers, young workers, and other casual employees (NIOSH and ASSE, 2015). Challenges in recruiting companies at the work organization level, include the limited number of personnel responsible for multiple tasks (i.e. the owner having multiple responsibilities for commercial, financial, process, and safety tasks), greater likelihood of a reactive rather than pro-active safety approach (Harrington

et al., 2009; Ozmec *et al.*, 2015), and time constraints. System-level barriers include local construction market fluctuations or season-dependent work (i.e. snow removal contractor during the wintertime and residential construction work afterward), less demanding regulatory requirements, and under-enforcement of safety regulations in the residential and small commercial sector. Small business owners may be aware of safety compliance gaps but their more limited time and monetary margins influence them to cut corners on safety. This negative safety culture may steer small contractors towards not participating in safety intervention research.

Building a community-based partnership

Community-Based Participatory Research (CBPR) can be an effective approach to investigating and improving immigrant occupational health. CBPR facilitates the application of knowledge, suggestions, and insights from a range of stakeholders, and promotes community acceptance of proposed changes (Wallerstein and Duran, 2006; Schenker, 2010). As discussed above, traditional approaches of reaching and recruiting construction companies through unions or workers' compensation insurers may not be appropriate or effective in these populations. Of CBPR's nine accepted principles applicable to collaborative research partnerships (Israel *et al.*, 2005), at least three can be considered recruitment-related: (i) recognizing community as a unit of identity; (ii) building on strengths and resources within the community; and (iii) fostering co-learning and capacity building among all partners. These CBPR principles can be particularly effective at engaging key community members interested in solving their own problems, developing trusting relationships, fostering open communication, and reaching common goals.

Previous studies have demonstrated the value of academic collaborations with community-based organizations to recruit participants from hard-to-reach populations to research studies (Ochsner *et al.*, 2012). These strategies have included announcing the project to the community with a press release, introducing researchers through established local organizations (Hawkes *et al.*, 2007); collaboration with local groups (Sutton *et al.*, 2009) and non-profit organizations (Azaroff *et al.*, 2011); participating in community events, and involving community members in outreach (i.e. promoters) (De la Torre *et al.*, 2013).

The process of applying the principles of CBPR as a strategy to recruit hard-to-reach small construction contractors is contextualized here from an intervention study recently described by Marin and Roelofs (2017).

A CBPR study was conducted to investigate the root causes of fall hazards and silica dust exposures affecting Hispanic construction workers and to design and implement an intervention to improve occupational safety and health. The project called ‘Protección en Construcción (PenC): the Lawrence Latino Safety Partnership’ was conducted through collaboration with the Lawrence (Massachusetts) Mayor’s Health Task Force, Laborers International Union of North America Local 175, University of Massachusetts Lowell, and Lawrence Community Connections. These organizations coordinated and conducted the research on a day-to-day basis, determined the overall scope of work and goals, and guided the participation of other organizations and individuals in project work from the beginning to the end of the project. The partnership operated on a consensus basis, with a great deal of consideration for procedures that ensured equitable participation and mutual decision-making. Each partner was responsible for participating in partnership collaborative work and for managing their organization’s fulfillment of agreed-upon tasks.

Leaders in safe construction (LISC)

Using the CBPR process, we designed the LISC 5-h training intervention directly in response to results of the analysis that identified key domains for training related to the safety climate affecting Hispanic construction workers (Marin *et al.*, 2015). The training program’s goal was to enhance the ‘safety efficacy’ of small contractors and construction supervisors by improving their knowledge, skills, and attitudes toward safety leadership. The in-person training consisted of three modules covering fall prevention and silica exposure, leadership and communication, and safety planning, and was eligible for required Construction Supervisor License continuing education credits. The details of how the LISC program was designed and implemented were previously reported (Marín and Roelofs, 2017).

