

Community-Based Participatory Research and Policy Advocacy to Reduce Diesel Exposure in West Oakland, California

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We conducted a multimethod case study analysis of a community-based participatory research partnership in West Oakland, California, and its efforts to study and address the neighborhood's disproportionate exposure to diesel air pollution. We employed 10 interviews with partners and policymakers, participant observation, and a review of documents. Results of the partnership's truck count and truck idling studies suggested substantial exposure to diesel pollution and were used by the partners and their allies to make the case for a truck route ordinance. Despite weak enforcement, the partnership's increased political visibility helped change the policy environment, with the community partner now heavily engaged in environmental decision-making on the local and regional levels. Finally, we discussed implications for research, policy, and practice. (*Am J Public Health*. Published online ahead of print May 5, 2011: e1–e10. doi:10.2105/AJPH.2010.196204)

Located on the San Francisco Bay, and bounded by freeways, West Oakland is a small but vibrant community of predominately low-income African American and Latino residents. Home to nearly 22 000 people in 10 distinct neighborhoods, the community also contains thousands of moving and stationary sources of diesel pollution.¹ From the buses and trucks on surrounding freeways, to the container trucks moving through neighborhoods as they take goods to and from the Port of Oakland and a major US Post Office distribution center, residents have long experienced disproportionate exposure to diesel exhaust and traffic-related air pollutants. Although such exposures are known to adversely affect cardiovascular health outcomes, including premature mortality,^{2–4} of greatest concern to West Oakland residents is the role of these pollutants in exacerbating asthma and related respiratory conditions in children and their families. Recent prospective studies have shown a positive relationship between traffic-related air pollution and the onset of asthma in children,⁵ as well as adverse effects of such exposure on the growth of lung functioning in children aged 10–18 years.⁶ In a nested case-control study in British Columbia, Canada,

elevated exposure to traffic-related air pollutants, such as nitrogen dioxide, carbon monoxide, and black carbon, in utero or in infancy was also recently found to be associated with higher risk of asthma in children under age 5.⁷

In many low income urban neighborhoods, and particularly communities such as West Oakland with major “goods movement” activity related to international trade, a larger than normal percentage of traffic consists of diesel trucks,⁸ including those moving containers.⁹ The emissions from diesel exhaust are a combination of gases and particles, including a high number of ultrafine particles shown to be especially hazardous because they can escape many of the body's defenses, allowing them to enter the lungs and the systemic circulation.¹⁰ Although automobile emissions also include ultrafine particulate matter, for residents of West Oakland, who see relatively little car traffic in the neighborhood itself but regularly find diesel exhaust soot on their window sills and heating vents from the high volume of truck traffic, diesel air pollution is of far greater local concern.

In West Oakland, as in a growing number of low income communities disproportionately impacted by environmental hazards, community-based participatory research (CBPR) has

been used by local residents, in partnership with outside researchers, to help study and address neighborhood challenges, while building local capacity.^{11–19} Green et al²⁰ defined CBPR as “systematic inquiry, with the participation of those affected by the issue being studied, for the purposes of education and taking action or effecting change.” Among the core principles of this approach to research are that it recognizes community as a unit of identity; it entails an empowering, colearning process that “equitably” involves all partners; and it includes systems development and increases local problem-solving ability. It also achieves a balance of research and action, and “involves a long term process and a commitment to sustainability.”²¹ Finally, CBPR pays serious attention to issues of research rigor and validity. However, it also “broadens the bandwidth of validity”²² to ask whether the research question is “valid,” in the sense of coming from or being meaningful to the involved community. With its commitment to action as part of the research process itself, CBPR has increasingly been utilized by community-academic partnerships interested in using their research findings, together with advocacy and organizing, to help move policy that may improve conditions and environments in which people can be healthy.^{17,19}

Our primary research goal was to analyze a CBPR partnership between a community-led and -based organization, the West Oakland Environmental Indicators Project (WOEIP), and its academically trained research partners at the Pacific Institute in Oakland, California. We examined the processes by which community and academically trained research partners collaborated to study a community-identified issue (i.e., diesel traffic in West Oakland²³) and then worked with other stakeholders to use the findings and residents' experience to advocate for policy change.

METHODS

The collaboration between community members and partners at WOEIP and their research collaborators at the Pacific Institute was 1 of 36 current or recent policy-focused CBPR partnerships in California that our research team at the University of California, Berkeley and PolicyLink, Inc., identified in 2008 as appearing to have played a role in contributing to policy level change. With funding from The California Endowment, we designed a study to explore CBPR as a strategy for linking place-based work and policy toward building healthier communities. As part of this broader study, and in consultation with an advisory committee, we selected for in-depth analysis 6 of the 36 partnerships that met the following criteria: (1) demonstrated the CBPR core principles previously noted,^{21,22,24} (2) substantially contributed to either a specific policy change or a change in the policy environment, and (3) helped capture the diverse range of such projects in the state. A 28 item in-depth, semistructured interview schedule was developed for administration to key community and academic partners, along with a shorter phone interview guide for relevant policymakers at each site. The on-site interviews (range, 60–90 minutes) included questions designed to explicate partnership genesis and evolution; research aims, methods, and findings; policy goals, steps, and activities; success factors and barriers; and perceived contributions to helping change a specific policy or the broader policy environment.

