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Surveying for Environmental Health Justice: Community Organizing Applications of Community-Based Participatory Research

Alison Klebanoff Cohen, Andrea Lopez, Nile Malloy, and Rachel Morello-Frosch

ABSTRACT

Although the benefits of community-based participatory research (CBPR) for community and university partners have been well documented, these have mostly focused on disseminating research findings. However, how CBPR can function as a useful community organizing tool remains understudied. We present the CBPR process of an environmental health survey conducted by a team of community organizers and academic researchers in Richmond, CA, to describe how survey research can be aligned with community organizing principles and methods. Through a case study of our Richmond health survey that documented and quantified neighborhood concerns and health problems, we describe and analyze three steps through which community organizing and CBPR align: community-driven hypothesis generation and testing, how community surveyors are trained and study participants are recruited, and how results are applied and disseminated to policy advocacy and community action. Our case study of surveying for environmental health justice demonstrates how CBPR can be used for community organizing by: (1) building community capacity in research methods, literacy, and numeracy through training community residents as surveyors and data analysis advisors; (2) supporting organizing goals with community-driven hypothesis generation and hypothesis testing; (3) using research findings to determine future issues to prioritize; and (4) developing strategic initiatives accordingly. We recommend ensuring adequate, funded time for CBPR partners to apply their research findings toward community organizing goals and strategic planning for future community organizing and research.

Keywords: community-based participatory research, environmental health, community organizing, survey research

INTRODUCTION

COMMUNITY-BASED PARTICIPATORY RESEARCH (CBPR) offers numerous benefits to both community and university partners. CBPR's benefits to university partners

include improving: recruitment and retention of study participants, the quality of data collected,^{1,2,3} the relevance of the research for local communities and policy actions,^{4,5} and the extent to which the research is disseminated.⁶ Benefits for community partners include:

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¹Carolina L. Balazs, and Rachel Morello-Frosch. "The Three Rs: How Community-Based Participatory Research Strengthens the Rigor, Relevance, and Reach of Science," *Environmental Justice* 6 (2013): 9–16.

²Suzanne B. Cashman, Sarah Adeky, Alex J. Allen, III, Jason Corburn, Barbara A. Israel, Jaime Montañó, *et al.* "The Power and the Promise: Working With Communities to Analyze Data,

Interpret Findings, and Get to Outcomes," *American Journal of Public Health* 98 (2008): 1407–1417.

³Rachel Morello-Frosch, Steven Zavestoski, Phil Brown, Sabrina McCormick, Brian Mayer, and Rebecca Gasior. "Social Movements in Health: Responses to and Shapers of a Changed Medical World." in *The New Political Sociology of Science: Institutions, Networks, and Power*, K. Moore and S. Frickel (eds.) (University of Wisconsin Press, 2006), pp 244–271.

⁴Jason Corburn. *Street Science: Community Knowledge and Environmental Health* (The MIT Press, 2005).

⁵Sarena D. Seifer, and Sarah Sisco. "Mining the Challenges of CBPR for Improvements in Urban Health." *Journal of Urban Health* 83 (2006): 981–984.

⁶Barbara A. Israel, Amy J. Schulz, Edith A. Parker, and Adam B. Becker. "Review of Community-Based Research: Assessing Partnership Approaches to Improve Public Health." *Annual Review of Public Health* 19 (1998): 173–202.

deeper understanding of issues of interest⁷ and the research process,⁸ increased access to monetary and personnel resources (including grants for academic research),^{9,10,11,12} improved quality of research methods,¹³ and increased credibility of results for academic, political, and judicial audiences.^{14,15}

The ultimate goal of CBPR is to leverage research in ways that motivate policy and social change, through the research process and the application of research findings to action.^{16,17,18} CBPR can improve community health through research dissemination to the community¹⁹ and policy-making audiences.^{20,21,22} It can build participants' research and advocacy skills by empowering them with

tools to make a change in their communities.^{23,24} More generally, CBPR can facilitate co-produced knowledge between community members and academic or government actors, leading to informed citizenship,^{25,26} strengthened social movements,²⁷ and policy change.²⁸

However, the usefulness of CBPR for the community partner's own organizing initiatives remains understudied. Community organizing involves engaging community members in a collective action process to identify and achieve social change goals.^{29,30} Inductively, a core component of CBPR involves the task of balancing research with action, which can involve community organizing.³¹ Assessment of health needs

⁷Steve Wing, Rachel A. Horton, Naeema Muhammad, Gary R. Grant, Mansoureh Tajik, and Kendall Thu. "Integrating Epidemiology, Education, and Organizing for Environmental Justice: Community Health Effects of Industrial Hog Operations." *American Journal of Public Health* 98 (2008): 1390–1397.

