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Integrating Research and Action: A Systematic Review of Community-based Participatory Research To Address Health Disparities In Environmental and Occupational Health in the United States

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Abstract

Introduction—Integrating research and action represents a goal and key principles of CBPR, but there has been little effort to synthesize the literature to evaluate if such integration is occurring.

Objectives—1) To examine the extent to which CBPR integrates action to effect community-level change; and 2) to ascertain factors that facilitates such integration.

Methods—Original articles reporting on CBPR in environmental and occupational health in the United States were identified primarily through a MEDLINE search. Inceptions, processes, methods, and outcomes of the projects were reviewed.

Results—In fourteen of the twenty studies reviewed, CBPR led to community-level action to improve the health and well-being of the community members. Observational studies that investigated problems posed by the affected community and that incorporated qualitative methods were more likely to lead to action. The collaboration among government scientists, university researchers, and community partners emerged as a new model of CBPR partnerships that effectively integrates research and action.

Conclusions—To help CBPR better integrate research and action, a shift towards community-initiated and action-oriented observational studies might be needed.

Key phrases

community-based participatory research; health disparities; community health; environmental health; and occupational health

I. Introduction

Community-based participatory research (CBPR) is essentially an egalitarian and action-oriented endeavor that strives to equitably involve community members, organizational representatives and researchers in all aspects of the research process. The partners contribute unique strengths and share responsibilities to enhance the understanding of a given

phenomenon and the social and cultural dynamics of the community, and integrate the knowledge gained with action to improve the health and well-being of community members. [1]

Integrating action with research is an integral part of most known definitions of CBPR,[1–4] representing one of the goals and key principles of CBPR, but there has been little effort to synthesize the literature to evaluate to what extent such integration is occurring. Most of the previous reviews have focused mainly on the process of CBPR to document institutional, methodological, and other issues and challenges involved in building and sustaining CBPR partnerships and the strategies to cope with them.[5–7] To help CBPR deliver on its promises, it is imperative to take the next step to evaluate the extent to which CBPR involves action to effect community-level changes and what factors facilitate such action. The present review represents such an effort.

One of the previous reviews, the most comprehensive one to date,[8] touches upon this issue to provide a brief account of CBPR projects in which research findings were translated into policy change, albeit with fundamental differences from the present review. First, even while acknowledging unique benefits of CBPR, the authors of this previous review take the perspective of the prevailing biomedical tradition of health research in evaluating research quality of CBPR mainly with respect to research design rigor (such as internal and external validity, intervention fidelity, outcome measures, statistical analysis, and blinding, etc.) and formulating recommendations on how to incorporate community involvement in a way to enhance such research quality in CBPR. Although an emphasis on design rigor is fundamentally legitimate, such criteria need to be reconsidered in evaluating CBPR in which scientific pursuit of knowledge is not an overarching goal but integrating action to address the problem investigated is considered an equally justifiable element of scientific endeavor. Secondly, the recommendations formulated in this comprehensive review are more conceptual than empirical, and thus limited in providing meaningful, qualitative information that can help CBPR move forward. The present review offers such qualitative information.

The scope of the present review is limited to environmental and occupational health areas in the United States. More resources have been made available for CBPR projects in these two areas in recent years, with more public funding provided for CBPR in environmental health [9] and with labor unions able to support CBPR to address health problems affecting their constituents.[10] It is thus meaningful to take stock of the progress made in these areas. Also, given that occupational and environmental hazards and their remedies tend to be of a collective nature in their origins (that is to say, environmental and workplace hazards are likely to affect all those who live and work in the same physical environment), it is particularly appropriate to examine if CBPR projects in these two areas have yielded community-level action to address such problems. On the basis of the recent developments in CBPR in these areas, the present review attempts to glean the facilitating factors for CBPR that successfully integrates research and action.

II. Methods

1. Inclusion Criteria

To identify references for CBPR to address health disparities in environmental and occupational health, the MEDLINE database was searched using the key phrase, “community-based participatory research,” “participatory research,” “participatory action research (PAR),” and “health disparities” in combination with “environmental health,” “environmental justice,” “worker health,” “worker safety,” and “occupational health.” A manual search was conducted on all the references thus identified. Searches were not restricted to a specific time period.

Studies that met all of the following criteria were included:

- Original articles published in English;
- CBPR/PAR studies conducted in the United States;
- Studies that investigated the effect of environmental or occupational risk factors on human health or those that implemented interventions to address them.