As 1 of the 6 partnerships that comprised the final sample, WOEIP and the Pacific Institute were visited 4 times by members of the research team who conducted 7 key source interviews, 3 phone interviews with local policy makers, observed a WOEIP training for local residents, and analyzed relevant internal documents and media coverage. Audiotapes of the 7 interviews were transcribed and coded independently by 3 research team members using a 16-item coding template, with subcodes whose code categories were related to each major domain of interest (e.g., partnership creation and evolution; partner involvement in conducting the research; policy goals, stages, activities, and outcomes; facilitating factors and obstacles faced; and sustainability indicators). We conducted interrater reliability checks,

reconciling discrepancies. Next, we employed the qualitative software package, ATLAS.ti, version 5.5 (Atlas.ti GmbH, Berlin, Germany Version 5.5) to group all key domains by site and generate reports, facilitating an additional layer of coding following a similar technique. Finally, we shared preliminary case study reports based on the reconciled findings with community partners at WOEIP and their collaborators at the Pacific Institute for member checking as an added means of ensuring the accuracy of data interpretation. In the spirit of CBPR, both community and academically trained researchers in the WOEIP partnership participated in coauthoring this paper.

RESULTS

The West Oakland EIP began in 2000 as a project partnership between a nonprofit research organization, the Pacific Institute, and the 7th Street-McClymonds Neighborhood Improvement Initiative. This early collaboration undertook research, in which “residents selected the indicators they wanted to track; collected, analyzed, and reported on selected indicators, and supported the continued use of this data to advocate for positive change in West Oakland.”²³ A Task Force of 16 residents identified 17 key indicators (e.g., toxic exposure, illegal dumping, and asthma rates), each related to a topic of major concern in the neighborhood (e.g., air quality and health, physical environment, and transportation). The academic partner then collected and examined both survey data collection and secondary data on the municipal and state levels, and drew comparisons between indicator data for West Oakland and that for the city and state as a whole. Released in 2002, the West Oakland EIP report, *Neighborhood Knowledge for Change*,²³ which summarized study findings and forwarded recommendations, was cited in the local media, with some of its findings (e.g., children younger than 15 years in West Oakland had asthma rates 7 times the state’s average) drawing particular attention. This visibility, together with the high quality of the research, contributed to WOEIP’s spinning off to become a community-led organization in its own right and incorporating as a nonprofit in 2004.

The processes and outcomes of the *Neighborhood Knowledge for Change* project laid the groundwork for a true CBPR partnership

between community members engaged with the newly formed community organization, WOEIP, and the Community Strategies program of the Pacific Institute to study and address a key concern raised in the original study but for which insufficient data existed: the high volume of diesel truck traffic in West Oakland.²³

Although we focus here primarily on 2 of the resultant CBPR studies (the truck count and truck idling studies) and subsequent policy work to secure a truck route ordinance, these were part of a range of intersecting efforts to study and address disproportionate exposures and environmental injustice, and in the words of a partner, to increase “democratic community participation in decision making in West Oakland.”

Research Design, Methods, and Participant Roles

The initial idea for conducting the truck count and truck idling studies emerged from initial community meetings held as part of the *Neighborhood Knowledge for Change* project. When residents and staff realized there were insufficient data to allow the inclusion of indicators related to diesel truck traffic in the original study, they left this as 1 of several “indicators not included” in the report, “as a placeholder” for subsequent study. WOEIP and their Pacific Institute research partners then returned to this issue to develop and conduct studies to better understand the residents’ key concern. Although community residents played important roles in the planning and implementation of the truck count and idling studies, this research was preceded by considerable background study by the Pacific Institute partners, including a review of existing research to determine what methods had already been employed for estimating diesel sources. The Pacific Institute also conducted secondary data analysis to estimate diesel pollution in West Oakland and its potential sources, which provided important background and context for the truck count and truck idling studies that followed.

Building on this preliminary work, the WOEIP partnership and the Pacific Institute jointly designed and conducted the truck count and idling studies, together with a third study of

indoor air quality (not detailed here because of small sample size), with funding from the federal Environmental Protection Agency and the California Department of Health Services. One partner described these studies as “research with a purpose,” with the 2 studies we explored designed to “better understand truck patterns and behaviors” so that the partnership could identify strategies to reduce pollution and other impacts of the heavy truck presence in this community.¹

To provide additional background for the work, the Pacific Institute partners conducted an in-house diesel inventory and helped develop a request for application for firms interested in providing technical assistance with the truck count and truck idling studies. Community members played a key role in interviewing 2 potential subcontractors, and the transportation technologies consulting firm TIAX, Cupertino, California, was unanimously chosen through this process. TIAX trained 10 community residents and WOEIP staff while also learning about the community’s lay knowledge to enrich the research. TIAX and the community residents worked together, for example, to identify key street intersections at which the studies should take place. After some background study, TIAX generated a potential list, with community residents and WOEIP staff then using their “in the trenches” knowledge to add additional potential locations and actively participate in selecting final locations. These included intersections with high truck traffic and/or those where large (4.5 ton) trucks were prohibited.²⁵ TIAX then trained the residents as truck observers. After learning to identify different types of trucks (e.g., container and noncontainer trucks, 2- and 3-axle trucks), the observers counted the number and types of trucks, and which direction they were traveling, on 5 neighborhood streets over 3 days. Similarly, they observed and tracked truck idling at the Port of Oakland for 2 different 24-hour periods.²⁵ TIAX also conducted informal interviews with truckers from an independent trucking company and community members to gather their opinions on and experiences with truck traffic.

