Published in final edited form as:

Int Q Community Health Educ. 2010 ; 31(4): 311–330. doi:10.2190/IQ.31.4.b.

UNINTENDED BENEFITS: LEADERSHIP SKILLS AND BEHAVIORAL CHANGE AMONG GUATEMALAN FIELDWORKERS EMPLOYED IN A LONGITUDINAL HOUSEHOLD AIR POLLUTION STUDY*

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Abstract

The RESPIRE and CRECER studies measured the effects of reduced household air pollution (HAP) from wood-fired cookstoves on respiratory health in rural highland Guatemala. This article examines behavior change and leadership skill development in local community members who were hired as *fieldworkers* to assist with research. Fieldworkers administered household questionnaires, shared functions similar to community health workers, and bridged health resources to communities. A mixed-methods design for data collection (in-depth interviews, focus groups, impact drawings, knowledge questionnaire, and retrospective pre-test) was used. Purposive sampling included 10 fieldworkers and 13 local service providers. Fieldworkers showed an increase in knowledge, positive attitudes, and practices around HAP. They developed new technical, interpersonal, and leadership skills. Fieldworkers played a crucial role in building *confianza* (trust) with the community, bridging resources, and improving outside researchers' relationships with locals. Recommendations for future researchers include inclusion of additional training courses and adoption of community participatory approaches.

*This research was made possible through a Center for Global Public Health fellowship at the University of California Berkeley. We also appreciate the support from the U.S. National Institute of Environmental Health Sciences (NIEHS#2R01ES010178).

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INTRODUCTION

Background

The field of health promotion and disease prevention increasingly recognizes the theoretical role that lay community members (fieldworkers) can have in improving interventions, research processes, and outcomes. Fieldworkers have been particularly important in helping outside researchers to design culturally appropriate research instruments and to conduct data collection. The Randomized Exposure Study of Pollution Indoors and Respiratory Effects (RESPIRE) and its continuation study, Chronic Respiratory Effects of Early Childhood Exposure to Respirable Particulate Matter (CRECER), were conducted between 2002 and 2010 in resource-poor, rural indigenous Mayan communities in the San Marcos Department in the northwestern highlands of Guatemala. An important element of the two longitudinal studies examined in this article is the team of highly trained, local fieldworkers who periodically visited participating homes to administer questionnaires regarding children's health, cookstove status, and HAP exposures. As described below, the fieldworkers are from the same communities as the study participants, and are fluent in both Spanish and *Mam*, a Mayan dialect. Therefore, they bridge an important cultural and language gap between researchers and communities. In this population, illiteracy is common and the principal language spoken is *Mam* [1]. Traditionally, women in these communities spend about 5 hours per day cooking in a kitchen with an open fire [1, 2]. In RESPIRE and CRECER, over 700 wood-fired chimney cookstoves, which lowered kitchen smoke levels substantially, were introduced in these communities. In addition, most families regularly bathed in a wood-heated traditional sauna (*temazcal* in Spanish or *chuj* in *Mam*), which produces potentially dangerous exposures to carbon monoxide (CO) [3, 4]. CO is one constituent of the household air pollution (HAP) that is produced when fuels are incompletely combusted. HAP is an important risk factor for developing acute lower respiratory infections and chronic obstructive pulmonary disease in poor countries [5–7].

The RESPIRE and CRECER studies could not have taken place without fieldworker participation. However, as discussed below, their role was limited to data collection and dissemination of results. During RESPIRE (2002–2004), the fieldworkers received ongoing training sessions on administering household surveys on health, implementing the integrated management of childhood illnesses (IMCI) strategy [8], and recognizing the health importance of the chimney cookstoves and the risks of *chuj* use. RESPIRE fieldworkers visited 534 study homes on a weekly basis to assess the children's respiratory health and referred any children suspected of being ill to the study physicians [1]. During the CRECER study (2005–2010) fieldworkers were trained to administer household questionnaires about children's respiratory health and to monitor HAP levels in the homes. They made visits every three months to over 500 participating households. Their final responsibility at the end of the CRECER study was to administer exit interviews to household participants and to participate in the dissemination of results to the communities. Upon completion of the study, these highly skilled fieldworkers were then left without regular employment.