In this report, we expand on our previously published data to describe strategies based on three core principles of CBPR which were implemented to recruit participants for a supervisors’ safety training program for small construction contractors (fewer than 20 employees). Recruiting strategies reported here were the result of an in-depth CBPR process within the particular context of the small construction contractors in Lawrence, Massachusetts, an area with a large Hispanic immigrant workforce and contractors with varying levels of knowledge and resources.

Methods

Overall research goals of this study were to understand and describe factors at multiple levels (individual, interpersonal, organizational, and societal) that contribute to higher injury rates among Hispanic construction workers and, based on these findings, to design safety interventions targeting modifiable factors that were identified. Using formative research, we explored the factors associated with the disproportionate number of fatal and non-fatal accidents and occupational exposures experienced by Hispanic construction workers (Roelofs *et al.*, 2011). Then, a community survey was administered to examine safety climate factors experienced by Hispanic construction workers (Marin *et al.*, 2015). Based on these findings, we devised interventions targeting the contributing factors of the injury disparities with tailored outreach to the needs and interests of the contractors, including improving eligibility as city contractors, gaining continuing education credits for the Massachusetts construction supervisor license, or being visible to the local construction market through publicizing themselves as a PenC-LISC participant.

In accordance with the principle of CBPR to build on strengths and resources within the community, we formed a recruitment team comprised of staff from a local union, a community organization, and a community members’ outreach team. The community members’ outreach team included four ‘promotores,’ who had previously participated in a health promotion project in Lawrence. The term ‘promotores’ has been widely used in CBPR to describe community health workers that conduct outreach for interventions that promote health and prevent diseases and disability (CDC, 2015). The strength of using ‘promotores’ to recruit hard-to-reach populations lies their existing ties with these populations because they already live, work, or are otherwise engaged with them.

We also identified other potential network members that would be key to reaching small construction firms. These network members included the Northeast Builders Association (NEBA) of Massachusetts (a local branch of the National Association of Homebuilders and a trade association of more than 270 small construction companies in the greater Merrimack Valley area), local media; AMEDAL (a religious leaders organization), the Mayor’s Health Task Force (local health and social services agencies), a vocational training center; city, state, and federal agencies; and a lumberyard.

Recruitment team training

Under the CBPR principle of fostering co-learning and capacity building among all partners, the recruitment team was trained to participate in every phase of the research and conduct the recruitment fieldwork. Before beginning recruitment, the team attended general project meetings to discuss the study's scope as well as small group sessions to discuss practical aspects of the recruitment process. These sessions included:

1. *Project context including* a history of PenC's development, CBPR principles, project's structure, roles, timeline, and primary goals. These sessions provided context for the recruiters and prepared them to accurately respond to questions from potential participating contractors and construction workers.
2. *Cultural, historical, and political context of Lawrence, MA.* In this session, outreach team members trained academic and other community partners on the history and culture of Lawrence and of their role in the community in order to help raise the level of 'cultural competency' among the study members.
3. *Fall protection and silica exposure training.* This 2-h presentation provided recruiters with technical information to gain understanding regarding the study's significance, goals, and expected impact.
4. *LISC Training Program.* The recruitment team attended the 5-h supervisor training program to prepare them to respond to questions about the intervention program and benefits of the training program.
5. *Human Subjects Research Training.* Outreach team members were not aware of the Internal Review Board (IRB) process required by universities for research with human subjects. Thus, before taking the computer-based training for IRB, they engaged in a conversation with researchers to establish an understanding of why it was needed for this study. During these sessions, recruiters also discussed the importance of obtaining informed consent and key elements such as the voluntary nature of participation, monetary incentives, the right to withdraw at any time, and the confidentiality of the information collected.
6. *Survey Data Collection.* Experienced researchers reviewed survey instruments with the recruitment team and explained the rationale behind questions in order to prepare them to respond to the most common questions raised by participants. Members of the outreach team shared that they expected to be asked for assistance with jobs and other social services and requested help addressing these issues. Experienced researchers led role-playing recruitment

exercises focused on helping the recruitment team members become more comfortable with approaching construction contractors and workers. The exercises included demonstrations of potential scenarios for recruiter-participant interactions. Recruiters received a script giving a brief introduction of the study, assessing eligibility criteria, and obtaining oral informed consent.

