

## **Partnering with *Parteras*: Multi-Collaborator International Service-Learning Project Impacts on Traditional Birth Attendants in Mexico**

**M. Alexandra Friedman**

**Dana R. Gossett**

*Northwestern University*

**Isabella Saucedo**

*Child and Family Health International*

**Shayna Weiner**

**Mimi Wu Young**

*Northwestern University*

**Nick Penco**

*Child Family Health International*

**Jessica Evert**

*University of California, San Francisco*

Medical students are increasingly seeking global health service-learning opportunities; however, the impact of these interventions is often not assessed. In this article, the authors describe a model for global health service-learning programs as well as a pilot tool for assessing program impacts on populations traditionally difficult to evaluate. Specifically, a group of medical students from the United States, in collaboration with local health officials and a global NGO, successfully implemented a training program for *parteras*, or traditional birth attendants, in Mexico. The training included educational objectives from the Ministry of Health. A pilot assessment tool was developed which included oral pretest and posttest self-reported knowledge and task-specific ability in 12 program-specific categories. The assessment was administered in an effort to determine educational impact: *parteras*, who were receptive to students as teachers, reported increased knowledge and skill in all topics except nutrition and postpartum care. The results of the assessment suggest that undergraduate medical students, when collaborating with a facilitating organization, community-based healthcare workers, and local ministries of health, can improve lay birth attendants' confidence in basic obstetric knowledge and skills through global service-learning. Moreover, creative assessments are required to understand impacts on difficult to access populations.

**Keywords:** service-learning, community engagement, capacity building, midwifery, global health education, infant/maternal health, intrapartum care

As more medical trainees have demonstrated interest in global health, new concerns have emerged around the ethics of global health travel and participation in international communities (Crump, Sugarman, & Working Group on Ethics Guidelines for Global Health, 2010; Friedman, Loh, Evert, 2015). While earlier global health experiences centered on short term, experiential "mission based" trips, global service-learning (GSL) has emerged as a new model for reciprocal learning and responsible engagement. According to Smith, Carpenter, and Fitzpatrick (2015), GSL includes "experiential educational programs in which students are immersed in another community and culture, providing meaningful service in

partnership with a host community” (p. 161). The benefits of immersive GSL are well documented and include the fostering of openness to diversity, cultural humility, and improved self-knowledge (Evanson & Zust, 2006; Haq et al., 2000; Lee, Walt, & Haines, 2004). As Kiely (2005) maintained, in order to be beneficial, GSL programs must include community-driven service, involve interaction with a global community, and rely heavily on reflection. Providing meaningful service, however, may be challenging for trainees entering new communities for the first time. Furthermore, measuring the impact of service is difficult in resource-limited, largely illiterate communities, where traditional assessment tools are inaccessible to those being evaluated or too cumbersome (Garcia, Morrison, & Savrin, 2012; Perosky et al., 2011).

The Northwestern University Alliance for International Development (NUAID) is a student-led global health organization at Northwestern’s Feinberg School of Medicine. Prior to 2011, NUAID had undertaken brigade-style global health activities, in which student teams, supervised by attending physicians from the U.S., provided single encounter, primary care services for patients (Rassiwala, Vaduganathan, Kupershtok, Castillo, & Evert, 2013). In 2011, NUAID began collaborating with Northwestern’s Center for Global Health, which had engaged with the U.S.-based global health education organization Child Family Health International (CFHI) to facilitate integration of NUAID student learning into existing health systems and projects focusing on local capacity building. Since 2011, NUAID students have collaborated through CFHI with the Oaxacan Department of Public Health to facilitate annual training of *parteras*, or traditional birth attendants (TBAs), from the region. Local officials identified this project as a priority in order to enhance the capacity of *parteras* to recognize birth complications early and respond appropriately to intrapartum emergencies. In addition, the local public health officials considered the training an opportunity to build camaraderie among *parteras*, as well as to strengthen relationships between the local health system and the *parteras*, who are often isolated in rural villages.