⁸Valerie B.B. Jernigan, Tvl Jacob, the Tribal Community Research Team, and Dennis Styne. "The Adaptation and Implementation of a Community-Based Participatory Research Curriculum to Build Tribal Research Capacity." *American Journal of Public Health* 105(S3) (2015): S424–S432.

⁹Wilma B. Caldwell, Angela G. Reyes, Zachary Rowe, Julia Weinert, and Barbara A. Israel. "Community Partner Perspectives on Benefits, Challenges, Facilitating Factors, and Lessons Learned from Community-Based Participatory Research Partnerships in Detroit." *Progress in Community Health Partnerships: Research, Education, and Action* 9 (2015): 299–311.

¹⁰Theresa J. Hoelt, Wylie Burke, Scarlett E. Hopkins, Walkie Charles, Susan B. Trinidad, Rosalina D. James, and Bert B. Boyer. "Building Partnerships in Community-Based Participatory Research: Budgetary and Other Cost Considerations." *Health Promotion Practice* 15 (2014): 263–270.

¹¹Rachel Morello-Frosch, Manuel Pastor, James Sadd, Carlos Porras, and Michele Prichard. "Citizens, Science, and Data: Leveraging Secondary Data Analysis to Build a Community-Academic Collaborative for Environmental Justice in Southern California." in *Methods in Community-Based Participatory Research for Health*. (Jossey-Bass, 2005), 371–392.

¹²Nina Wallerstein, Bonnie Duran, Meredith Minkler, and Kevin Foley. "Developing and Maintaining Partnerships with Communities." in *Methods in Community-Based Participatory Research for Health*, B.A. Israel, E. Eng, A.J. Schulz, and E.A. Parker (eds.) (Jossey-Bass, 2005), 31–51.

¹³Pam T. Lee, Niklas Krause, and Charles Goetchius. "Participatory Action Research with Hotel Room Cleaners: From Collaborative Study to the Bargaining Table." in *Community-Based Participatory Research for Health*, M. Minkler and N. Wallerstein (eds.) (Jossey-Bass, 2003), 390–404.

¹⁴Phil Brown, Julia G. Brody, Rachel Morello-Frosch, Jessica Tovar, Ami R. Zota, and Ruth A. Rudel. "Measuring the Success of Community Science: The Northern California Household Exposure Study." *Environmental Health Perspectives* 120 (2012): 326–331.

¹⁵Steve Wing, Rachel A. Horton, Naeema Muhammad, Gary R. Grant, Mansoureh Tajik, and Kendall Thu. "Integrating Epidemiology, Education, and Organizing for Environmental Justice: Community Health Effects of Industrial Hog Operations." *American Journal of Public Health* 98 (2008): 1390–1397.

¹⁶Carolina L. Balazs, and Rachel Morello-Frosch. "The Three Rs: How Community-Based Participatory Research Strengthens the Rigor, Relevance, and Reach of Science." *Environmental Justice* 6 (2013): 9–16.

¹⁷Meredith Minkler, and Nina Wallerstein. *Community-Based Participatory Research for Health* (2nd ed.). (Jossey-Bass, 2008).

¹⁸Randy Stoecker. "Are Academics Irrelevant? Roles for Scholars in Participatory Research." *American Behavioral Scientist* 42 (1999): 840–854.

¹⁹Julia G. Brody, Rachel Morello-Frosch, Ami Zota, Phil Brown, Carla Perez, and Ruth A. Rudel. "Linking Exposure Assessment Science With Policy Objectives for Environmental Justice and Breast Cancer Advocacy: The Northern California Household Exposure Study." *American Journal of Public Health* 99(S3), (2009): S600–S609.

²⁰Nicholas Freudenberg, Marc Rogers, Cassandra Ritas, and Mary Nerney. "Policy Analysis and Advocacy: An Approach to Community-Based Participatory Research." in *Methods in Community-Based Participatory Research for Health*, B. Israel, E. Eng, A. Schulz, and E. Parker (eds.) (Jossey-Bass, 2005), 349–370.

²¹Analia P. Garcia, Nina Wallerstein, Andrea Hricko, Jesse N. Marquez, Angelo Logan, Elina G. Nasser, and Meredith Minkler. "THE (Trade, Health, Environment) Impact Project: A Community-Based Participatory Research Environmental Justice Case Study." *Environmental Justice* 6 (2013): 17–26.

²²Meredith Minkler, Victoria B. Vasquez, Mansoureh Tajik, and Dana Petersen. "Promoting Environmental Justice Through Community-Based Participatory Research: The Role of Community and Partnership Capacity." *Health Education and Behavior* 35 (2006): 119–137.

²³Suzanne B. Cashman, Sarah Adeky, Alex J. Allen, III, Jason Corburn, Barbara A. Israel, Jaime Montaña, et al. "The Power and the Promise: Working With Communities to Analyze Data, Interpret Findings, and Get to Outcomes." *American Journal of Public Health* 98 (2008): 1407–1417.