7. *Coaching.* During the first field days, the recruiters were accompanied by an experienced researcher who observed the recruitment process and provided individual or group feedback when needed.

Media marketing strategy

CBPR identifies and builds upon community strengths, resources, and relationships (Katigbak *et al.*, 2016). The recruitment process included a media marketing strategy utilizing flyers, banners, participation in local Spanish-language radio segments and community broadcast shows, and fall protection equipment demonstrations in the local lumberyard. The media strategy also included the participation of a bilingual Occupational Safety and Health Administration (OSHA) inspector on the Spanish-language radio for the first time to discuss fall prevention topics. We also had appearances on the local community television station and received press coverage in local newspapers as a result of a press conference with the Mayor of Lawrence about the launch of the PenC project. In order to create technical content to engage potential participating construction firms and workers, we produced a five-part bilingual fall prevention column that appeared in the regional Spanish weekly newspaper. We also produced our own quarterly newsletter that was distributed to community partners, contractors, and workers (Fig. 1A, B).

Participation in community events

Recognizing community identity is considered to be a critical component of CBPR (Israel *et al.*, 2005). In order to make PenC visible to the community, each year, PenC was represented at the City of Lawrence's Building Safety Week and the traditional Bread and Roses Heritage Festival. Additionally, we participated in and brought workers and community members to three 'OSHA Listens' tour stops. We presented the PenC project in several meetings at numerous organizations including: the Lawrence Mayor's Health Task Force, Lawrence Training School, NEBA, OSHA Area Office and Consultation Program, Massachusetts Department of Public Health Fall Prevention Taskforce, City of Lawrence Community Development (including contractor pre-bid meetings), Greater Lawrence Family Health Center, Hancock

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Sea un líder en seguridad de escaleras

POR/BY NATALIE SULLIVAN
Protección en Construcción: Una Agrupación para la Seguridad del Trabajador Latino

"En una escalera de 40 pies, porque yo lo he hecho, subido en una escalera en el último peldaño y agarrado nada más tales con esta mano y muchas veces con las dos manos libres haciendo el trabajo. Eso es muy frecuente, es más, eso usted lo ve aquí en Lawrence. Usted lo ve usted – si pasa por cualquier construcción puede ver a un obrero encaramado allá arriba."

Para un transeúnte, una escalera de cuarenta pies puede ser aterradora. Pocos considerarían subir 40 pies

utilizó una escalera como había hecho muchas veces antes. Sin embargo, esta vez algo salió mal. Con sólo 56 años, se cayó de la escalera y se mató. Dejó una esposa sin marido, cinco hijos sin un padre y seis hermanos sin un hermano. Trágicamente, él fue uno de muchos. Entre 2008 y 2009, el Sr. Nina fue uno de los 241 trabajadores de construcción en los EE. UU. a morir a causa de una caída desde una escalera.

Los que tienen la fortuna sobrevivir a una caída raramente escapan sin un rasguño. En 2009, 212.760 trabajadores en los EE.UU. sufrieron lesiones después

prevenir más de 90% de las lesiones por caídas desde una escalera. El uso de escaleras seguras correctamente es la clave. Escaleras seguras están en buenas condiciones, tienen peldaños con textura antideslizante y tienen pegatinas diciendo que OSHA las ha aprobado. Como un trabajador local dijo, "Hay que dar información al supervisor que la escalera está rota y sacarla, cambiarla por otra pero le pegan tape tratan de arreglar entonces esa escalera la usan, se dobla y ahí viene el accidente." Todos de los equipos rotos deben ser destruidos o claramente etiquetados como roto para proteger a los

Be a Leader in Ladder Safety

"On a 40-ft. ladder, I have worked on the last step, holding nothing more than the rail with one hand and many times with both hands free doing work. This is common and you can see it here in Lawrence. Pass by any construction site and you'll see someone perched up there."