Traditional birth attendants contribute significantly to health in many developing nations where access to medical facilities is oftentimes limited by distance, cost, and cultural barriers. A TBA is defined by the World Health Organization (WHO) (1992) as “a person who assists the mother during childbirth and who initially acquired her skills by delivering babies herself or through an apprenticeship to other TBAs” (p. 4). While some countries have made TBA practice illegal, groups like the WHO and UNICEF have recommended that TBAs be used to “bridge the gap until there is access to acceptable, professional, modern health care services for all women and children” (p. 2).

Several barriers, however, complicate the training of TBAs, including illiteracy, innumeracy, and divergent learning styles (Adegoke, Mani, Abubakar, & van den Broek, 2013; Jordan, 1989). Creative curricula have been developed by NGO workers, researchers, and clinicians utilizing pictorial representations, role-plays, simulators, and oral instruction with call and response to teach basic peripartum and neonatal care (Chabot & Eggens, 1986; Garcia et al., 2012; Gill et al., 2012; Perosky et al., 2011). The same challenges that limit education also make assessment of interventions difficult. Traditional written survey tools and knowledge assessments may not be accessible to illiterate TBAs, necessitating the use of more expensive and time-consuming measures like interviews, observed role-plays, and simulations with checklists (Garcia et al., 2012; Perosky et al., 2011). In one study in which TBAs and nurses were both taught bimanual massage for postpartum hemorrhage on a simulator, the only assessment tool utilized was a survey; thus, the illiterate midwives were not evaluated (Garcia et al., 2012).

This article describes a model global service-learning program: a partnership between medical students of varying levels of training and local leaders in midwifery and medicine, facilitated by a global non-governmental organization (i.e., Child and Family Health International). We highlight key features of global health education abroad and underscore capacity building as meaningful service-learning. Finally, we describe the pilot of a new assessment tool for evaluating the impacts of student-led training on illiterate health workers.

## Materials and Methods

A group of 10 medical students from NUAID traveled to Oaxaca, Mexico, for a service-learning trip. The group included six first-year students and four third-year students, and comprised six women and four men. Three students planned to specialize in obstetrics and gynecology (OB-GYN), two in family medicine, two in general surgery, and three were undecided. Regarding language ability, one student was fluent in Spanish, four were proficient, and five were beginners. Students lived with host families in the local community and participated in daily language lessons based on ability level throughout the month.

During the first two weeks, students focused on improving their language and cultural capacities. They shadowed local physicians in outpatient family medicine clinics and the labor and delivery floor in the local hospital. Twice weekly, senior-level residents gave lectures on pertinent OB-GYN topics. Students also learned about efforts to reduce endemic diseases, including malaria and Chagas disease, by joining public health workers on risk-reduction home visits. Finally, students visited a local *partera* to learn about traditional birthing practices in the region.

During the third week, students worked in tandem with local government representatives and CFHI facilitators to design materials for co-facilitating a four-day *partera* training course. The curriculum centered on 12 principles outlined by the Mexican Ministry of Health (see Table 1). Students reviewed resources published by the American College of Obstetrics and Gynecology, the WHO, and the American College of Nurse Midwives to ensure that best practice recommendations were represented. Where possible, these recommendations were adapted for low-resource settings appropriate to the *parteras'* practice locations.