²⁴Galen el-Askari Julie Freestone, et al. "The Healthy Neighborhoods Project: A Local Health Department's Role in Catalyzing Community Development." *Health Education and Behavior* 25 (1998): 147–159.

²⁵Jason Corburn. *Street Science: Community Knowledge and Environmental Health* (The MIT Press, 2005).

²⁶Sheila Jasanoff. "Science and Citizenship: A New Synergy." *Science and Public Policy* 31 (2004): 90–94.

²⁷Alissa Cordner, David Ciple, Phil Brown, and Rachel Morello-Frosch. "Reflexive Research Ethics for Environmental Health and Justice: Academics and Movement Building." *Social Movement Studies* 11 (2012): 161–176.

²⁸Lisa Cacari-Stone, Nina Wallerstein, Analia P. Garcia, and Meredith Minkler. "The Promise of Community-Based Participatory Research for Health Equity: A Conceptual Model for Bridging Evidence with Policy." *American Journal of Public Health* 104 (2014): 1615–1623.

²⁹Brain D. Christens, and Paul W. Speer. "Community Organizing: Practice, Research, and Policy Implications." *Social Issues and Policy Review* 9 (2015): 193–222.

³⁰Alycia Santilli, Amy Carroll-Scott, and Jeannette R. Ickovics. "Applying Community Organizing Principles to Assess Health Needs in New Haven, Connecticut." *American Journal of Public Health* 106 (2016): 841–847.

³¹Meredith Minkler. "Linking Science and Policy Through Community-Based Participatory Research to Study and Address Health Disparities." *American Journal of Public Health* 100(S1) (2010): S81–S87.

is a first step in both program planning³² and community organizing.³³ Community-based participatory health assessments meaningfully engage community members in the process.³⁴ Environmental justice organizing³⁵ and CBPR^{36,37,38} are each committed to addressing social determinants of health and health inequities. Similar to community organizing, CBPR acknowledges and tackles issues of power.³⁹ CBPR is also aligned with Paulo Freire's dialogic action principles, which are often used in community organizing.⁴⁰ One well-documented example in North Carolina describes how epidemiologic research was used to inform organizing around hog farms.⁴¹ CBPR offers an opportunity for university and community partners to collaborate to conduct a comprehensive, creative analysis of the community.

CASE STUDY

We present a case study of a partnership between the environmental justice organizing group Communities for a Better Environment (CBE) and academic researchers at the University of California, Berkeley, and Brown University to conduct a CBPR health survey in Richmond, CA. The primary goal of this partnership was to quantitatively and qualitatively describe the health concerns of Richmond's Iron Triangle residents, a low-income community of color disproportionately exposed to environmental pollution and neighborhood-level stressors. The secondary goal was to apply these findings to inform and bolster ongoing community organizing and advocacy work. The methods of the health survey, and additional results, are described elsewhere.⁴²

CBE has a history of more than 30 years of activism and community organizing in low-income Californian communities of color bearing a disproportionate pollution burden, including Richmond's Iron Triangle.⁴³ CBE is a membership-based community organizing organization that also has legal and scientific capacity in-house; among its nonadministrative staff, 10 are organizers, 3 are researchers, and 3 are lawyers.⁴⁴ At least half of the organizers on staff are long-time residents and/or grew up in the communities with whom they work. CBE's community organizing efforts in Richmond have taken a multipronged approach, as described on its webpage outlining its Richmond work,⁴⁵ which highlights lawsuits against the major local refinery and our health study as part of their efforts to improve the health and well-being of local residents, alongside political organizing around renewable energy and economic measures (in collaboration with and/or in response to local government initiatives).

Here, we describe our CBPR health survey project as it aligns with and advances community organizing strategies. In particular, we describe the process of a CBPR health survey and analyze its alignment with community organizing in three domains: community-driven hypothesis generation and testing, how community surveyors are trained and study participants are recruited, and how results are applied and disseminated to policy advocacy and community action. We report new analyses of survey data and qualitative observations from our time of con-

ducting the survey as university partners (Cohen and Morello-Frosch) and CBE employees (Lopez and Malloy).

Community concerns about elevated levels of cancer (especially breast cancer) due to exposure to multiple sources of pollution (including from multiple petrochemical industries in the area) in this primarily low-income fence-line residential community of color led CBE to collaborate with academic researchers to write a proposal for a 1-year study to the Avon Foundation, a breast cancer-oriented foundation, which agreed to fund it. This study, for which CBE was the principal investigator (per documents provided to both the funder and the university), thereby had the following parameters: (1)

³²Judy Payne. *Researching Health Needs: A Community-Based Approach*. (Sage Publications, 1999).