Although the original intent of the RESPIRE and CRECER studies was to train fieldworkers to collect data for the longitudinal research, an unintended, but beneficial outcome of the

research study was the development of a cadre of fieldworkers who viewed themselves, and were viewed by their peers, as community health workers (CHWs). The RESPIRE and CRECER studies included community members as part of the research team, but as discussed later, did not use formal CHW or community participatory approaches.

Study Objectives

The aims of the present study were to evaluate: 1) the fieldworkers' knowledge, attitudes, and practices around HAP as a result of working for the RESPIRE and CRECER studies; 2) their leadership skill development as a result of working for the RESPIRE and CRECER studies; and 3) the gaps in fieldworker training that research staff could have addressed. After a brief review of the literature and relevant theories, we describe the methods, present the results, discuss the fieldworker's role in longitudinal research, and conclude with recommendations.

Literature Review

There have been many published studies on community participation and empowerment through community-based participatory research (CBPR) and participatory action research (PAR), which actively engage local community members as part of the research team [9–21]. A large number of these participatory research studies include women as lay health workers who facilitate recruitment of study participants, receive training and often a small payment for their role as peer researchers [11, 22–25]. CBPR and PAR occur along a continuum of community participation, ranging from narrow involvement (e.g., in recruitment and data collection) to full participation in all aspects of the research [26]. However, there is a growing trend in engaging community members at the “farther ends” of the continuum, so that they are also involved in data analysis and/or interpretation, dissemination of findings, and in the use of findings in the action phase of the work, including advocacy for policy change [12, 26–28].

Although the RESPIRE and CRECER studies did not employ CBPR or PAR approaches in the traditional sense, they did engage community members, mostly women, in data collection and as interviewers. However, few such studies have been published that describe the use of local community members as part of the research team for longitudinal research studies that focus on *training fieldworkers* or on *satisfaction with their experience* working as researchers for the study. This present study focuses on examining behavior change, new skills development, empowerment, and improving the experience of fieldworkers through increased opportunities for trainings, which may hold relevance for those interested in community engagement in CBPR/PAR and/or in longitudinal studies.

The literature related to this study was challenging to delineate due to the plethora of *terms* used to describe the *people* involved in the research and their diverse *functions*. Synonymous search terms for “fieldworker” included “data collector,” “surveyor,” “survey personnel,” “local researcher,” “interviewer,” “community health worker,” “health promoter,” “lay helper.” As described in the literature, it is difficult to provide a catchall term for this category of worker given the vast range of terms used in the field [29–31]. Andrews et al. provided an analysis of CHW roles and responsibilities in research with

ethnic minority women [32]. Their analysis coded four roles for CHWs: educator, outreach, case manager, and data collector [32]. “Fieldworkers” in the present study share roles similar to CHWs, especially as informal educators and data collectors. CHWs, lay helpers, and fieldworkers often share the same ethnic, cultural, and social backgrounds as the communities they serve and usually come from the same communities [29–31]. A study by Li et al. reviewed CHW training manuals in several countries and provided a guide to 22 manuals [33]. Literature on CHWs is extensive, though there are fewer studies that evaluate the effectiveness and experience of CHW-type training programs [34–37].

The roles and characteristics of CHWs and fieldworkers overlap substantially. However, the literature on local fieldworkers or the local field researcher population is limited. Additionally, there is an even larger gap in the literature describing training programs, capacity building, education, and leadership skills development for this population. In this article we expand on the limited literature on the local fieldworker (as researcher) and suggest capacity building strategies to improve skills for this population and their experience with research staff and principal investigators.

Theoretical Framework

The theoretical framework that guides this study is the empowerment theory, particularly as it relates to the literature on CHWs. Psychological empowerment includes perceived personal control or beliefs, one’s sense of competency, a desire to exert control, participation in activities, and having a critical awareness of the environment [38].

Empowerment is both a value orientation for working in the community and a theoretical model for understanding the process and consequences of efforts to exert control and influence over decisions that affect one’s life, organization functioning, and the quality of community life [38–41].

When CHWs and fieldworkers become engaged in community activities, such as bridging community health resources or education, their opportunities for learning and adopting new skills increases, which then builds their confidence and increases their sense of control [38]. Additional community involvement includes educating community members through house visits, running community meetings, and public speaking, which increase CHWs and fieldworkers’ sense of competency and critical awareness of the environment [38]. In the present study we use empowerment to understand behavior change in leadership and interpersonal skills.