**Table 1.** Topics Outlined by the Mexican Ministry of Health for *Partera* Training

Topic	Subtopics
Risk Factors	<ul style="list-style-type: none"> <li>Personal risk factors (substance use, STIs)</li> <li>Environmental risk factors</li> <li>Domestic violence</li> </ul>
Anatomy and Physiology	<ul style="list-style-type: none"> <li>Names and function of male/female reproductive parts</li> <li>Conception</li> <li>Reproductive cycle</li> </ul>
Normal Pregnancy	<ul style="list-style-type: none"> <li>Normal signs and symptoms of pregnancy by trimester</li> <li>Concerning signs and symptoms of pregnancy</li> </ul>
Complicated Pregnancy	<ul style="list-style-type: none"> <li>Symptoms and management of preeclampsia, hyperemesis gravidum, ectopic pregnancy/abortion, vaginal bleeding in pregnancy</li> <li>Management of risk factors for complications</li> <li>Know when to refer patient to hospital</li> </ul>
Prenatal Care	<ul style="list-style-type: none"> <li>Basic recommendations for prenatal appointments by trimester</li> <li>Proper history, exam, and tests for pregnant women</li> <li>Nutrition in pregnancy</li> <li>Lifestyle modifications in pregnancy</li> </ul>
Normal Labor	<ul style="list-style-type: none"> <li>Stages of labor and fetal movements</li> <li>History and exam of patient in labor</li> <li>Management of labor</li> <li>Delivery maneuvers</li> </ul>
Complicated Labor	<ul style="list-style-type: none"> <li>Preterm labor</li> <li>(Preterm) Premature rupture of membranes</li> <li>Prolonged labor</li> </ul>

Topic	Subtopics
Neonatal Care	<ul style="list-style-type: none"> <li>Immediate care of newborn</li> <li>Determining need for referral</li> <li>Alarm signs for the newborn</li> </ul>
Postpartum Care	<ul style="list-style-type: none"> <li>Delivery of the placenta</li> <li>Care in the postpartum period</li> <li>Management of postpartum hemorrhage</li> <li>Prevention and management of infection postpartum</li> </ul>
Lactation	<ul style="list-style-type: none"> <li>Benefits of breastfeeding</li> <li>Steps for successful breastfeeding</li> <li>Complications of breastfeeding</li> </ul>
Contraception	<ul style="list-style-type: none"> <li>Forms of birth control</li> <li>Use of emergency contraception</li> <li>Methods of permanent birth control</li> </ul>
Nutrition	<ul style="list-style-type: none"> <li>Basic food groups, vitamins, and minerals</li> <li>Foods to avoid in pregnancy</li> <li>Proper weight gain</li> </ul>

Students worked closely with a local physician and a nurse representative from the Ministry of Health to ensure that the curriculum was designed and implemented effectively for the *parteras*. The physician and nurse had indicated beforehand that the *parteras* learned best through interactive teaching exercises. For this reason, activities such as call and response, role-play, simulation, and discussion comprised the focus of material delivery, with visual cues such as photos, models, and drawings supplementing the curriculum wherever possible.

Groups of two to three students led the development and implementation of material for each topic, with the majority of pairs consisting of an upper- and lower-level student, at least one of whom was a proficient Spanish speaker. A script (in English and Spanish) was created for each topic. All materials were reviewed with the doctor and nurse before they were delivered to the group as a whole.

In addition, students wanted to design a tool for assessing the impact of their curriculum on the *parteras* who participated in the training. However, a literature review revealed few available methods for efficiently or effectively assessing the impacts of training programs on largely illiterate populations. Available tools were time-consuming to implement (e.g., observed simulations, individually administered oral tests) and would have reduced the already limited time available for teaching. Students decided, therefore, to assess participants' confidence levels as a proxy for program impact. They developed individual confidence-related questions to be administered orally before and after each topic (see Table 2). A numeric scale from 1 to 5 (with 1 representing no confidence and 5 signifying a high degree of confidence) was used to rate the confidence questions. *Parteras* were given a packet in which to record their responses for each section, which was labeled with a representative symbol. In a section comprising three questions, three Likert scales (1-5) were available for marking responses with pens (provided). The physician and nurse responsible for overseeing the training reviewed the questions to ensure that they had been properly translated.