Throughout these studies, researchers at the Pacific Institute “were behind the scenes as much as possible.” Community residents and WOEIP staff worked on data collection, with

guidance from TIAX, and subsequently worked with the Pacific Institute on data analysis. Although engaging in rigorous research was an exciting and critical part of the work, both community and academically trained partners noted that there were initial tensions in “not having residents at the same technical level as the Pacific Institute.” As a community member commented, this resulted in “a certain amount of pushback,” with residents wanting “a bigger role in designing and conducting the studies and concerned about “having PhDs just come and do the research and then leave.” However, transparency on both sides allowed communication to flow and partners to work out their differences. In the words of another WOEIP leader and community resident, “We’ve always been able to stop a meeting and find the common ground, come to an agreement and resolve the skills difference, and most times after it was explained, we could move on.” In this case, the community learned to appreciate through dialogue that they could not “learn in a week” what outside researchers had spent years learning, yet could still play a vital (and deeply appreciated) part in the research, partially based on their wealth of lay knowledge of the location of heavily trafficked intersections.

WOEIP Study Findings

The truck count study revealed that 6300 truck trips occurred daily through West Oakland, some in areas prohibited to trucks.²⁷ Trucks traveled through local neighborhoods to find truck services, such as fuel, truck repair, food, and overnight parking. The trained resident observers also found that approximately 40 large trucks per day drove on streets prohibited for trucks over 4.5 tons.^{1,25}

Findings from the truck idling study were similarly striking: community partner observers found that trucks were idling outside the Port of Oakland terminal gates an estimated combined 280 truck-hours per day—the equivalent of nearly 12 trucks idling for 24 hours a day. They further found that most of the idling trucks were doing so inside the terminal gates where data collection was precluded. By conservative estimate, however, each truck appeared to be spending about 1.5 hours per trip idling or moving at a very slow pace for container pick up or delivery.¹ The

combined results of these studies revealed that approximately 64 lbs/day of diesel particulate matter emissions were generated from truck traffic and truck idling.²⁵

Although these studies were based on small samples, the partners extrapolated from their findings that West Oakland might be exposed to “90 times more diesel particulates per square mile per year than the state of California.”¹ They further suggested that this figure could translate into an increased risk of 1 additional case of cancer per 1000 residents over a lifetime.¹ These findings, moreover, were given additional weight by a third, albeit very small CBPR study on indoor air quality (not described) suggesting that some West Oakland residents were likely being exposed to almost 5 times more diesel particulates than residents in other parts of the city.¹

From Research to Action

As Bardach,²⁶ Kingdon,²⁷ and others²⁸ have suggested, although the policy making process often is messy and circuitous, several key steps and activities typically are involved, including problem identification, creating awareness, getting on the agenda, constructing policy alternatives, deciding on a policy to pursue, and policy enactment and implementation. For CBPR practitioners interested in helping effect policy level change, relevant research findings, education and policy advocacy frequently are used in conjunction with these steps or activities.²⁸

Building on earlier work that demonstrated very high youth asthma rates and diesel truck traffic as a top neighborhood concern,²³ the WOEIP partnership used findings from its recent truck count and truck idling studies to further define the problem and create awareness, in part by gaining the buy-in of a growing number of stakeholders. After the partnership and a handful of community members crafted initial recommendations based on the study findings, for example, the partners met independently with local organizations, businesses, truckers, and relevant government entities (e.g., the Port Commission, Department of Public Works, and the Police Department) to elicit their feedback. This inclusive strategy was widely credited to the former director of the Pacific Institute’s Community Strategies program. In the words of a EIP community resident and leader:

I don't think I was ever in a meeting with [her] when she didn't say, "who else do we need to have at the meeting?" She was never willing to rush to judgment . . . there was always the potential that you would get a better perspective if you got a few more people to the table.

Involving the truckers was not always easy for WOEIP, one of whose leaders noted that:

In the beginning, this was a tension, because we did not have a good relationship with truckers. I was very adamant dealing with [them], but that was the beginning of my education.

She went on to add that over the course of this and subsequent meetings, "we began to understand the needs of truckers, the labor piece, and began forming our relationship with [them]. We still have this relationship."

The truckers and other stakeholders were also invited to a larger half day release event and community workshop where the WOEIP and Pacific Institute presented the study results and initial recommendations, and received feedback. Additional community members were then trained to conduct door-to-door outreach and advertise a follow-up meeting with WOEIP where residents could further discuss and prioritize the recommendations. The close to 3 dozen residents who attended this release event also shared their experience in relation to diesel exposures and truck traffic in their community. However, as a Pacific Institute partner commented, the other groups present at this meeting (e.g., truckers and the Port Commission) felt buy-in because their ideas, expressed earlier in the more individualized stakeholder group meetings, were represented along with those of community members. Further, when truckers heard residents' stories of how diesel exposure was affecting their children and grandchildren, they expressed more understanding of the community's concerns about their heavy presence in the neighborhood. Similarly, when community members learned about the truckers' experiences and hardships (typically as immigrants of quite modest means), they began forming better relationships and worked to find common ground that would be mutually beneficial.