As highlighted in the literature review, many of the CHW roles parallel the roles of the RESPIRE and CRECER fieldworkers. A definition proposed by a World Health Organization study group in 1989 is:

Community health workers should be members of the communities where they work, should be selected by the communities, should be answerable to the communities for their activities, should be supported by the health system but not necessarily a part of its organization, and have shorter training than professional workers [30].

One of the most important roles of CHWs and fieldworkers is to serve as a bridge between health services and the community. Bridging these resources to communities creates opportunities for better health development through preventive and curative services [30, 42].

To further develop the skills of CHWs and fieldworkers and the important role they have in their communities, they must have continuous training. Refresher courses help motivate and keep retention high because CHWs become educated in new areas, challenged in new ways, and develop their skills both professionally and personally [29, 43, 44]. Working through an empowerment framework is important to further efforts to increase community involvement by strengthening and developing new skills through more training.

METHODS

Study Design

We conducted a small, exploratory research study using a mixed-methods design that combined qualitative methods (in-depth interviews, focus groups, and impact drawings) and quantitative methods (knowledge questionnaire, retrospective pre-test). In-depth interviews were used as the primary interview method for fieldworkers and focus groups as a follow-up approach. Impact drawings, in which participants drew pictures of their lives before and after a particular event, were used to further capture positive behavioral change. This mixed-methods approach was used to verify in-depth interview information, assess any different responses in a group setting, and assess the group dynamic.

Sampling Methods

Participant selection was accomplished using purposive sampling. Inclusion criteria for fieldworker recruitment in the study was a minimum of one year experience working in either the RESPIRE or CRECER study. Service providers were recruited if they had worked directly with fieldworkers or had knowledge of the RESPIRE and/or CRECER studies. A total of 23 participants, including 10 fieldworkers and 13 service providers, were interviewed for the study. The 10 fieldworkers were of varying education levels (from completing the sixth grade to university graduates) and had an age range of 20–50 years old. Seventy percent were women and 30% were men. Of these 10, six were categorized as long-term fieldworkers who worked in both studies for a total of at least 3 years. The 13 service providers represented health professionals from all levels of the Guatemalan Ministry of Health, Guatemalan Ministry of Social Services staff, local NGO staff, CRECER staff, a Peace Corps Volunteer, and a Community Health Promoter/Traditional Birth Attendant. Sixty-two percent were women and 38% were male. This study focused primarily on the six long-term fieldworkers. Short-term fieldworkers were included as a comparison group and service providers were included to provide another perspective on fieldworkers.

Data Collection Methods

This research study was reviewed and approved by the University of California Berkeley Committee for Protection of Human Subjects. Verbal consent was obtained from all study participants and confidentiality was emphasized. All research instruments were piloted for

Spanish language accuracy and cultural appropriateness and then refined before beginning data collection. All data collection methods were conducted and collected in the Spanish language (see Table 1).

Structured interview guides were developed for the in-depth interviews and focus groups with the fieldworkers. Separate structured interview guides were developed for service providers. All interviews and focus groups were conducted in private rooms, without the presence of non-participants, to foster an environment that encouraged honest opinions [38]. All interviews were completed within 1 hour and focus groups within 1½ hours. A total of three focus groups were conducted; two with long-term fieldworkers and one with short-term fieldworkers. For the impact drawings, long-term fieldworkers were given two sheets of paper and colored pencils. On one sheet of paper, they were asked to draw their life before they were hired for the study and on the other sheet their life after working for the study.

The quantitative data collection instruments included questions regarding fieldworker knowledge around HAP. The knowledge questionnaire had seven multiple choice questions, which were developed from an educational poster that the CRECER field manager used to educate the long-term fieldworkers during a 1-day training session on HAP. Short-term fieldworkers did not receive this training. The 14-item retrospective pre-test had two sections (before and after the training) with the same seven items in each section. In the first section, participants were asked to check the box that best represented how well he or she knew each item *before* the HAP training using a 4-point Likert scale (“*I knew this very well*,” “*I knew this moderately well*,” “*I knew a little about this*,” “*I did not know this*”) and in the second section, participants were asked to check the box that best represented how well he or she knew each topic *after* the HAP training using the same Likert scale.

Data Analysis Methods

All in-depth interviews, focus groups, and discussion around impact drawings were audio recorded and later transcribed in the original language (Spanish). All data analysis was also conducted in Spanish. After transcribing, the data were cleaned and made anonymous before the formal analysis. The transcripts were analyzed by identifying key themes that emerged through the process of re-reading, editing, and coding. The point of saturation was reached when several common themes emerged and no new themes surfaced [45]. Descriptive analysis involved identifying and describing issues pertaining to a theme, detecting patterns, and comparing how the theme was discussed in the interviews. All quantitative and qualitative analyses were done manually using Microsoft Office.