To the passerby, a forty-foot ladder may be scary. Few would even dream of standing 40 feet in the air with nothing to secure them. However, ladders are a common feature of local construction. Many

B

The image shows a promotional graphic for the PenC project. On the left is a circular logo with the text 'PROTECCIÓN EN CONSTRUCCIÓN' at the top, 'Lawrence Latino Safety Partnership' at the bottom, and an illustration of a ladder. To the right of the logo is a dark blue banner with the title 'Protección en Construcción' in large white letters. Below the title, it says 'VOLUMEN I NUMERO I' and 'ENERO - MARZO 2009'. Underneath the banner is a white box with the question '¿Qué es Protección en Construcción PenC?' in blue text. Below this is a photograph of two construction workers in orange safety vests and yellow hard hats. At the bottom of the graphic, there is a short paragraph of text in Spanish.

¿Qué es Protección en Construcción PenC?

Protección en Construcción (PenC) es un proyecto de investigación en el cual se reúnen personas y organizaciones en Lawrence que se preocupan por la seguridad de los trabajadores de construcción. Este proyecto es financiado por el Instituto Nacional de Seguridad y Salud Ocupacional (NIOSH). PenC busca estrategias de prevención para disminuir las lesiones y enfermedades entre los trabajadores de la construcción. El proyecto trabaja con un enfoque basado en la participación y dirección de la comunidad, en el cual contratistas, trabajadores, las

Figure 1. Promotional pieces of the PenC media marketing strategy. (A) Technical bilingual content in local newspaper. (B) Quarterly bilingual newsletter.

Neighborhood Association, Area Health Education Center, Pathway Ways to Family Success, Greater Lawrence Technical School, and Jackson Lumber.

Equipment hands-on demonstrations at local lumberyards

During previous stages of the PenC project, we ascertained that small construction firms purchase their construction supplies at local lumberyards. In order to engage potential participating firms, we sponsored fall arrest and guardrail system demonstrations at a local lumberyard with two different equipment manufacturers. The equipment manufacturer's instructors presented the wide range of personal fall arrest systems (PFAS) available. These hands-on demonstrations allowed

owners of small construction business to learn about the different types of PFAS, how to properly assemble parts, inspect, and use them. These activities were designed to facilitate discussions between participants and the instructors regarding the current systems they were using and the most appropriate one for the tasks to be performed. This resulted in our partner, NEBA bringing back the representative to hold another demonstration at one of their well-attended meetings and inviting its members to enroll in the PenC study.

Exploring the Lawrence area

The outreach team scanned different Lawrence neighborhoods to identify ongoing residential construction projects and contractors who were working to invite them

to join the LISC program. They also visited places commonly frequented by contractors such as barbershops and coffee places. Outreach team members were at doughnut shops where contractors, supervisors, and workers used to meet every morning (about 6:00 am). In these locations, the outreach team members approached potential participants, distributed flyers to market the project, invited them to enroll in the LISC program, attend the community ‘charlas’ offered by the project, and/or take a safety climate survey. They also spoke with local religious leaders about the project and the benefits to the Lawrence community in order to invite construction contractors among their parishioners to be part of the PenC project.

‘Charlas’ for the community

We held five bilingual community conversations with OSHA, the Massachusetts Coalition for Safety and Health (MassCOSH), the Massachusetts Division of Occupational Safety (OSHA consultation office), and the Massachusetts Attorney General’s Office. These informal events were an opportunity for agency officials to both share information about their work and services and to hear from the community about their perceptions of the agencies and to ask questions. These two-way conversations transferred knowledge and provided insight into the strengths and limitations of each agency’s work to protect workers.

Educational material

In order to educate and involve the community in the PenC project, we developed and distributed educational

materials, including a fall prevention equipment catalog to several towns’ Inspectional Services Offices. In collaboration with the City of Lawrence, we developed their first public health advisory brochure on Safety in Residential Construction, which was distributed by Inspectional Services to contractors and homeowners when they applied for building permits (Fig. 2A, B).