When more than one article was published from the same study, all the articles that documented the inception, process, findings, and the use of findings were included.

2. Key Aspects of CBPR to be Reviewed

I examine whether the research problem originated from the defined community. This is of critical importance in CBPR because a research problem originated from the community may be more likely to reflect genuine and central community concerns and the research project to be supported by members of the community. Three categories used to determine the degree to which the research problem was posed by the community are if the project was initiated by: 1) community members or groups; 2) academic researchers; or 3) the mutual agreement between community partners and researchers. These categories—and most other categories used in the present review—are used mainly as “sensitizing concepts,”[11] rather than strictly operationalized variables, to allow further generation of qualitative information

Secondly, I examine whether the collaboration was relatively equitable. Researchers possess inherent power when partnering with community members[12] and conventionally take the lead role in designing and implementing research. An equitable partnership in the CBPR process was operationalized as community partners’ active participation in decision-making in central research areas, that is to say, over setting research agenda/priorities, developing and implementing the research project, and how to use the findings, beyond the customary roles of providing consultation and volunteering or working as supportive research staff.

Thirdly, I evaluate research designs and methods used in the CBPR projects in search for clues for those more compatible with action-oriented CBPR. The categories used to classify research designs are: 1) randomized control trial; 2) retrospective or prospective cohort study; and 3) cross-sectional study. I also examine if a given project used quantitative methods, qualitative methods, or both.

Fourthly, I examine whether a given CBPR project led to community-level action, which was operationalized as collective efforts to effect community-level changes that go beyond efforts to modify individual-level behaviors of community members. With little prior research to guide the conceptualization of community-level action, further operationalization was not attempted.

On the basis of the evidence provided by this review, suggestions are formulated concerning appropriate methodological approaches and funding policies that might facilitate CBPR better integrating research and action to improve the health and well-being of community members.

III. Results

Thirty-three articles reporting on twenty studies—seventeen in environmental health and three occupational—met the inclusion criteria. They were conducted in collaboration with low-income communities, mostly African American and/or Latino communities, with the exception of two Native American communities and a Vietnamese community. A summary of the studies included is presented in Table 1.

1. The Inception of the Studies

Ten of the twenty studies reviewed were initiated by the affected communities: seven of them by community-based organizations (CBOs) or groups (Studies 1, 2, 6, 9, 12, 13, 20); one by a labor union (Study 11); one by community residents (Study 14); and one as an outgrowth of preliminary research initiated by a community member and a nurse (Study 5). The rest of the studies were initiated by university researchers (Studies 4, 8, 14, 17, 19), by U.S. EPA scientists (Study 7), by both a CBO and university researchers with mutual understanding that CBPR was needed (Study 3), and grew out of an existing CBPR partnership (Study 10). Authors of three studies (Studies 15, 16, 18) did not explicitly state who initiated the projects.

It appears that community partners who initiated the research partnerships recognized the strategic importance of collaboration with academic researchers. Communities tend to lack the expertise needed to conduct health research, and academic researchers can lend support to them by compiling credible evidence to validate community concerns. For example, a CBO routinely collected information on the community's exposure to environmental hazards, but unable to collect, synthesize, and present the data in a way to effectively influence public opinion and policy, they sought to collaborate with researchers (Study 3). In other cases, community partners chose to work with researchers because of the credibility lent by the latter's affiliation with academic and other respectable institutions (Studies 7, 9). In one study, this validation of community concerns helped spur the community's readiness to act, further promoting changes (Study 11).

Academic researchers reported that community collaboration had been valuable in making the studies possible and valid and in generating credible data. Community partners helped academic researchers to recruit and retain study participants (Studies 2, 4, 8, 10, 11, 12), to increase compliance and improve accuracy of reported information (Study 14), and to render the research to be more culturally sensitive and acceptable to the participants and relevant to the local context (Studies 4,8,10).

2. Community Collaboration

The most common role community partners played was to provide consultation, either as staff of a CBO, individual community members, or members of Community Advisory Board or a Steering Committee. In just one study (Study 17), consultation was the only role community members played in the research process otherwise dominated by academic researchers. In the rest of the studies, consultation was provided in conjunction with other research-related activities.