³³Marc Piliusuk, Joann McAllister, Jack Rothman, and Lauren Larin. "New Contexts of Organizing: Functions, Challenges, and Solutions." in *Community Organizing and Community Building for Health* (2nd ed.), M. Minkler (ed.) (Rutgers University Press, 2005), 97–115.

³⁴Meredith Minkler, and Trevor Hancock. "Community-Driven Asset Identification and Issue Selection." in *Community-Based Participatory Research for Health*, M. Minkler and N. Wallerstein (eds.) (Jossey-Bass, 2003), 135–154.

³⁵Penn Loh, and Jodi Sugerman-Brozán. "Environmental Justice Organizing for Environmental Health: Case Study on Asthma and Diesel Exhaust in Roxbury, Massachusetts." *The Annals of the American Academy of Political and Social Science* 584 (2002): 110–124.

³⁶Lisa Cacari-Stone, Nina Wallerstein, Analilia P. Garcia, and Meredith Minkler. "The Promise of Community-Based Participatory Research for Health Equity: A Conceptual Model for Bridging Evidence with Policy." *American Journal of Public Health* 104 (2014): 1615–1623.

³⁷Margaret W. Leung, Irene H. Yen, and Meredith Minkler. "Community Based Participatory Research: A Promising Approach for Increasing Epidemiology's Relevance in the 21st Century." *International Journal of Epidemiology* 33 (2004): 499–506.

³⁸Penn Loh, and Jodi Sugerman-Brozán. "Environmental Justice Organizing for Environmental Health: Case Study on Asthma and Diesel Exhaust in Roxbury, Massachusetts." *The Annals of the American Academy of Political and Social Science* 584 (2002): 110–124.

³⁹Michael Muhammad, Nina Wallerstein, Andrew L. Sussman, Magdalena Avila, Lorenda Belone, and Bonnie Duran. "Reflections on Researcher Identity and Power: The Impact of Positionality on Community Based Participatory Research (CBPR) Processes and Outcomes." *Critical Sociology* 41 (2015): 1045–1063.

⁴⁰Michael J. Montoya, and Erin E. Kent. "Dialogical Action: Moving From Community-Based to Community-Driven Participatory Research." *Qualitative Health Research* 21 (2011): 1000–1011.

⁴¹Steve Wing, Rachel A. Horton, Naeema Muhammad, Gary R. Grant, Mansoureh Tajik, and Kendall Thu. "Integrating Epidemiology, Education, and Organizing for Environmental Justice: Community Health Effects of Industrial Hog Operations." *American Journal of Public Health* 98 (2008): 1390–1397.

⁴²Alison Cohen, Andrea Lopez, Nile Malloy, and Rachel Morello-Frosch. "Our Environment, Our Health: A Community-Based Participatory Environmental Health Survey in Richmond, California." *Health Education and Behavior* 39 (2012): 198–209.

⁴³CBE. Communities for a Better Environment, 2016. <www.cbecal.org>. (Last accessed on 13 June 2016).

⁴⁴CBE. Communities for a Better Environment, 2016. <www.cbecal.org>. (Last accessed on 13 June 2016).

⁴⁵CBE. Communities for a Better Environment, 2016. <www.cbecal.org>. (Last accessed on 13 June 2016).

cancer needed to be addressed in our survey; (2) this was an inherently short-term initiative, so although this survey was conducted within a pre-existing, long-term CBPR partnership, there would be little time available for dissemination purposes and strategic planning; and (3) CBE emphasized the community-centered nature of the survey while still following academic research ethics (we followed IRB procedures, including training all survey team staff and volunteers in research ethics, human subjects protection and ensuring the protection and security of data). Lopez developed a training that met community surveyors where they were: Although most of the community surveyors (who were residents in the communities surveyed and employed by CBE only to work on this project) had not received any higher education, and some spoke Spanish only, we were able to adapt the key messages of research ethics through oral and visual presentations and group discussions. Then, Lopez worked with each of the community surveyors, providing translation as needed, to go through human subjects protection certifications.

Community-driven hypothesis generation and testing

The health survey methodology was community driven and participatory in nature, with an explicit emphasis on action, based on principles of combined expertise from local and academic sources^{46,47,48,49} to inform policy. The project responded to long-standing community questions about how their disproportionate exposure to pollution was affecting their health, and hypotheses about factors involved in elevated levels of asthma and breast cancer in the community. Building on the Household Exposure Study,⁵⁰ an exposure assessment analyzing the presence of a wide range of chemicals in both indoor and outdoor air and dust in Richmond's Iron Triangle, our community-academic research team had information about specific environmental exposures with implications for health, and it was interested in documenting health issues of concern to residents.⁵¹