The follow-up community workshop was attended primarily by 20–25 residents. Although it did not involve a formal process of weighing a range of policy alternatives, this interactive session was described by a community partner as

leading to "a smaller set of solutions." Resident "voting" through dots on a collective list of finalized recommendations clarified their overwhelming priority: designating a truck route that would prevent trucks from traveling through West Oakland neighborhoods. Residents further emphasized their desires for community participation in the process of determining what an alternate truck route would look like, and ensuring that report findings were taken seriously. Their final 13 recommendations were highlighted, along with the study findings, in the partnership's report, *Clearing the Air: Reducing Diesel Pollution in West Oakland* released in November 2003, and an accompanying press release, "West Oakland residents choking on diesel," which emphasized, in particular, residents' desire for a designated truck route³.

Policy Action Strategies and Approaches

The EIP partnership showed considerable policy acumen in its efforts to get the truck route proposal on the agenda of policy makers. Although safety and health concerns were the initial catalyst for the truck count and truck idling studies, for example, when moving into the policy advocacy phase of the work, the partnership was strategic in framing their findings and their policy objective even more explicitly in terms of health. As a community partner noted,

We could have said the truck route was about traffic. We could have said it was about walkability in the neighborhood. We could have said it was about a whole lot of things [but] we said it was about health. And so it was really grounded in something no one could really argue with, especially if they were local.

In underscoring the "health angle," the partnership also provided important backing for their key policy ally: a city councilwoman with strong roots in West Oakland. In her words:

State law, city law looks at commerce [but] we wanted to look at *health issues*—they were not part of agenda. There was community advocacy [framing the problem as a health issue]; community voice added to mine.

The partnership also worked with community members to conduct a power analysis to identify decision makers who could bring policy change and bridge gaps with the city. A

strategic method in policy advocacy, power analysis (or power mapping) helped identify, for a given policy objective, targets with decision-making power on the issue, as well as potential allies, opponents, and other stakeholders and their relative strength and degrees of overlap or independence.²⁹ Such an analysis helped partners create a strategic plan of action to neutralize or win over opponents, mobilized constituents, and brought appropriate arguments and advocacy methods to bear on a target or group of targets.²⁸ In West Oakland, where many key players had already been identified, the power analysis process highlighted the importance of the Port as a key decision maker, and of the district's local city councilmember as a potent ally. However, it also shone a spotlight on West Oakland businesses as an under appreciated group that would be impacted by the proposed new truck route and that they needed to be included in subsequent planning.

Policy makers frequently note the importance of being presented not simply with problems, but also with solutions—ideally solutions that have "buy in" from multiple stakeholders. The WOEIP partnership was strategic in creating a truck route committee that met monthly from October 2004 through September 2005 and included such diverse yet critical stakeholders as local residents, the Port of Oakland, an independent trucking company, the Police Department, the Department of Public Works, the District Air Board, and the West Oakland Commerce Association. The committee's goal was to negotiate an actual truck route that could address community concerns without unduly burdening other stakeholders.

To reinforce the collaborative spirit that had been evident in earlier multistakeholder meetings while assuring continued high level resident engagement, the WOEIP partnership established a collaborative process for the truck route committee in which no one entity took over the agenda. As a community partner stated:

[We] had an agency and a resident, or a business person and a resident. It [was] never one single entity in the lead. And we would go through the process of training each other on how to get along, how this would work. . . that was a new policy for them, a new action for them . . . of the community being a part of defining who were the stakeholders.

Although initially concerned about the implications of having truckers and businesses at the table, for example, just as WOEIP leaders had been early on, community residents gained a better appreciation and understanding of the labor hardships of truckers and the concerns of “mom-and-pop” store owners and other small businesses who benefited from the revenue generated by the truckers’ presence in the neighborhood. Conversely, the truckers became more accepting of a route that would take them out of the neighborhood, whereas business owners began to recognize that as local shopkeepers, they or their employees were also likely to have their health adversely impacted by heavy diesel truck traffic exposure.