It appears that community partners in some CBPR projects were in more equitable partnerships than in others: they defined research questions, set research agenda or determined research priorities (Studies 2, 9, 11, 13, 14), jointly made decisions on the design of research or intervention (Studies 2, 5, 6, 7) or how to use the findings to create change (Study 1), and approved grant applications or publications/presentations (Study 6). In one study (Study 11) community partners appear to have been more dominant than the academic researchers, with one of them—a labor union—providing the bulk of the research funding and setting research priorities.

It should be noted that community partners tended to play a more integral role in studies initiated by community members or organizations: eight (Studies 1, 2, 5, 6, 9, 11, 13, 14) of the nine studies (Studies 1, 2, 5, 6, 7, 9, 11, 13, 14) in which community partners shared power with academic researchers in defining the research problem and developing the project on a more or less equal footing were initiated by the community.

3. Research Designs and Methods

Four (Studies 4, 8, 10, 15) of the twenty studies reviewed involved randomized control trials (RCTs); the rest were observational studies. One of the observational studies was a combination of cross-sectional/case-control design; another a combination of cross-sectional/cohort design; two were prospective cohort studies; and the rest were cross-sectional studies. In most of the cross-sectional studies, both quantitative (i.e. administering structured questionnaires and conducting exposure assessment) and qualitative methods (observation, in-depth interviews, focus group sessions, etc) were used.

All of the ten studies initiated by the community were observational studies: six (Studies 1, 2, 6, 9, 11, 20) of them were cross-sectional, using both quantitative and qualitative methods; three involved prospective cohort studies (Studies 1, 12, 14); and one (Study 5) combined cross-sectional exposure assessment and a case-control design. None of the studies originated from the community involved an RCT.

Research quality of the observational studies included in this review may not rate high with respect to research design rigor. Most of these studies relied on purposive or snow-ball sampling, finding willing study participants through community partners in communities that were willing or sought to work with professional researchers. Cross-sectional studies may have fared worse because of the limitations inherent in the design—i.e. the inability to establish temporality between the exposure(s) and the outcome(s). Prospective cohort and case-control studies were designed to address this issue but were not free from the limitations that plague exposure assessment in environmental and occupational health—i.e. the difficulty to assess simultaneous and cumulative exposures to multiple hazards/risk factors and their unknown combined effects.[45]

In the four studies that involved RCTs, arrangements were made to enhance design validity by randomly assigning study participants to intervention and comparison groups. However, community partners in all four RCTs found the design too complex or simply unacceptable, with the main contention being over the withholding of beneficial interventions from the control group. In response to such community reactions, investigators of three RCTs instituted staggered designs in which what initially was to be the control group became a “treat later” (Studies 4,10) or a “lower-intensity” group (Study 15). Still, field staff members recruited from the community had “concerns about asking low-intensity groups to wait one year before receiving the benefits of the high-intensity intervention” (Study 15). These findings indicate that the design rigor involved in the RCT may be fundamentally at odds with the healthy common sense of community partners that beneficial treatments should not be withheld from those who could benefit from them just to satisfy rigorous research requirements. To the extent that such a design appears unreasonable to community members, it may undermine the trust the academic researchers work hard to forge with community members: in one study, the use of RCT gave the impression to some community partners that “research mattered more” to the academic partners than their well-being (Study 10).

3. Outcomes of CBPR

A. Did CBPR Lead to Action?—In fourteen (Studies 1, 2, 5, 6, 7, 9, 11, 13, 14, 15, 16, 17, 19, 20) of the twenty studies reviewed, CBPR led to action to improve the health and well-being of the community members, for example: to force the cancellation of plans to build industrial hog plants (Study 2); to clean a river bank and to identify alternative sources of food to fish caught in contaminated river (Study 7); to successfully negotiate a new union contract that reduced workload for hotel room cleaners (Study 11); and to force the local Housing Authority to replace the central heating system at a public housing to improve air quality (Study 17). In some studies, the intervention itself—for example, one that involved soil lead abatement

for homes (Study 16) and another to reduce indoor asthma triggers (Study 15)—represented a significant action to improve community health.

Nine (Studies 1, 2, 5, 6, 9, 11, 13, 14, 20) of the fourteen studies that led to community-level action were initiated by the members or CBOs of the affected community. This may be because community partners who initiated CBPR continued to search for solutions to the problems investigated during the course of research. In a way, CBPR they initiated may in itself constitute a community-level action to address the problems that negatively affected their communities.