Continuing education credits for construction supervisor license

In order to attract participants by meeting their needs, we took advantage of the relatively new Massachusetts construction supervisors licensing renewal requirement for continuing education credits. Our LISC training modules (in English and Spanish) were approved by the Massachusetts Department of Public Safety for five credit hours toward the 12-h continuing education requirements of the Massachusetts construction supervisors’ license renewal. Construction supervisors were able to get these credits at no cost when offered by our trainers or by the trainers we trained in conjunction with NEBA.

Results

With our CBPR partners, local Lawrence networks, NEBA, and the assistance of a local lumberyard, we recruited 118 contractors, supervisors, and foremen from more than 50 construction firms across the Greater Lawrence Area to participate in the LISC project (Table 1). Although we targeted participation in the LISC



Figure 2. Fall protection equipment catalog (A) and public health advisory brochure on Safety in Residential Construction (B).

Table 1. Recruitment of LISC intervention participants by primary job title company size, ethnicity, and experience in the construction industry.

	<i>n</i> = 118	%
Job title		
Contractor	24	20
Supervisor	87	74
Worker	7	6
Company size		
1–5 employees	56	48
6–10 employees	22	19
More than 10 employees	15	13
No employees	20	17
No reported	5	4
Ethnicity		
Hispanic	40	34
Non-Hispanic	78	66
Experience in construction		
Less than 1 year	5	4
1–5 years	15	13
6–10 years	16	14
More than 10 years	58	49
No reported	24	20

program to owners/managers, supervisors, and foremen, seven workers attended the construction supervisor training program. Seventy percent of participants worked for companies with 10 or fewer employees, and 18% had no employees at the time of the intervention. While the recruitment was an on-going process, its design and preparation lasted approximately a year and involved several layers of the CBPR partnership. During this phase, one full-time and one part-time research assistant, and an outreach team of five promotores (5 h week⁻¹ person⁻¹) were required to develop and implement the recruitment strategies. The estimated participant/recruiter ratio was 18 participants per recruiter. Additional efforts by project staff included meeting with partner organizations and arranging networking and programmatic events where recruitment was a component of the activity.

Eight different recruitment strategies were implemented to target supervisors and owners from small construction companies (Table 2). The partnership with a building trade association was the most successful recruitment strategy, producing almost half of the participants (48%). Media marketing strategies, ‘Charlas’ for the community, and participation in community events were implemented with the aim of reaching a large group of potential participants, however, the number of people reached and recruited as a result of each strategy was not possible to quantify. Based on our observations, field reports, and participants’ comments, we estimated

that this combination of strategies might have accounted for more than a third of the total recruitment. Hands-on demonstrations at the local lumber added ten participants or about 10% of the total. It is likely that these strategies overlapped for several participants and were more effective in combination.

Discussion

This article describes the process of implementing the core principles of CBPR to recruit ‘hard-to-reach’ small construction contractors in the city of Lawrence, MA. As reported in the literature, researchers face considerable challenges in recruiting this population. The LISC program was embedded in a network of community organizations and businesses trade associations that worked together to bring the intervention to the intended population.

Not all outreach strategies were successful. Due to the boom of the construction sector in the Greater Lawrence area, housing developers were identified as natural allies in the recruitment process. However, they declined to participate, as did local firefighters. The participation of representatives from the local OSHA office in the PenC networking meetings and our network may have been problematic at first due to potential distrust of the agency. However, as the project progressed and a greater understanding evolved between OSHA and the community, the level of participation in activities with OSHA increased. The OSHA area office also referred a contractor who participated in the LISC program.

We established collaborative networks with community members and organizations which increased our presence in the community and allowed us to understand the dynamics of the city and local construction contracting. Community network members participated in the iterative process to adjust and test recruitment strategies. Outreach team and community members provided feedback such as the selection of key community events to attend and information about places visited by construction contractors that could result in recruitment opportunities.