Preliminary Data Presentation and Feedback

To synthesize the preliminary data collection, one-on-one interviews were conducted with the long-term fieldworkers after the feedback groups to validate the interpretation of issues and recommendations. After the preliminary data analysis was completed, the initial study findings were presented to the long-term fieldworkers as a group. They were given a chance to provide feedback on the data, and their interpretations were supportive of our findings.

Long-term fieldworkers were the primary focus of the present study and therefore participated in the presentation.

RESULTS

Knowledge, Attitudes, and Practices of HAP

Table 2 summarizes the results of the HAP knowledge questionnaire. Overall, long-term fieldworkers scored higher on all questions as compared to short-term fieldworkers, except for question 3, “*what happens if you breathe in too much CO?*” (33% vs. 50% correct response rate), and they had an overall higher total correct response rate (62%), compared to the short-term fieldworkers (39%). An important finding was that long-term fieldworkers scored higher on all items related to community daily life over the technical aspects of CO. For example, 100% *know where CO came from* (question 2), 83% *know if they or someone else had CO poisoning* (question 5), and 83% *know what to do daily to avoid CO poisoning* (question 7). This contrasts with the response rates about the technical aspects, such as the *definition of CO* (question 1) (67% correct response rate).

Table 3 summarizes the results of the retrospective pre-test. When items in the retrospective pre-test were analyzed and grouped into a total percentage of items, 81% of the items from before to after increased to the “*I know this very well*” category for long-term fieldworkers compared to only 54% for short-term fieldworkers. For three long-term fieldworkers, these items increased 3 Likert-points (from the “*I did not know this*” category to the “*I know this very well*” category). This occurred only for one short-term fieldworker. Interestingly, question 4, “*who is most affected by CO poisoning?*” yielded conflicting results for the knowledge questionnaire (lowest correct response rate 17% and 0%) and the retrospective pre-test (high percentage of “*I know this very well*” category 83% and 100%). The long-term fieldworkers displayed above average knowledge about:

1. the risks associated with using open fires for cooking and in traditional saunas; and
2. characteristics of a chimney cookstove and traditional sauna.

In addition to knowledge assessment, we examined attitude and practices using qualitative methods. Their attitude to change was positive as shown through their enthusiasm for chimney cookstove adoption. The focus groups, interviews, and impact drawings confirmed that five of the six long-term fieldworkers currently use chimney cookstoves in their homes. In addition to their excitement for improved living, the impact drawings provided a testament to perceived economic and social status improvement. One long-term fieldworker explained,

I’m going to comment about my life. When I was little I went to school, after returning from school I would take care of the lambs, feed the chicken, and put them in their cages. We cooked with an open fire. And now, thanks to God my life has improved. In the morning I come to work here and I have 2 houses because before I only had one house and nothing more. We slept in the same room that we cooked in, but thanks to God I have one room for sleeping and another for cooking. I have a chimney cookstove in my kitchen and I even have a small store and three kids.

Another long-term fieldworker expressed her positive attitude for the chimney cookstove despite unforeseen changes,

I used to cook with an open fire, then I got a chimney cookstove. We had to move houses, so I had to go back to using an open fire and now I realize how much my eyes burned from the smoke. I miss my chimney cookstove.

Three out of six long-term fieldworkers decreased the frequency of traditional sauna bath use from twice per week to once a month. However, only one made changes to the physical structure by installing a new chimney and cement floor. All fieldworkers unanimously agreed,

We still use our traditional sauna baths, but in a safer way for our families and us. You can teach people to improve the use of the traditional sauna, but to tell them to not use it, no, it's so difficult. Because it's a custom among our people, we're not going to stop using it.

All fieldworkers increased their knowledge around HAP, had positive attitudes toward chimney cookstoves, and most had changed their habits to reduce their risk of HAP.

New Skills Acquired and Empowerment

The in-depth interviews and focus groups with the fieldworkers and the in-depth interviews with the service providers identified new skills that the fieldworkers had acquired as a result of working for the study. Four major themes emerged:

1. increased proficiency in technical skills, such as the utilization of HAP equipment and implementation of IMCI, specifically, assessment of acute respiratory infections in children;
2. gained *confianza* (trust) of community members;
3. increased interpersonal and leadership skills; and
4. desire for more training sessions.