It is noteworthy that CBPR projects initiated or prompted by government agencies also led to action to improve the conditions within communities. U.S. Environmental Protection Agency (EPA) seems to have led the way: in at least three studies reviewed, the partnership of community groups, EPA scientists, and university researchers investigated environmental health risks, and developed/implemented interventions to address them or engaged in action otherwise. In the fourth study, the federal Agency for Toxic Substances and Disease Registry played a similarly pivotal role. In five other studies reviewed, state or city departments of Health, Environmental Protection, and Housing were integral partners, providing funding and technical assistance in designing and implementing interventions. Only two of the CBPR projects that led to action were initiated by university researchers (Studies 17,19), one of which was initially proposed by the company medical director who became aware of similar health problems plaguing the workforce (Study 19). Thus, CBPR projects that led to action are much more likely to have been initiated by the affected community or by government scientists/agencies than by academic researchers.

With the exception of one study that involved an RCT (Study15), all of the studies that led to action were observational studies, most of which had cross-sectional designs employing both qualitative and quantitative methods. While quantitative methods were useful in collecting and synthesizing data to estimate epidemiological measures, qualitative methods were invaluable in: developing research tools, for example, survey instruments (Studies 1, 9, 10, 11) and culturally-appropriate and contextually-relevant interventions (Studies 3, 8); and incorporating community knowledge and observations to uncover new sources of health risks previously unknown to researchers (Studies 6, 7). Thus, qualitative methods played a more central role in many of the CBPR projects reviewed than in conventional biomedical health research to produce more informative findings.

B. Did CBPR Help Build the Community's Capacity?—Enhanced capacity of the community has been reported in several studies in terms of the acquisition of research skills (Studies 3,6,8,9,12,14) or an improved ability to secure funding (Studies 3,6,8,15). However, for CBPR to truly energize and empower communities, a critical consciousness on the part of community members and their increased desire and ability to mobilize their community to effect change are essential. In this respect, building leadership skills is critical.

Two studies stand out in the ways in which community members built and demonstrated their leadership skills. In one study, youth interns not only became more knowledgeable about air pollution and air monitoring, but also cultivated and exercised key leadership skills while engaging in public speaking, strategizing, and educating community members to successfully rally the community behind them (Study 9). In another study, some hotel room cleaners—the core members of the research team—emerged as peer leaders to serve on hotel's joint labor management problem-solving committees even after the completion of CBPR (Study 11). Both of these studies were initiated by the communities and further aided by the related social movements—the former by the environmental justice movement in which the youth leaders were initially trained, and the latter by the labor movement that supported the CBPR project.

IV. Discussion

To summarize the findings, community partners in studies initiated by the community are more likely to participate in the CBPR process in a more integral and equitable manner, build leadership skills, and use the findings to take community-level action to address the problems investigated. The integration of research and action in CBPR is more likely to occur in observational studies incorporating qualitative methods.

Limitations of the present review should be noted. First, in relying on published articles to synthesize information, I was unable to use unpublished articles or independently verify the information provided by the authors in published articles. Though inherent in most systematic reviews, this limitation may have biased the findings, to the extent pertinent information was omitted or misrepresented in the published articles. Secondly, in evaluating the integration of research and action in CBPR, the present review was not able to take into account the circumstances under which the practitioners of CBPR deemed no immediate action to be the best option, mainly due to little documentation of such circumstances in the literature reviewed.

Findings of the current review offer clues on key facilitating factors for successful CBPR.

Firstly, who initiated the study is of critical importance in shaping the process and outcome of CBPR. The needs of the researcher are often guided by theoretical research questions, whereas the needs for the community are practical and action-oriented.[46] Therefore, it is not surprising that when the impetus of CBPR came from the affected community, the research problem is more likely to reflect genuine community concerns and the research to be carried out with potential, relatively near-term solutions in mind and to lead to meaningful action.

Secondly, CBPR can be more successful when supported by social movements. The findings of this review offer examples of CBPR in which community partners who had built their organizational strength in related social movements—i.e. the environmental justice and labor movements—came to play an integral role in CBPR to generate tangible benefits for the community. To conduct successful CBPR, therefore, the community itself should be mature, enough to offer a vision and the ability to jointly investigate community health issues and to plan a course of action to address them.