CBE organizers facilitated two brainstorming sessions with community members about topics to be covered in the survey, with an interest in identifying health problems that they observed anecdotally and for which they wanted community-wide data. Although community needs assessments had been earlier done in the region,⁵² this survey focused on a more specific geographic area and on health problems that were known to be associated with environmental exposures. Then, community and university partners discussed what would be strategically useful to include in the survey, in consultation with community- and university-based colleagues elsewhere, with a focus on health outcomes that were known to be associated with pollution exposures, including asthma, cancer, and headaches, and individual and area-level factors that may enhance vulnerability to the adverse health effects of hazard exposures, including access to healthcare, housing quality, and neighborhood quality.⁵³ We relied on academic partners' survey expertise in developing questions

for low-literacy populations and in using validated questions from other research endeavors. Operating at the nexus between community-driven hypotheses and academic research tools, we integrated both local knowledge and expert knowledge to ensure that our survey would be both rigorous and relevant.

On data collection completion, we held three meetings and additional informal conversations, in both English and Spanish, with a total of 3 community surveyors, 12 survey participants, and 5 other interested community residents to discuss our preliminary findings. We experimented with multiple formats for presenting data so that community members could choose the formats that most clearly conveyed our findings to them. Our emphasis on clarity of data presentation and on building community numeracy and literacy for participants to become facile with the data also allowed for further hypothesis generation. For example, at one meeting, one community member said that the asthma prevalence we had calculated seemed low, because he had lived in Richmond for a long time and it seemed like everyone else who had lived in Richmond for as long also had asthma. This led us to analyze the association between length of residency in Richmond and adult asthma, controlling for potential confounders; just as that community member hypothesized, we found a strong association.⁵⁴ This level of responsiveness between researchers and community members, coupled with the triangulation of local knowledge with survey findings,

⁴⁶Phil Brown. "When the Public Knows Better: Popular Epidemiology Challenges the System," *Environment: Science and Policy for Sustainable Development* 35 (1993): 16–41.

⁴⁷Jason Corburn. *Street Science: Community Knowledge and Environmental Health* (The MIT Press, 2005).

⁴⁸Nicholas Freudenberg, Marc Rogers, Cassandra Ritas, and Mary Nerney. "Policy Analysis and Advocacy: An Approach to Community-Based Participatory Research." in *Methods in Community-Based Participatory Research for Health*, B. Israel, E. Eng, A. Schulz, and E. Parker (eds.) (Jossey-Bass, 2005), 349–370.

⁴⁹Meredith Minkler, Victoria B. Vasquez, Mansoureh Tajik, and Dana Petersen. "Promoting Environmental Justice Through Community-Based Participatory Research: The Role of Community and Partnership Capacity." *Health Education and Behavior* 35 (2006): 119–137.

⁵⁰Julia G. Brody, Rachel Morello-Frosch, Ami Zota, Phil Brown, Carla Perez, and Ruth A. Rudel. "Linking Exposure Assessment Science With Policy Objectives for Environmental Justice and Breast Cancer Advocacy: The Northern California Household Exposure Study," *American Journal of Public Health* 99(S3), (2009): S600–S609.

⁵¹Phil Brown, Julia G. Brody, Rachel Morello-Frosch, Jessica Tovar, Ami R. Zota, and Ruth A. Rudel. "Measuring the Success of Community Science: The Northern California Household Exposure Study," *Environmental Health Perspectives* 120 (2012): 326–331.

⁵²Meredith Minkler. "Using Participatory Action Research to Build Healthy Communities." *Public Health Reports* 115 (2000): 191–197.

⁵³Alison Cohen, Andrea Lopez, Nile Malloy, and Rachel Morello-Frosch. "Our Environment, Our Health: A Community-Based Participatory Environmental Health Survey in Richmond, California." *Health Education and Behavior* 39 (2012): 198–209.

⁵⁴Alison Cohen, Andrea Lopez, Nile Malloy, and Rachel Morello-Frosch. "Our Environment, Our Health: A Community-Based Participatory Environmental Health Survey in Richmond, California." *Health Education and Behavior* 39 (2012): 198–209.

TABLE 1. NEIGHBORHOOD OVERVIEW

<i>Neighborhood name</i>	<i>Environmental justice community organizing group present</i>	<i>Number of survey participants</i>	<i>Demographic overview</i>
Atchison Village	Communities for a Better Environment	<i>n</i> = 64	34% White/53% Hispanic 94% homeowners
Liberty Village	Communities for a Better Environment	<i>n</i> = 32	100% Hispanic 94% renters
North Richmond	West County Toxics Coalition	<i>n</i> = 44	80% Black 36% homeowners/55% renters
St. Mark's/Nevin Center	None	<i>n</i> = 48	98% Hispanic 77% renters

Note: Ten respondents did not have information linking them to one of these four neighborhoods.

empowered residents to take ownership of the data for their own organizing purposes, as evidenced by references to study results in subsequent city meetings.