Through active community participation, fieldworkers developed these skills to identify resources, bridge resources, and develop strategies to improve health.

Increased Proficiency in Technical Skills—Long-term fieldworkers discussed how they learned to handle data collection instruments such as carbon monoxide monitoring tubes and also health related skills like using a thermometer, blood pressure apparatus, and timer to count respirator breaths. When prompted, they were able to explain verbally and apply these skills by demonstrating step-by-step how to use each instrument. These skills, in addition to the interpersonal and leadership skills, increase their marketability.

Gaining Confianza—Increased interpersonal and leadership skills include gaining *confianza* (trust). Fieldworkers emphasized the importance of gaining *confianza* with community members through each visit in order to set the stage for future visits.

If the mother was busy preparing breakfast when I arrived, I'd say, "Oh no problem Señora, I'll wait here, please finish up first before we talk." If I jumped in right

away asking the questions on the survey, it wouldn't go well with the mother, they wouldn't receive us with open arms. So like this, we gained the *confianza* of the families little by little.

A local nurse highlighted the advantages that fieldworkers had with community members because fieldworkers were from the same communities where the studies took place, which helped greatly with gaining *confianza* of locals.

They speak Mam and Spanish, share the same culture, and have the *confianza* of their people. The Mayan people trust their own people more than an outsider. Something I explain to them wouldn't be received the same as if a nurse from their own background did the explaining.

Increased Interpersonal and Leadership Skills—As fieldworkers gained *confianza* (trust) of families and more confidence in their abilities to teach community members, bridge health resources, and give advice to mothers who sought them out, their leadership and interpersonal skills increased. A long-term fieldworker reflected on one of his most memorable experiences working for the RESPIRE and CRECER studies,

Another thing I loved was that I learned a lot about health and now I can teach and explain things I didn't know before. People in the community now ask me, "What do I do, my baby is sick?" So now I can give them an idea of what to do so that the baby doesn't die. I tell the mother, "Look, you have to take the baby to the health center right away, it's a serious respiratory problem, the doctor is there." It's all about having good communication with the families. Another example, when the children in the communities are sick with diarrhea, I now have an idea to teach the mom oral rehydration and to refer them to the health post. So I give them an idea of how their child can stay alive. Also, I never thought I'd be a worker for a university.

Another fieldworker shared how she had always been a timid person, especially when meeting strangers or public speaking, but after working for the study and learning to do so effectively, she is sought out for advice.

Before I started working for the study, I didn't know how to talk to the mother and I was scared to talk in public, but now I can do it and more women come looking for me to ask for advice.

Working for the study, the fieldworkers became more responsible and equipped to perform their community tasks.

I'm punctual now and make sure I have all my things in order to go into the field like my papers, clipboard, something to write with, and a stick for the aggressive dogs.

Desire for More Training Sessions—All fieldworkers expressed their desire to learn more about childhood illnesses and to be more effective at their work as fieldworkers. When asked what could have improved their experience as fieldworkers, they unanimously suggested more continuing education trainings. All expressed that they would have liked

refresher courses of previous trainings to reinforce their knowledge, as well as new trainings with new topics.

It would be nice to have more training sessions on infant and children's health, maternal health ... communication, and leadership. People in the communities always asked us things about health, and we only had a few trainings on it, so I'd say I want more. We wanted to have more information because our neighbors often come to us more and more asking us, "What do I do? My baby just cries and cries. I think she's sick. I don't know what to do. Help me please."

Service providers described fieldworkers as a valuable community asset and resource because they serve as the bridge between health services and the community. Since most communities are geographically spread out and located sometimes hours from the health services, the community referrals the fieldworkers provide are crucial to minimize mortality.

One of the best strengths of the fieldworkers is their function as CHWs, especially when they bring the sick into our health centers. They serve an important role in bridging education and making referrals.

Another service provider commented on similar strengths.

The fieldworkers are easily identified as being the CHW of their community because community members seek them out for health advice. What kind of training do they receive? It'd be nice if they could get the same education as our CHWs and traditional birth attendants in the monthly meetings.

As suggested above, fieldworkers desired to learn more in order to provide health resources to community members who sought them out for advice.