Appropriate and timely recruitment of participants is decisive in the success of a research study (Felsen *et al.*, 2010; Chu *et al.*, 2018). A CBPR approach facilitated the development and implementation of recruitment strategies that resulted in the participation of a significant number of hard-to-reach small construction contractors. Our recruitment strategies had varying levels of success over the more than 5 years of the study, however building trusting relationships with key community organizations and members facilitated the recruitment process (Katigbak *et al.*, 2016). Endorsement by the Mayor’s office, well-known community organizations, and building associations may have had a positive impact in

Table 2. List of recruitment strategies by targeted group, reaching goal, and contribution to total participants.

Recruitment strategy	Target group	Goal	Participants recruited
Educational material: safety in residential construction brochure and fall prevention equipment catalogue	City contractors	Residential contractors pulling permits in the city of Lawrence	4 (3%)
Exploring Great Lawrence (MA) area	Residential contractors	Residential contractors performing construction project in the Lawrence area	3 (3%)
Hands-on demonstrations at local lumber	Residential contractors	Contractors purchasing supplies at local lumber	10 (9%)
Partnership with a building trade association	Trade association members	Non-hispanic residential contractors employing Hispanic workers	56 (48%)
'Charlas' for the community ^a Participation in community events ^a	Construction firm owners in the great Lawrence area	Construction firms' owners living in the Lawrence area currently performing construction projects inside/outside Great Lawrence area	45 (38%)
Media marketing: flyers, radio shows, local broadcasting, newspaper articles ^a	Construction firms owners and supervisors	Contractors living or working in the Lawrence area	
Offering continuing education credits ^a	Construction supervisors	Supervisors looking for renewing their Massachusetts Construction Supervisor license	

^aThis strategy overlapped with other described. Thus, it was not possible to measure its individual contribution to the recruitment process.

encouraging participation in the project. Participation in community events required investing significant time and resources, however as observed by [Shedlin et al. \(2011\)](#), project staff participation facilitates the identification of the community leaders that may serve as intermediaries between the researchers and communities. We also identified potential conflicts of interest between prospective network members and the goals of the research project. The CBPR partnership allowed us to identify these limitations and search for other potential members that would bring benefits to the network in line with the goals of the project.

Small construction businesses may have little leeway for any additional time or resources necessary for participating in research studies. Thus, the intervention program must be tailored to identify and respond to the needs of small construction contractors. Our LISC program offered continuing education credits for small contractors interested in renewing their construction supervisor's license, which represented an important benefit for these firms. The research team gained valuable insight into the barriers facing by small contractors in implementing safety and health programs. Poor safety climate, diffuse responsibilities, and lack of knowledge regarding the appropriate equipment and techniques to reduce hazards were some of the challenges identified.

Some limitations of this study include the lack of financial and project effort data needed to quantitatively measure the impact and effort of each recruitment strategy. Costs derived from implementing each recruitment strategy included staff time, marketing materials, registration in community events, and facilities rental. However, materials and other efforts designed for a specific strategy might be used for more than one. Some strategies overlapped or were launched simultaneously. Therefore, it was not possible to measure their individual contribution to the general recruitment rate.

Conclusion

Reaching small non-union construction contractors remains a challenge. The organizational structure of these firms and their limited personnel restrict their time to participate in research studies. CBPR principles were demonstrated to be an important framework to develop tailored and flexible recruitment strategies to reach small contractors in places beyond the construction sites. However, significant challenges exist such as gaining trust from the community, engaging the key organizations and community members, and adding actual value to the day-to-day operation of these small contractors. The CBPR partnership research process requires a

significant resource and time investment, but it produces tremendous rewards. We presented different strategies to recruit a hard-to-reach population that may be used to guide other researchers in the field.

Acknowledgements

This research was supported by the National Institute for Occupational Safety and Health (NIOSH) Grant 5R01OH008750. We would like to thank our research team, the training participants, the organizations, and construction contractors who participated in this study.

Declaration

The authors declare no conflict of interest relating to the material presented in this manuscript. Its contents, including any opinions and/or conclusions expressed, are solely those of the authors.

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