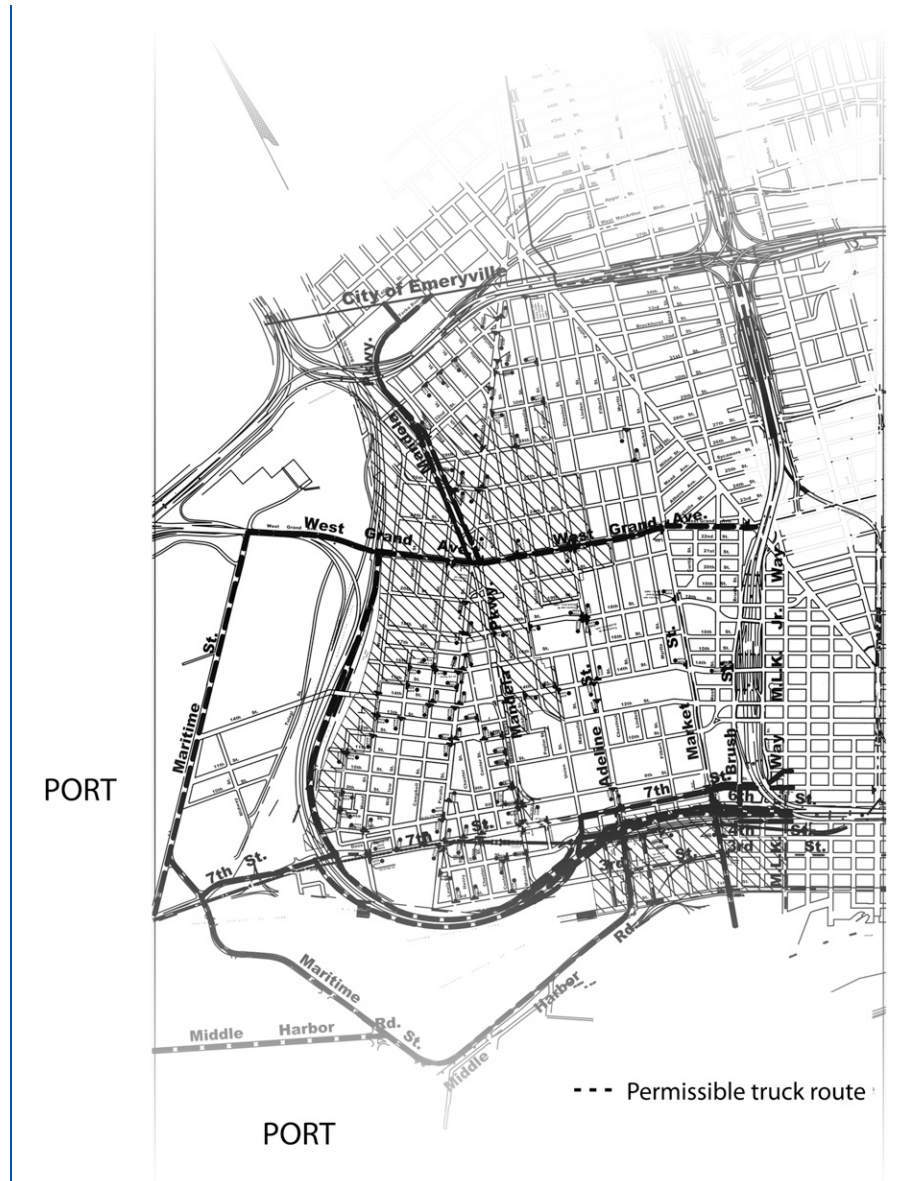
By far the greatest challenge, however, remained getting buy-in from the Port, whose leadership, according to one community leader, “thought that the community shouldn’t be telling the Port what to do.” To better engage this and other city partners in the process, WOEIP’s local city councilwoman and informal policy mentor offered to hold the monthly meetings at her office:

so that people showed up: Other city departments showed up, the Commerce Association, the Port, traffic department, truckers association showed up, so we had buy in from all. . . The power to change policy came out of that.

The city councilwoman was cited as key to getting the Port as part of this process and eventually agreeing to support the new truck route.

Throughout this process, WOEIP leaders and local residents frequently “made the rounds” of neighborhood organizations, getting on the agenda, keeping them informed on “where the routing discussion was going,” and getting their feedback on possible unintended consequences. In this way, even less directly involved residents could have their issues raised and discussed by the truck route committee.

Once the committee agreed on a route, and pushed for a city ordinance to implement it, they engaged in several steps to help increase awareness and support for the proposed policy change. EIP leveraged its alliances with other community and statewide groups organizing to combat diesel pollution, key among them the West Oakland Toxics Reduction



Source: City of Oakland, California. Available at: <http://clerkwebsvr1.oaklandnet.com/attachments/11326.pdf>. Accessed May 14, 2010.

FIGURE 1—Designated truck routes as proposed by truck route committee, West Oakland, California.

Collaborative³⁰ and the Ditching Dirty Diesel Collaborative.³¹

Several town hall meetings and community forums were held to further engage the larger community and generate support for the ordinance, and attracted up to 30 local participants. Residents who expressed interest in providing testimony at the upcoming City Council meeting were also encouraged to do so, and reminded to “stay on the mark” in telling

their own stories because “you’re here to put a human face to the issue.”

Getting to Policy Implementation: Two Steps Forward, One Step Back

In September 2005, the WOEIP partnership and its allies achieved a key victory when the City Council unanimously passed a Truck Route ordinance that adhered closely to the specific truck routes the partnership proposed

(Figure 1). Several of the policy makers interviewed noted that the partnership, and particularly its sound research and the strong community voice represented by WOEIP community members, deserved substantial credit both for this particular victory and for subsequent broader efforts. The combined presence and participation of grassroots residents and “grass-tops” level opinion leaders (e.g., community-based organization heads), together with researchers and representatives of the truckers, the Port, etc., helped achieve a unanimous vote that was “almost anticlimactic” given all the work that had preceded it. As a decision maker said of the WOEIP Pacific Institute partnership,

Their research and advocacy have been critical—critical—in making the Port recognize its responsibility to the surrounding neighborhoods—that they should do their operations in a way that doesn't hurt the community.

Unfortunately, the most visible policy win for which the partnership was given substantial credit was also the most frustrating and incomplete: as the partnership members and policy makers interviewed all commented, failure to enforce the new truck ordinance made it, in many ways, a somewhat hollow victory. As a Pacific Institute partner put it:

We had this great truck route, we had new signs, we had brochures and maps that were supposedly getting distributed through the Port of Oakland, but there was no enforcement. And without that, there's no point. . . . [Enforcement] was overlooked.