DISCUSSION

Interpretation of Results

These findings illustrate that fieldworkers involved in this study developed an above average level of knowledge, positive attitudes, and positive behaviors to reduce the risk associated with HAP. For question 3, "*what happens if you breathe in too much CO?*," short-term fieldworkers had a higher correct response rate (50%) compared to long-term fieldworkers (33%). And question 4, "*who is most affected by CO poisoning?*," had a low correct response rate (17% vs. 0%) among both long-term and short-term fieldworkers, respectively. These anomalous responses could be due to the nature of the multiple-choice answer options, which may have been confusing. Many fieldworkers marked answer choice *a*, or answer choice *b*; however, the answers were scored correct only if they had marked the answer choice *c*: *answers a & b*.

Fieldworkers developed new technical and leadership skills, but desired to learn more, especially as community members sought them out for help. Fieldworkers appeared empowered in terms of a perceived increasing sense of control and confidence in improving their personal health as well as that of their community [38]. After this study was conducted, the fieldworkers participated in the dissemination of CRECER study findings to community members and to health centers in the study area. They demonstrated public speaking skills,

confidence, and strong communication skills. A local health service provider requested their assistance with traditional birth attendant trainings since they were seen as valuable CHWs.

Service providers were included in the study to give their perspective in identifying the new skills and strengths that could be helpful for the fieldworkers in their search for future employment or continuing education. Long-term fieldworkers were the primary focus of this study, hence the comparison to short-term fieldworkers. Short-term fieldworkers were harder to locate because many years had passed since they worked for the study.

Community participatory approaches or principles such as CBPR or PAR have not been widely used in longitudinal study designs. However, some researchers are shifting toward using CBPR approaches to drive their longitudinal research studies. Chung et al. used CBPR principles to inform the design of a randomized controlled trial [46]. Although the use of community based participatory methods in the RESPIRE and CRECER studies was largely limited to the engagement of fieldworkers as data collectors, their contributions to study processes and outcomes suggest the potential for such engagement in the context of longitudinal studies.

Triangulation

To enhance the validity of the research, we used methodological triangulation by employing a mixed-methods approach, namely, qualitative methods and obtaining feedback from participants on the preliminary research findings [47, 48]. Long-term fieldworkers were asked questions through two methods of data collection, in one-on-one interviews as well as through focus groups. The findings from the different methods were consistent with little variation, thus increasing the validity of the findings.

The long-term fieldworkers were more relaxed in the focus groups than in the one-on-one interviews and provided even more detail of their experiences in the field. Overall, the conversation flowed in the focus groups, each person taking a turn to talk, but also leaving room for unexpected ideas to arise and be discussed as a group. The increased openness of the focus groups could have been because the fieldworkers had all worked together, known each other for years and, therefore, were more relaxed and open to talking about their experiences with an outsider. Additionally, another reason for the consistency of the findings could have been the order of data collection. The one-on-one interviews were conducted first and rapport was still being established with the interviewer/focus group moderator. The focus groups and impact drawing activity took place a few days later after fieldworkers and the interviewer/focus group moderator had more informal conversations.

Limitations and Threats to Validity

Baseline data were not available for the training sessions that the long-term fieldworkers received on IMCI and HAP in the RESPIRE and CRECER studies. These workshops did not implement knowledge evaluations, such as traditional pre-tests/post-tests. A knowledge questionnaire and retrospective pre-test were, therefore, the best options for collecting this data. A further limitation of the present study involved the desire of fieldworkers to show a “good subject effect” and, therefore, to sometimes give responses to support what they thought the researcher wanted to see or know through the quantitative and qualitative data

collection [49]. The retrospective pre-test is prone to the “learning effect” where the fieldworkers would have a tendency to show that learning occurred whether this was true or not [49]. Self-reported data and recall bias are other limitations as fieldworkers were unsure of when and how many training sessions they received [49]. If funding and research staff were not a limitation for this research project, investigator triangulation would also have been ideal to further contribute to the validity of research results. Additionally, participant observation would have further validated the adoption of the chimney cookstove use.

Preliminary Findings Presentation and Feedback

Preliminary study findings were presented to fieldworkers in July 2010. Fieldworkers agreed with the preliminary study findings and emphasized their desire for more trainings, periodic feedback from the investigators and senior researchers, and information on how their work contributes to a bigger purpose. A summary report with the preliminary study findings and the recommendations discussed in the conclusion below was compiled for the principal investigator and senior researcher who employed the fourth recommendation. The fieldworkers were integrated in the dissemination process of the CRECER study and senior researchers explained the far-reaching impact of their valuable data collection and dissemination in the global context.