Thirdly, CBPR projects that integrated research with action are more likely to be observational studies, most of which incorporated qualitative methods. With the exception of one study (Study 15) that led to advocacy, the RCTs reviewed did not lead to community-level action geared toward delivering tangible benefits for the community; none of the RCTs were initiated by the community. The findings involving the contention over RCTs—that, by design, it denies benefits of interventions to control group members, albeit temporarily in some RCTs—suggest an inherent tension between the rigor required of RCT and core principles of CBPR to integrate research and action for the mutual benefit of all partners.

Critics have questioned if the preoccupation with RCTs is appropriate in addressing research questions posed in community interventions with long and complex causal pathways,[47] especially for those that require flexibility to incorporate the perceptions and characteristics of the community.[48] RCTs involving community participation have been used mainly in phase-two translational research that promotes the adoption of an intervention whose efficacy has been established in clinical research.[49,50] A case can be made that in action-oriented CBPR a higher priority should be given to making a beneficial intervention available to the community than to testing its effectiveness in the most rigorous manner. Observational designs closely integrated with surveillance[51] might be more appropriate in evaluating the effectiveness of the intervention in CBPR.

Qualitative methods are conducive to eliciting in-depth information from the participants without imposing more structured research protocols on them. Also, while quantitative, individual-level data collection is likely to decontextualize the ways in which risk-taking behaviors and environment are generated and sustained, well-designed and carefully conducted qualitative studies can enhance one's understanding of the problem within the context it is generated.[52] These qualities render qualitative methods particularly useful for CBPR in that they are likely to help generate actionable knowledge—better informed by community members living under local conditions—and integrate it into contextually relevant strategies to effect community-level changes.

Fourthly, the collaboration among government scientists, university researchers, and community partners emerged as a new model of CBPR that effectively integrates research and action. Armed with scientific expertise and access to resources and governmental decision-making, and yet unencumbered by the requirements made by funding agencies of research fund recipients, government scientists may be in a unique position to freely investigate and promote action to better serve disadvantaged communities. Such is the flexibility that should be allowed to CBPR researchers to enable them to conduct truly participatory research that integrates research and action.

IV. Conclusions

The focus on action in the present review is not intended to downplay CBPR projects that do not lead to action. Even when not generating immediate benefits, CBPR has been an important vehicle in public health research by incorporating community involvement to better identify the community needs and to conduct a more valid and relevant study, while engaging the community in a more or less equitable manner. Such progress should be duly recognized.

Rather, I argue that action-oriented CBPR seeking solutions to the community's problems though community-level change—one that is perhaps more consistent with the proclaimed goals and ethical principles of CBPR—should be recognized and promoted. Some federal research funding agencies that have been at the forefront of promoting CBPR, most notably the National Institute of Environmental Health Sciences (NIEHS), recognize that to be successful, research and prevention/intervention strategies must address the concerns of the community residents and that the scientific knowledge community residents acquire may be used to inform policy and regulatory decisions.[53] However, reflecting the currently prevailing paradigm of biomedical research, their funding criteria favor biomedical, hypothesis-driven research questions.[54]

Advocates of CBPR have already argued that funding and academic institutions need to extend their criteria for research excellence and be flexible to incorporate the input of community partners.[6] I go further: I recommend that “action” should be a legitimate component of the criteria. It might be helpful for funding agencies to create programs to support action-oriented CBPR or institute special emphasis panels to evaluate the merits of proposed CBPR projects in their ability to integrate research and action.

When communities engage in CBPR, their primary concern is to generate usable or actionable knowledge.[19,55] To help communities generate actionable knowledge and use it to promote the health and well-being of community members, the extent to which research findings are used to effect change should be an integral part of the criteria to evaluate the quality of outcome-oriented CBPR. A new set of funding criteria and priorities, or, indeed, a paradigmatic shift in determining what constitutes good public health research is called for to promote community-initiated and action-oriented CBPR.

What this paper adds

Posing research questions not addressed in previous reviews of CBPR, this paper produces findings that will help facilitate the integration of research and action in future CBPR. It also offers a new model of CBPR partnerships that are conducive to action-oriented CBPR.

Policy Implications

Funding agencies need to revise the currently prevailing criteria for research excellence in evaluating proposed CBPR projects. It might be helpful for funding agencies to create programs to support action-oriented CBPR or institute special emphasis panels to evaluate the merits of proposed CBPR projects in their ability to integrate research and action.