**Table 2.** Pretest and Posttest Questions by Learning Topic, Outlined by the Mexican Ministry of Health

Topic	Subtopics
Risk Factors	How able are you to explain the consequences of smoking/drinking during pregnancy? How able are you to identify common symptoms of STIs? How much do you know about identifying risk factors in the home?
Anatomy and Physiology	How much do you think you know about the reproductive organs? How able are you to explain a woman's menstruation and fertility to her?
Normal Pregnancy	How much do you know about when to send a woman to the hospital How able are you to recognize the normal and abnormal signs and symptoms of pregnancy?
Complicated Pregnancy	How able are you to recognize the symptoms of pregnancy complications? How able are you to identify when a woman needs to go to the hospital? How able are you to manage risk factors for complications in pregnancy?
Prenatal Care	How able are you to provide basic recommendations for prenatal care? How able are you to ask the right questions in a prenatal visit? How much do you know about what nutritional supplementation women need? How much do you know about the lifestyle modifications women should follow while pregnant?
Normal Labor	How able are you to determine where a woman is in the course of normal labor? How able are you to evaluate the fetus during normal labor? How able are you to manage maternal wellbeing during the course of labor?
Complicated Labor	How able are you to take care of a woman who comes to you in preterm labor? How able are you to take care of a woman who comes to you with premature rupture of membranes? How able are you to take care of a woman with prolonged labor?
Neonatal Care	How able are you to care for the newborn? How able are you to decide when a baby needs to go to the health center (Centro de Salud)? How able are you to explain alarm symptoms to the mother?
Postpartum Care	How able are you to remove the placenta? How able are you to care for the women after delivery? How able are you to manage excessive bleeding after delivery? How able are you to care for a woman with infection after delivery?
Lactation	How able are you to explain breastfeeding to a mother? How able are you to explain the complications of breastfeeding to a mother?
Contraception	How able are you to counsel a woman about contraception? How able are you to counsel men on vasectomies?
Nutrition	How able are you to recommend healthy foods to a pregnant mother? How able are you to identify foods to avoid in pregnancy?

During week four, the students co-facilitated the *partera* training program with the representative from the Mexican Ministry of Health. Each training day began at 9:00 a.m. following breakfast, included two 15-minute breaks, and ended between 2:00 and 3:00 p.m., at which time some students would remain to interact with the *parteras* during lunch. Two to four topics were covered each day. The students responsible for developing each content section led the topic, while other students assisted with facilitation as needed. The partnering physician and nurse orally administered the confidence surveys.

Each day following lunch, students met to debrief and prepare for the next day. Team leaders prompted students to reflect on their experiences working with lay health workers and implementing the curriculum. The team leader recorded these observations.

Survey data from the confidence surveys were entered into a Microsoft Excel spreadsheet by two participating students and reviewed by both for accuracy. In those cases where two responses were marked for the same question, an average of the points was entered. Data were analyzed using a paired t-test to compare means of the pretest and posttest questions for each category. Analyses were conducted using SAS software (version 9.2). Values of specific questions were calculated when a decrease in knowledge/ability was reported. Qualitative student observations recorded during team meetings were collated, serially reviewed, and abstracted for main themes.

## Results

During the program, 32 *parteras* participated in the training and evaluation. Twenty-nine of the participants were female; three were male. This was the first training for some participants, while others had attended several facilitated trainings in the past. Participants traveled from across the state of Oaxaca to attend. While all could converse in Spanish, some were more comfortable using indigenous languages.

### Orally Administered Surveys

When the local doctor and nurse delivered the oral surveys on the first day of the training, students observed that many of the *parteras* were not participating in the confidence assessment. When students asked *parteras* about their hesitancy, the *parteras* reported that they were not familiar with the word *confidence*. Furthermore, they did not understand the numeric scale; they were innumerate as well as illiterate. After consulting with the local physician and nurse, the decision was made to query *parteras* about their self-perceived ability and knowledge, asking questions beginning with “how able are you” or “how much do you know” in an effort to evaluate participant understanding. The scales were adjusted to include faces that correlated with each number; for instance, a smile indicated “very able/know well,” and a frown indicated “not at all able/do not know at all.” As a result of these revisions, the *parteras* were able to complete the orally administered survey without difficulty.