As discussed in the literature review, community members have been increasingly involved in research conducted in their communities, such as through CBPR and PAR. However, community participation and capacity building occurs on many different levels. The randomized controlled trial RESPIRE and its follow-up study CRECER built ongoing research capacity with non-local Guatemalan university collaborators and with the local Guatemalan Ministry of Health. However, it was beyond the primary focus of these studies to train and build ongoing research capacity among the local fieldworkers. However, as seen through the findings of this study, fieldworkers were empowered as a result of working for the study. Fieldworkers’ desire for more leadership skills development and continuing education was high and could have been strengthened through more capacity building trainings, which would have been beneficial for formally integrating fieldworkers as well as CHWs into longitudinal studies.

CONCLUSION

Bridging and improving researchers’ relationships with local community members and empowering locals through capacity building are certainly a growing concern. More research on how to grow local research capacity is needed. Based on the experiences of the RESPIRE and CRECER studies, we offer the following recommendations for future field research that employs local fieldworkers:

1. include new capacity building trainings for fieldworkers on leadership development, communication types, and interpersonal skills, in addition to the existing training (e.g., administering surveys, data collection equipment);
2. include refresher courses or trainings every 3 to 4 months;

3. provide periodic feedback to fieldworkers on the quality of their work so that they can improve;
4. provide information (e.g., preliminary results) regularly on how their work contributes to a larger purpose; and
5. consider using community participatory approaches, such as CBPR or PAR, in longitudinal studies.

We encourage future principal investigators and researchers to recognize the value that local fieldworkers bring to their communities even after the research study has ended, and to integrate capacity building trainings and continuing education into their ongoing research when using local community members in longitudinal research studies.

Acknowledgments

The authors are particularly grateful to all the fieldworkers without whom this study would not have been possible, the Guatemalan Ministry of Health for providing a space for the research headquarters, and the Guatemalan research staff and U.S. research teams for their continual support. We would also like to thank Professor Meredith Minkler, University of California, Berkeley, for her valuable guidance in this article.

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Table 1**Data Collection Methods**

	All fieldworkers	Long-term fieldworkers^a	Service providers^b
In-depth interviews		X (<i>n</i> = 5)	X (<i>n</i> = 13)
Focus groups	X (<i>n</i> = 10) LT (<i>n</i> = 6) ST (<i>n</i> = 4)		
Impact drawings		X (<i>n</i> = 6)	
Knowledge questionnaire	X (<i>n</i> = 10)		
Retrospective pre-test	X (<i>n</i> = 10)		

^aEmployed for a total of 3 or more years in the RESPIRE or CRECER studies. One long-term fieldworker was unavailable for the interview.

^bHealth professionals from Guatemalan Ministry of Health, Guatemalan Ministry of Social Services staff, local NGO staff, CRECER staff, a Peace Corps Volunteer, and a Community Health Promoter/Traditional Birth Attendant.

Table 2

Knowledge Questionnaire Percent of Correct Answers for the 10 Fieldworkers

	Long-term fieldworkers (<i>n</i> = 6)	Short-term fieldworkers (<i>n</i> = 4)
1. What is CO?	67%	25%
2. Where does CO come from?	100%	50%
3. What happens if you breathe in too much CO?	33%	50%
4. Who is most affected by CO poisoning?	17%	0%
5. How do you know if you have CO poisoning?	83%	75%
6. What should you do if someone you know has CO poisoning?	50%	25%
7. What can I do daily to avoid CO poisoning?	83%	50%
Total correct answers on average	62%	39%

Table 3

Retrospective Pre-Test Items that Reached the “I Know This Very Well” Category for the 10 Fieldworkers

	Long-term fieldworkers (<i>n</i> = 6)	Short-term fieldworkers (<i>n</i> = 4)
1. What is CO?	67%	75%
2. Where does CO come from?	67%	25%
3. What happens if you breathe in too much CO?	67%	50%
4. Who is most affected by CO poisoning?	83%	100%
5. How do you know if you have CO poisoning?	83%	0%
6. What should you do if someone you know has CO poisoning?	100%	50%
7. What can I do daily to avoid CO poisoning?	100%	75%
Total items that reached the “I know this very well” category	81%	54%