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Table 1

Summary of Studies Included in the Review

Study no./ Authors	Location	Project goals/objectives	Research design/methods	Partnership composed of	Project initiated by	Community Collaboration	Action taken by community/outcomes
1 Farquhar & Wing.[13]	Rural eastern North Carolina	Investigate health effects of a flood and the needs of survivors	Cross-sectional/Quantitative & qualitative	A coalition of local CBOs & university researchers	A community coalition on the basis of input from flood survivors	Consultation; generated survey questions; conducted interviews; determined how to apply findings to create changes	Rallies, media and legislature advocacy/ Extended provision of temporary housing for survivors
2 Wing.[14]	Rural Halifax County, North Carolina	Quantify potential impacts of industrial hog feeding operations on health and quality of life	Cross-sectional/Quantitative & qualitative	Community groups and university researchers	A grassroots environment al group	Determined the research problem, participated in developing survey, selecting research site, collecting data, and determining how to present the results	Plans to build hog feeding operations cancelled
3 McCauley et al.[15]; McCauley et al.[16]	Willamette Valley, OR	Assess pesticide exposure and its health effects	Cross-sectional/Quantitative & qualitative	CBOs and university researchers	A CBO and university researchers	Consultation on instrument design, data collection, data interpretation, and presentation of results; youth worked as research assistants	Not reported
4 Swartz et al.[17]	Baltimore, MD	Test the effectiveness of a pollutant and allergen control strategy on childhood asthma	Randomized controlled trial/Quantitative	Community members, social worker, public health practitioner, & university researchers	University researchers	Consultation-- served on CAB to jointly develop principles of research protocol and to facilitate communication and recruitment	Not reported (University researchers assisted community beyond the conduct of the study)
5 Maslia et al.[18]	Ocean County, NJ	Assess environmental exposures and its effect on childhood cancers; Conduct community/professional education	Cross sectional and case control; quantitative	A community group, county & state health departments, federal Agency for Toxic Substances and Disease registry, & university researchers	Outgrowth of preliminary research, initiated by a community member and a nurse	Jointly developed research/action plan; consulted on further research activities; facilitated communication with community	Increased community/professional education; developed and implemented an environmental health curriculum for students
6 Quigley et al.[19]	Native American communities in NV, UT, and CA	Build community capacity for managing the health risks of nuclear contamination	Cross-sectional/quantitative & qualitative	Community groups, EH research institute, university researchers	An organization representing Native American Reservations Communities	Consultation; shared decision-making on grant applications, publications & presentations; staff recruitment; jointly developed a research plan & protocol, and educational program; collected data	Educational program developed and implemented for community and health care providers
7 Coburn.[20]	Brooklyn, NY	Investigate health risks of subsistence fishing	Cross-sectional/quantitative & qualitative	U.S. EPA scientists and a community group composed of CBOs	U.S. EPA scientists	Consultation; jointly developed a research plan & protocol; tailored and administered survey; made observations	Developed and conducted community education; identified alternative food sources
8 Quandt et al.[21]; Quandt et al.[22]; Quandt et al.[23]; Arcury et al.[24]	Rural east-central North Carolina	Formative research; design, implement, and evaluate health education interventions	Formative research (quantitative & qualitative); Intervention (randomized-controlled trial)	A CBO and university researchers	University researchers	Consultation; assisted in collaborated on research design, data collection, and design and	Not reported