Other stakeholders pointed to the City's police officers being spread thin—and mostly focused on violent crime—as a key reason for the lack of enforcement. A community partner similarly noted that there was significant resistance from the city in actually implementing the truck route because it would generate more work and require additional staff time. Whatever the cause, failure to enforce the truck route ordinance was a major disappointment to the partnership, community members, and other stakeholders who worked hard for its passage. In retrospect, as Pacific Institute partner reflected:

Often times the most easily identified policy outcome is also the one that is least significant from a community health perspective. Precisely because decision makers realize that the

easiest way to get a community off its back is to pass something, without being committed in any way to do all the hard work it takes to actually realize the spirit and the vision of what the community needs.

Although lack of policy enforcement was a critical setback, this work has helped prompt other environmental justice initiatives addressing diesel pollution while further building the capacity of WOEIP and its resident leaders and activists. Several of the policy makers interviewed credited WOEIP community partners' advocacy and perceived professionalism, in addition to the still much cited CBPR truck studies conducted with Pacific Institute, as having helped spur other local, regional, and statewide changes. Together, these changes have helped create a more favorable policy environment with respect to environmental justice. The partnership's work, for example, prompted other agencies and institutions to conduct their own studies in this heavily impacted community. In 2006, the California Air Resources Board (CARB) began a comprehensive health risk assessment for diesel exhaust in West Oakland, a multiyear intensive endeavor to formally document the sources, extent, and impact of diesel pollution on health risk for West Oakland residents.³² In the words of one Pacific Institute partner, “CARB started paying attention, the Air District started paying attention. These studies put diesel in West Oakland on the map,” with the Air District itself subsequently conducting follow-up studies in this community.

As WOEIP gained recognition and an increasing voice through the truck count and truck idling work at the local level, it expanded its focus to other air quality efforts happening regionally and reframed them to increase their local relevance. As a community leader explained, “If you do ‘regional’ it will be watered down [in terms of] local impacts.” WOEIP therefore partnered with the Air District and the Port staff to design an air plan to benefit West Oakland as part of the broader goods movement efforts taking place regionally, statewide, and nationally. In the course of this work, WOEIP also helped change the structure of the planning group, so that a community member of WOEIP now serves as a cochair. As an WOEIP leader and long time resident pointed out:

We have moved from doing this truck thing to being engaged in goods movement, identifying something that's local and then actually dealing with what a clean air plan should look like locally.

Partners and policymakers described WOEIP's recent work as critical in getting the Port of Oakland to commit to an 85% reduction of the community health risk caused by its diesel operations by 2020. Although the process has been challenging and the details of the air plan are still being worked out, partners have described how their work has improved organizational structures so that the community and other important stakeholders are now represented in air planning groups. As another WOEIP community leader commented:

We've been successful on [many] procedural levels. We were able to change the entire structure of that air planning group [getting] a community member on as a co-chair. After we did that, we said, “Who else isn't here? . . . we think the industry ought to have a co-chair seat and the health department [too].” . . . So we expanded the agenda, setting part of that to include two other groups we thought were important, some as allies and some as adversaries, but voices that needed to be at the table. That kind of approach gets us respect and changes our perspective as a community organization. It adds to our reputation in a positive way.

Finally, both the partnership's early work and subsequent efforts helped create conditions in which partnership colearning could occur, and the research and advocacy capacity of the West Oakland community could grow, fostering sustainability. As one community partner noted:

As we did our own research and thought about things, we were able to ask other questions. It was good. . . much more of folks' unknown information [was brought] out into the community. Our ability to question, “Why was this? Why was this happening here?” We were able to do much more proactive advocacy on a lot of different levels at the same time.

Similarly, a research partner at the Pacific Institute spoke of how much she and her organization continued to learn from the community and the leadership of WOEIP, particularly about community organizing and advocacy.

New Directions and Building Sustainability

An important hallmark of CBPR involves its commitment to building community capacity as a means of ensuring long-term

sustainability.^{21,33} After the truck count and idling studies and subsequent work to establish a truck route, WOEIP expanded its own initiatives on several fronts, including conducting a second truck count in partnership with the Air Quality Management District in 2008, playing a key role in the formation of the West Oakland Toxics Reduction Collaborative, and receiving both a planning grant from the US Environmental Protection Agency and a grant from the Air District in support of its work. With assistance from the Pacific Institute, WOEIP also has continued to build local leadership capacity, offering a 4-week intensive training for West Oakland residents on topics including environmental health and land use planning, an understanding of the policymaking process, and skill-building in policy advocacy. Further, and in a major victory for the West Oakland community, WOEIP's executive director was appointed a Commissioner of the Oakland Port Authority in 2007.

The relationships formed between the WOEIP community partnership and agencies including the Air District, the Port of Oakland, and private trucking industry have also continued to develop. Recently, for example, when over 1200 independent truckers were threatened with losing the ability to service the Port due to a delay in getting grants for needed retrofitting equipment, WOEIP supported the truckers' request for an extension, and in the process helped prevent many of these predominately immigrant workers from losing their jobs.

WOEIP's and the Pacific Institute's truck count and related studies and policy level work continue to serve as a model for others of how CBPR can help produce solid data and use it to move forward environmental policy efforts in a way that empowers and respects the community. Recently, for example, WOEIP provided technical assistance and loaned equipment to another nonprofit organization, Communities for a Better Environment, which used the partnership's truck count model in doing its own truck count study in East Oakland.