Training surveyors and recruiting participants

In addition to gathering data about health outcomes, CBE viewed this survey as an outreach and organizing tool. First, CBE, in consultation with academic partners, trained community surveyors in survey methodology and in the conceptual framework underlying the survey (e.g., environmental justice, cumulative impacts of environmental and social stressors on health), thereby building community capacity to engage in scientific research. These community surveyors collaborated with our research team's staff to conduct each of the surveys. All survey teams were English-Spanish bilingual, enabling them to reach a high percentage of Spanish speakers in the four target neighborhoods.

Second, the effectiveness of different strategies for survey recruitment, which differed by neighborhood, offered useful lessons for future organizing efforts. Our CBPR partnership recruited survey participants (*n* = 198) from four neighborhoods in Richmond's Iron Triangle (Table 1). Two of the neighborhoods were CBE's organizing base; the third neighborhood was home to another community organizing group (West County Toxics Coalition) who joined our collaboration; and the fourth neighborhood was one that CBE was interested in expanding.

Although our project began by mailing letters to all 150 CBE members, the letters yielded only one call from someone interested in participation. Although this may be partially due to the fact that CBE's membership includes people outside of our survey's catchment area, this limited response highlighted the shortcoming of letters as an effective strategy for reaching out to the CBE membership, which could then inform future organizational endeavors.

Then, community surveyors and research team staff (including Cohen and Lopez) canvassed Atchison and Liberty Villages, which comprised ~500 households, on foot over the course of several weeks and several times within the day to knock on doors and invite residents to participate. We also phoned people who had participated in the partnership's previous Household Exposure Study.

Out of 30 total HES participants living in Richmond, we contacted 28, and 23 agreed to participate in the health survey. Calling people who had already participated in much more time-intensive research projects with CBE was an effective recruitment strategy, especially considering that many HES participants had raised questions about the health effects of the environmental exposures measured in their homes that inspired the creation of this health survey. The documentation of the successes of different recruitment strategies highlighted that a cohort of repeatedly engaged residents—not only in these research initiatives but also in ongoing advocacy, simultaneously regarding the presence and proposed expansion of the Chevron refinery—forms the core of CBE's membership.

In North Richmond and St. Mark's/Nevin Center, though, residents were recruited via word of mouth and announcements at community events (snowball approach), after community surveyors advised that residents' doors were often inaccessible because of gates and as residents did not generally open their doors due to concerns of violence. The CBE survey coordinator (Lopez) did 2 days of outreach and recruitment at a church festival and fundraiser, and both community surveyors and participants were asked to encourage other people they knew to participate in the survey, so that the completion of one survey led to the snowball recruitment of several more participants. Again, this highly localized knowledge has implications for future organizing initiatives that may attempt to conduct outreach to either share information or expand the base.

Third, through survey recruitment, especially in areas where CBE was not as well known, surveyors increased awareness about CBE's work. Less than one-third (30%) of participants reported having heard of CBE before completing the health survey. Having heard of CBE varied widely by neighborhood, with more participants having heard of CBE in their target areas (Atchison Village [56%]; Liberty Village [34%]) and fewer participants in the other neighborhoods (North Richmond [25%], where another environmental justice community organizing group was based; St. Mark's/Nevin Center [4%], where CBE was interested in expanding). From an organizing perspective, it was useful to recognize that CBE had not yet reached a saturation point in terms of awareness in the two neighborhoods in which it was

based (Atchison Village and Liberty Village), and that there was close to no knowledge about CBE in a neighborhood in which it hoped to expand (St. Mark's/Nevin Center). In addition, our survey increased awareness about CBE simply by mentioning it in the survey, and many people who participated in the survey expressed interest in learning more about CBE and in potentially becoming members.

Fourth, through survey development and recruitment, we bolstered collaborations between like-minded organizations and across neighborhoods that had previously self-identified as distinct by underscoring that they shared the same health concerns and lived in close proximity to each other. For example, Atchison Village and Liberty Village border each other but perceive themselves to be different, because all Atchison Village residents own their homes through a co-op system, whereas all Liberty Village residents are renters. Although there is a large literature on the power and civic engagement differentials between renters and homeowners, despite their perceived and demographic differences, their health outcomes were similar. Given these shared concerns, the two neighborhoods could build power by organizing together.

Applying results

In addition to discussing the focus of CBE's organizing, the Chevron Refinery, survey participants also mentioned several issues of concern that CBE does not work on, including community violence and noise pollution from trains.