Study no./ Authors	Location	Project goals/objectives	Research design/methods	Partnership composed of	Project initiated by	Community Collaboration	Action taken by community/outcomes
9 Loh et al.[25]	Boston, MA	Institute an air-monitoring system; establish a data management center; promote use of data by community to reduce exposures to air pollutants	Cross-sectional/quantitative & qualitative	A CBO, state department of environmental protection, county conservation district, university researchers	Youth and a CBO working with them	Implementation of intervention Defined research questions; collaborated on grant writing; collected data; developed and implemented interventions	Advocacy for measures to reduce air pollutants
10 Egren et al. [26]; Parker et al.[27]; Lewis et al.[28]; Keefer et al.[29]	Detroit, MI	Investigate environmental exposures; design and implement an intervention study to reduce asthma triggers	Randomized controlled trial/quantitative	Community members, CBOs, city health department, a health care system, university researchers	Grew out of an existing CBPP partnership	Collaborated on research design, design of survey instruments, and participant & staff recruitment; collected data and implemented intervention	Not reported
11 Lee, Krause, & Goetchius.[10]; Krause, Scherzer & Rugulies.[30]	San Francisco, CA & Las Vegas, NV	Investigate health and workload issues of hotel room cleaners	Cross-sectional/quantitative & qualitative	Labor union, university researchers, university occupational health program	A labor union	Provided funding; defined research priorities and methods; collaborated on instrument development; recruited participants & collected data	Collective action that led to reduced workload and increased labor representation on problem-solving committee
12 Lipscomb et al.[31]	Rural North-eastern North Carolina	Investigate health effects of employment in poultry-processing plants	Cohort & cross-sectional/quantitative & qualitative	Community members as paid staff and university researchers	A CBO	Consultation; recruit participants; collect data; provide other research/administrative support	Not reported (research still under way)
13 Perera et al. 2002.[32]; Vasquez et al.[33]; Kinney et al.[34]	New York City, NY/African-American & Dominican	Assess the effects of exposures to air pollutants on infant/child health; test health education interventions	Prospective cohort/quantitative	A CBO/youth/university researchers/U.S. EPA	A CBO	Identified problem; consulted on study design; facilitated communication and collaboration with community; implemented	Public awareness campaign/advocacy for environmental justice policy and regulations/
14 Jordan et al.[35]	Minneapolis, MN	Investigate the effects of lead exposure on child development	Prospective cohort	Community residents, university researchers, local businesses, city/state health departments	Community residents	Consultation; set research agenda; made decisions on proposals and future research direction; collaborate on research design and data collection	Preventive action to change city policy and to create lead-safe transitional housing; advocacy for families impacted by lead
15 Krieger et al.[36]; Krieger et al.[37]; Krieger et al.[38]; Krieger et al.[39]	Seattle & King County, WA	Investigate indoor asthma triggers and implement intervention to reduce exposure to indoor asthma triggers	Randomized controlled trial/quantitative	CBOs, advocacy groups, Health dept., Housing Authority, and university researchers	Not stated	Provided input on research design and process; as research staff, conducted home environment assessment; implemented intervention;	Organized a policy advocacy group; identified policy advocacy issues; secured funding to evaluate substandard housing units
16 Litt et al.[40]	Boston, MA	Quantify lead levels in residential soil, reduce exposure to lead through low-cost landscaping interventions, and	Pilot study	A CBO, university researchers, EPA laboratory, community health center, local landscape contractors	Not stated	Shared local knowledge for site selection and the design of intervention; staff, conducted outreach, education, & landscaping; donated materials and tools	Soil lead abatement as part of intervention; disseminate the model and information about the technology to other CBOs and government agencies

Study no./ Authors	Location	Project goals/objectives	Research design/methods	Partnership composed of	Project initiated by	Community Collaboration	Action taken by community/outcomes
17 Hynes et al.[41]	Boston, MA	develop educational materials Investigate indoor environmental health issues, develop an action, and design/ implement an educational program	Cross-sectional; quantitative	A community group, community health center, university researchers	University researchers	Consultation to guide survey construction and to provide feedback on survey	Educational programs developed; replacement of the central heating system at a public housing; a collaborative formed to improve community environmental health; Not stated
18 Brugge et al.[42]	Boston, MA	Investigate the connections between the environment and health in Chinatown	Cross-sectional; quantitative	CBO, Community Health Center, University researchers	Not stated	Provided cultural knowledge and local concern about environmental conditions; jointly developed instrument; administered survey	Not stated
19 Shurman & Israel.[43]; Shurman.[44]	South-central Michigan	Conduct needs assessment and develop/implement an intervention to reduce the long-term stress-related illness	Cross-sectional; quantitative & qualitative	Labor union, University researchers, Supervisors, & management	Initially by a company medical director but by the researchers for this particular project	Participated in diagnosing problems, developing/ implementing a pilot intervention, evaluating outcomes, and making recommendations	A corporate-wide program reflecting recommendations implemented
20 Corburn.[20]	Brooklyn, NY	Conduct community health surveys focusing primarily on asthma	Cross-sectional; quantitative & qualitative	A CBO and a non-profit research organization	A CBO in response to local students' suggestion	Consultation; jointly developed and administered survey; led focus group discussions	Developed and implemented community and professional education; organized residents to enroll in a free insurance program

CAB: Community Advisory Board