Finally, and in a further effort to help take this work to scale, without losing sight of local concerns, WOEIP helped design the statewide Goods Movement Action Plan, and WOEIP's executive director also served on the working group of the US Environmental Protection

Agency's National Environmental Justice Advisory Council (NEJAC). Drawing on the research of the WOEIP partnership and numerous other groups and organizations, NEJAC produced a major report with recommendations for federal, state, tribal, local, and other agencies on how best to identify, prevent, and eliminate the disproportionate burden of air pollution from goods movement in low-income communities of color.³⁴

Without ignoring the hurdles faced in this work—and in particular, the failure to get adequate enforcement of the truck route ordinance—the value of the partnership's contributions and their ripple effects in other communities and on the state and even national levels, were highlighted by policymakers and other key informants. Finally, the role of this partnership in showcasing the utility of research collaborations that “put community leaders in the driver's seat” was underscored. In the words of a Pacific Institute partner:

We were not doing the research 'on them,' but they were leading the research effort. They were asking the questions, choosing the contractor, deciding the policy solutions, and we were supporting them with technical and facilitation support throughout the process. This is completely the reverse of the typical academic-community partnerships. What if a high-powered research institution could be put at the service of communities (instead of industries and others)—what dramatic changes could result? Well, we've seen them.

DISCUSSION

Our research goal examined the CBPR processes and outcomes involved in the West Oakland EIP partnership's efforts to study and address, through policy level change, the problem of disproportionate exposure to diesel truck exhaust in this community. The partnership's struggles and successes in this regard were highlighted, as a means of illustrating how community-led partnerships may use CBPR to help change environmental health policy or the broader policy environment.

Although the use of multiple methods of data collection helped increase our confidence in the study findings, several limitations should be noted. Recall problems, particularly surrounding the original research studies conducted in 2003, may have led to inaccuracies

in the reporting of study methodology. To minimize this, we carefully studied the outside consultant's (TIAX) detailed report that helped corroborate the interviewees' description of study procedures. Partners and policy makers interviewed may have over or underemphasized the role of the WOEIP partnership's research and advocacy efforts in helping move policy, and may similarly have under or overestimated the role of other stakeholders and contextual factors. The use of triangulation of data sources was helpful in partially mitigating this problem, as we found a high level of consistency in responses among the 7 key partners interviewed; their responses were well corroborated by the policymaker interviews and archival reviews. However, it remained impossible to determine with any certainty the extent to which the WOEIP's partnership's work contributed to policy outcomes. As Stermann³⁵ noted, the lengthy time delays in policy-related work precluded understanding the long-term consequences of the actions of any individual actors. As a result, “Follow up studies must be carried out over decades or lifetimes. . . .”³⁵ Finally, the nature of this small qualitative study meant that by definition, the findings were not generalizable.

The results of this case study complemented those of a number of other studies in suggesting the utility of a CBPR approach in producing credible research that may help promote environmental health policy change.^{11-18,36,37} Consistent with the WOEIP partnership's experience, for example, studies credited CBPR efforts with playing a key role in helping implement policies to reduce exposures to diesel bus emissions in Harlem, New York³⁸ and Roxbury, Massachusetts¹¹ and to secure the renegotiation of a rule governing maximum allowable cancer risk from stationary facilities in southern California.^{18,39} Moreover, similar to the work of the WOEIP partnership, several of these efforts have been credited with helping change the broader policy environment. The Southern California Environmental Justice Collaborative, for example, received substantial credit for the state Environmental Protection Agency and other decision-making bodies increasingly thinking in terms of cumulative rather than individual risk and taking community health impacts into account in their policy deliberations.^{18,39} In New York City, the West Harlem Environmental ACTION, Inc. (WE

ACT) partnership's high quality research and effective community-based advocacy helped secure the community partner's executive director a leadership role on the task force charged with developing a statewide environmental justice policy.³⁸

Finally, and in addition to its role in several specific policy wins in Long Beach, Los Angeles, and the Inland Valleys (e.g., adoption of the joint Ports' "Clean Air Action Plan"), Trade, Health & Environment (THE) Impact project was credited with helping

change the debate on neighborhood contamination through increased community participation and recognition of the health impacts from living in close proximity to mobile source air pollution.

A recent decision to delay expansion of a major freeway to enable more community input in the deliberations was credited in part to THE Impact Project and its successes in changing the policy environment by "[elevating] community voices in the policy arena, while also using the science and policy work of the academic partners to strengthen those voices."⁴⁰

Several of the factors identified in the present study as critical to the WOEIP partnership's success also reflect those of other community-academic partnerships with a similar goal of helping to redress environmental injustice through policy change. The need for a strong community base including effective alliance and community leadership has been widely cited.^{14,15,19,33,38,39,41} Links to coalitions, for example, have been shown to help "reframe an issue so as to broaden support."⁴¹ The importance of credible science that can "stand up to careful scrutiny" additionally has been widely emphasized,^{18,36-38,42} as has the effective combining of research, community organizing, and policy advocacy.^{11-14,17-19,43}

Other CBPR case studies highlighted the importance, especially early on, of strong technical assistance as both strengthening the research and helping open doors and forge alliances with respected entities that could be of strategic importance in the future.^{12,14,17,36} Although academics sometimes are reticent to be involved with the mass media, Farquhar and Wing⁴⁴ noted:

Environmental health findings presented via mainstream media channels can protect exposed community members, motivate participation in

democratic processes, and influence public opinion and policymakers.