The first question of a series of neighborhood-related questions was an open-ended qualitative question to "tell us a little bit about your neighborhood," and responses ranged from a phrase to lengthy statements. Organizers often use this type of prompt to learn more about the community.^{55,56,57} We prompted participants to discuss environmental, health, and education issues. Despite not being prompted to discuss crime or safety, this was the most common item discussed, with more than 37% of participants mentioning crime or violence, with the most common concerns being robberies, shootings (including drive-by shootings and killings), and drug dealing. Similarly, 26% of respondents mentioned safety, with many indicating that they did not feel safe in general or that they only felt safe within a small geographic area (i.e., their house, their block, or their neighborhood); in a Likert-scaled follow-up question, 32% of respondents ($n=198$) said that they did not feel safe in their neighborhood.

Environmental pollution was also a commonly discussed concern, with 29% of respondents mentioning that this was a problem. Nearly half (49%) of the respondents concerned with environmental pollution ($n=57$) were concerned with Chevron and its proximity to residential neighborhoods. Interestingly, 71% of respondents who were also Household Exposure Study participants ($n=21$) mentioned environmental pollution, indicating that Household Exposure Study efforts may have raised people's environmental awareness.

Also, in St. Mark's/Nevin Center, the one neighborhood that was not home to an environmental justice-oriented community organizing group, only 4% of respondents mentioned environmental pollution. We also have evidence of CBE's effectiveness in communicating its message, which had an anti-Chevron focus: Survey participants who had heard of CBE were more likely to identify Chevron as their only pollution source of concern.

This survey allowed us to understand how residents conceptualize pollution. In addition to identifying particular sources of concern, community members described the combined impact of multiple sources of pollution in their responses. We then operationalized this in our survey research, and we found an association between cumulative stress and poor health.⁵⁸ These multiple data points encouraged CBE to continue to use a cumulative impact framework and a broad definition of environmental health that included diverse stressors as a framework for their organizing. Given how CBE has influenced community perceptions of pollution regarding Chevron, there is potential to do the same around cumulative impact. However, this underscores a tension and transition in environmental justice organizing, from historically organizing around a single polluter⁵⁹ to organizing around multiple diverse environmental health issues.⁶⁰ Background research for our survey as well as the survey responses themselves uncovered a multitude of other, less visible, less traditional pollution sources that could be a target of future organizing.

Disseminating results

Community members, community surveyors, organizing staff, and the academic partners identified targets for dissemination. In the past 2 months of grant funding, we distributed a fact sheet to all survey participants, released a report online, held one central community meeting, and presented to one CBE staff retreat, three academic conferences, and four local government bodies.

⁵⁵Phil Brown. "When the Public Knows Better: Popular Epidemiology Challenges the System," *Environment: Science and Policy for Sustainable Development* 35 (1993): 16-41.

⁵⁶Meredith Minkler. "Using Participatory Action Research to Build Healthy Communities." *Public Health Reports* 115 (2000): 191-197.

⁵⁷Marc Pilisuk, Joann McAllister, Jack Rothman, and Lauren Larin. "New Contexts of Organizing: Functions, Challenges, and Solutions." in *Community Organizing and Community Building for Health* (2nd ed.), M. Minkler (ed.) (Rutgers University Press, 2005), 97-115.

⁵⁸Alison Cohen, Andrea Lopez, Nile Malloy, and Rachel Morello-Frosch. "Our Environment, Our Health: A Community-Based Participatory Environmental Health Survey in Richmond, California." *Health Education & Behavior* 39 (2012): 198-209.

⁵⁹Nicholas Freudenberg. "Citizen Action for Environmental Health: Report on a Survey of Community Organizations," *American Journal of Public Health* 74 (1984): 444-448.

⁶⁰Jason Corburn. "Environmental Justice, Local Knowledge, and Risk: The Discourse of a Community-Based Cumulative Exposure Assessment," *Environmental Management* 29 (2002): 451-466.

Since grant funding ended, a paper presenting the findings was published in a public health journal⁶¹ and the research has been used to inform other public health work in Richmond.⁶² Each of these dissemination approaches has harnessed the power of multiple partners. In general, organizers and individual community members led the community and government meetings and the academics led the academic presentations and papers. Additionally, community members and CBE community organizers have leveraged study findings to inform policy advocacy. In local government meetings subsequent to the completion of the survey, community residents referred to some of the study's key findings to bolster arguments based on their own individual experiences. CBE's website about its Richmond organizing efforts⁶³ uses the health survey findings as part of its rationale for greater oversight of local facilities, prohibiting the expansion of Richmond's Chevron refinery, the largest facility in the area, and promoting climate justice.⁶⁴ Local investigative journalists have also referred to the survey when exploring the role of Chevron in Richmond.⁶⁵

DISCUSSION

Our case study of surveying for environmental health justice offers three main ways in which CBPR can be used for community organizing: community-driven hypothesis generation and testing, how community surveyors are trained and study participants are recruited, and how results are applied and disseminated to policy advocacy and community action.