Effective media advocacy, in which the mass media were used strategically to promote a community or public policy agenda, contributed substantially to the visibility and impact of the WOEIP partnership's work, and have likewise been important to other environmental policy-oriented CBPR collaborations.^{11,14,17-19,42,46} Ritas⁴⁵ online resource "Speaking Truth, Creating Power: A Guide to Policy Work for Community based Participatory Research Practitioners" may be useful to partnerships wishing to incorporate this and other forms of policy advocacy in their CBPR efforts.

The high value that the WOEIP partnership assigned to building collaborative relationships with potential policy allies and regulators, as well as other community-based organizations and local and regional coalitions, was reminiscent of the work of other successful environmental justice efforts around the country.^{11-12,14-19,39,42,43,45} Yet the WOEIP partnership's inclusion of representatives of the trucking industry, whose behavior they sought to change, may have set an important new standard in such work. This inclusive approach, captured in the catch phrase "who else should be at the table?" appeared critical to such policy wins as getting a truck route ordinance and more recently, getting the Port of Oakland to commit to an 85% reduction in the community health risk caused by its diesel operations by 2020—a policy that could ultimately have greater health payoff for the community than the ill-fated truck route. The community organizing maxim that there are "no permanent friends, no permanent enemies" appears to have held the WOEIP partnership in particularly good stead in this work.

Yet as this and other CBPR case studies focused on environmental justice illustrated,^{36,38,45,47} tensions emerged throughout this process that should be addressed openly and with an eye toward finding "common ground." The need for WOEIP and Pacific Institute partners to become comfortable with their different skill levels and roles in the more technical aspects of the research was critical for the process to go forward, as was the subsequent working out the tensions some community partners felt about including truckers in policy deliberations. Finally, as this and other environmental justice

projects case studies illustrated^{36,38,48} policy wins can be shallow victories if not followed by strong implementation commitment and oversight. Each of the 7 community and outside research partners interviewed commented on the failure to enforce the 2006 truck route ordinance as a bitter pill to take, even if not entirely unexpected, in the aftermath of a strong, inclusive, and well-fought campaign. In retrospect, it would have been useful for the community and the WOEIP partnership to include in their data collection documentation regarding implementation of the ordinance, and further, for residents to work with local law enforcement to cite offenders. Yet as noted previously, the dearth of sufficient police officers, and their understandable focus on problems such as violent crime, probably doomed the ordinance strategy from the outset. Further, as several of those interviewed commented, relatively easy policy wins like the passage of an ordinance, although important symbolically and in increasing community visibility, may not in themselves be strong enough to bring about real change.

In retrospect, and in addition to its sound research, the major accomplishment of the WOEIP partnership may well have been in substantially amplifying community voices in the policy arena: WOEIP and its partners are routinely consulted by key decision-making bodies and are often "at the table" when important decisions are being made. The appointment of WOEIP's director to the Port Commission further stands as an important signal that West Oakland and its leaders and organizations are making headway in attaining the "procedural justice" (having a say in decision-making affecting their community)⁴⁹ that is an integral part of environmental justice for low income communities of color.¹⁷

The fact that WOEIP conducted its own truck count study and brought in its own federal and local grant funding, are suggestive of the longer term contributions of this CBPR partnership to the community capacity building that can further sustainable change. As Srinivasan and Collman⁵² and others^{46,47} pointed out, building such capacity and striving "for a more equitable partnership—not only in the distribution of resources but also in power/authority, the process of research, and its outcomes" is a goal for which CBPR partnerships need to strive.⁵⁰

Recent changes in the context within which environmental health-focused CBPR takes place must be carefully monitored for their potential impacts, however. On the positive side, increasing collaboration between multiple partnerships and organizations concerned with diesel emissions and their health impacts, including, in California, the Ditching Dirty Diesel Collaborative,³¹ and the statewide coalition, Community Action to Fight Asthma⁵¹ may be increasing the clout of community, health department, and academic partners working to secure broader policy change in this area. Conversely, major cutbacks associated with the severe recession may also take a toll on this work, both in constraining funding and resulting in a weakening of regulations or implementation in the name of cost containment. Finally, as Sterman³⁵ noted, “Complexity hinders the generation of evidence” and any efforts to discuss the contributions of CBPR partnerships to changes in policy or the policy environment must be undertaken with considerable caution.

Bearing these precautions in mind, however, the WOEIP partnership may serve as a useful model for community and academically trained researchers interested in establishing sustainable local partnerships that can produce credible research, build community capacity, and potentially contribute to changes in policy and the policy environment that may promote environmental health. ■

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Contributors

M. Minkler originated and supervised the study including conceptualization, data collection, analysis and interpretation, and the writing of this article. P.A. Gonzalez and A.P. Garcia assisted with data collection, analysis and interpretation, and in the writing and editing of the article. M. Gordon, B. Beveridge, M. Palaniappan, C. Garzón, and S. Prakash all provided valuable information and

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Human Participant Protection

This study was approved by the institutional review board of the University of California, Berkeley. All key informants signed informed consent letters before their participation, and safeguards were taken to ensure confidentiality.

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