The CBPR process overlapped with strategic initiatives in two ways. First, the testing of multiple survey recruitment strategies allowed us to gain highly localized insights about effective community outreach strategies. By asking questions about prior knowledge of CBE, we also learned how effective prior outreach campaigns had been at raising awareness about issues and the organization. With these findings in mind, community organizers could refine their recruitment strategies accordingly. Second, through training community members to conduct the surveys and by engaging community residents in analyzing data, we facilitated community leadership to the point that community surveyors took the initiative in discussing results with their neighborhoods and engaging them in meetings without assistance from CBE staff.

The outcomes of our survey research also had implications for community organizing. With an eye to the present, we considered how this new information could bolster and refine ongoing community organizing efforts. For example, we had anecdotal evidence about higher levels of asthma for Richmond and existing research about asthma rates in other communities with similar exposures, but our survey was able to quantitatively document that asthma rates for adults and children were higher in Richmond than in other communities, and that there was an association between how long people had lived in Richmond and whether they had asthma.⁶⁶ However, to effectively leverage the amount of data that a survey like ours generates, it is essential to plan in and

budget for adequate time for dissemination of results to relevant groups and organizing activities as relevant.

Survey participants identified three primary issues of future concern: their health, their environment, and their neighborhood. However, this raised two important questions: What should be done when community members raise issues that the community organizing group neither currently addresses nor is interested in addressing in the future? For example, CBE is an environmental justice organizing group that was focused primarily on Chevron; however, residents mentioned their concerns about violence. Should this be incorporated into a broader framework of environmental health, or should this be transparently noted as something outside of the organization's mission and scope? Community organizations must choose the path they would take through strategic discussions. Either way, community members must continue to be engaged in these ethical and strategic conversations.⁶⁷ If community organizers choose not to work on an issue identified as a community priority, the commitment to CBPR as both research and action encourages sharing the information with other organizations that may be better suited to take action. We also considered how this research could inform CBE's future grant-seeking. The issues that residents identified could help prioritize which future grants to apply for (i.e., cumulative impact research and organizing). Our survey's issue selection function helped prepare CBE for the future.

A CBPR survey can be a valuable tool for community organizing in many ways. We encourage community organizing groups and researchers to integrate research and organizing goals at each step of the survey process, from developing survey questions, to conducting the survey, to analyzing and presenting the results. This can be applied within not only the realm of environmental health justice, as demonstrated here, but also public health and social services more broadly. Others have already documented how community organizing can be

⁶¹Alison Cohen, Andrea Lopez, Nile Malloy, and Rachel Morello-Frosch. "Our Environment, Our Health: A Community-Based Participatory Environmental Health Survey in Richmond, California." *Health Education & Behavior* 39 (2012): 198–209.

⁶²Jason Corburn, and Alison K. Cohen. "Why We Need Urban Health Equity Indicators: Integrating Science, Policy, and Community." *PLoS Medicine* 9 (2012): e1001285.

⁶³CBE. Communities for a Better Environment, 2016. <www.cbecal.org>. (Last accessed on 13 June 2016).

⁶⁴Ellen Choy, and Ana Orozco. "Chevron in Richmond: Community-Based Strategies for Climate Justice." *Race, Poverty, & the Environment* 16 (2009): 43–46.

⁶⁵Danielle Parenteau. (2015). Chevron's role in childhood asthma hazy. *Richmond Confidential*, December 10. <<http://richmondconfidential.org/2015/12/10/chevrons-role-in-childhood-asthma-hazy/>>. Accessed on 13 June 2016.

⁶⁶Alison Cohen, Andrea Lopez, Nile Malloy, and Rachel Morello-Frosch. "Our Environment, Our Health: A Community-Based Participatory Environmental Health Survey in Richmond, California." *Health Education & Behavior* 39 (2012): 198–209.

⁶⁷Meredith Minkler, and Cheri Pies. "Ethical Issues in Community Organization and Community Participation." in *Community Organizing and Community Building for Health*, M. Minkler (ed.) (Rutgers University Press, 1997), 120–136.

beneficial for health^{68,69}; we encourage researchers and practitioners to use CBPR to inform both organizing and health initiatives. We recommend that community organizations partner with academics to do CBPR with an explicit eye toward community organizing.

AUTHOR DISCLOSURE STATEMENT

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⁶⁸Cheryl Grills, Sandra Villanueva, Andrew M. Subica, and Jason A. Douglas. Communities Creating Healthy Environments: Improving Access to Healthy Foods and Safe Places to Play in Communities of Color. *Preventive Medicine* 69(S) (2014): S117–S119.

⁶⁹Meredith Minkler. *Community Organizing and Community Building for Health and Welfare* (3rd ed.). (Rutgers University Press, 2012).