Data from the oral assessment are included in Table 3. Notably, participants showed statistically significant increases in their perceived knowledge/ability in five categories: normal pregnancy (4.39, 4.91  $p = 0.01$ ), anatomy (3.78, 4.46  $p = 0.007$ ), complicated pregnancy (4.59, 4.94  $p = 0.009$ ), prenatal care (4.2, 4.72  $p = 0.003$ ), and complicated delivery (4.2, 4.65  $p = 0.016$ ). Participants demonstrated a non-statistically significant decrease in their reported knowledge/ability in two categories: postpartum care (4.7, 4.6  $p = 0.8$ ) and nutrition (4.88, 4.65  $p = 0.07$ ).

**Table 3.** Participant Responses to Questions of Knowledge/Ability, Pooled by Topic, before and after Training Sessions

Education Topic	Pretest Average	Posttest Average	t-score	p-value	N
Risk Factors	4.06	4.54	-0.7	0.5	12
Normal Pregnancy	4.39	4.91	-2.75	0.01*	28
Anatomy	3.78	4.46	-2.96	0.0068*	25
Complicated Pregnancy	4.59	4.94	-2.79	0.009*	31
Prenatal Care	4.20	4.72	-3.28	0.0028*	29
Healthy Delivery	4.57	4.63	-0.66	0.52	31
Complicated Delivery	4.20	4.65	-2.59	0.016*	27
Neonatal Care	4.73	4.75	-0.27	0.79	31
Postpartum Care	4.70	4.66	0.25	0.8	32
Nutrition	4.88	4.65	1.89	0.07	29
Lactation	4.61	4.75	-0.78	0.44	30
Contraception	4.84	4.85	-1.81	0.083	26

Note. Questions were administered orally, with responses ranging from 1-5 marked on individual score sheets.

\*  $p < 0.05$

When a decrease was observed in a category, results were also broken down by question. In the postpartum care section, the responses to the questions “How able are you to manage excessive bleeding after delivery?” (4.85 vs. 4.7  $p = 0.19$ ) and “How able are you to care for a woman with infection after delivery?” (4.91 vs. 4.79  $p = 0.34$ ) were lower after the intervention; however, this difference was not significant. In the nutrition section, the responses to both “How able are you to recommend healthy foods to a pregnant mother?” (4.83 vs. 4.69,  $p = 0.33$ ) and “How able are you to identify foods to avoid in pregnancy?” (4.93 vs. 4.54,  $p = 0.039$ ) decreased, but only the latter was significant (see Table 4).

**Table 4.** Participant Responses by Question in Content Areas Demonstrating Decrease in Knowledge

	Pre-test Average	Post-test Average	t-score	p-value	N
Postpartum Care					
Q1	4.63	4.8	-0.89	0.38	30
Q2	4.59	4.67	0	1	30
Q3	4.85	4.7	1.37	0.19	19

Q4	4.91	4.79	1	0.34	14
					Nutrition
Q1	4.83	4.69	1	0.33	25
Q2	4.93	4.54	2.18	0.039*	27

\*  $p < 0.05$

## Student Reflections

Four main themes emerged from student observations after serial review: *parteras*' knowledge base, learning style, clinical reasoning, and connection with students. Main ideas associated with each theme are described in the following sections.

### Knowledge base

Throughout the sessions, the breadth of the *parteras*' knowledge generally impressed the U.S. medical students. There were, however, a few key areas that stood out as needing improvement. First, the *parteras* struggled with identifying the names and functions of both male and female anatomy. In one activity, a large image of first male and then female genitalia was projected, and volunteers were asked to identify anatomic landmarks. Even with help from the audience, many could not complete the task. Similarly, *parteras* were unable to label parts of the reproductive cycle, fertilization, and contraception, or to answer basic questions about these topics during sessions.

*Parteras* also had little awareness of nutrition, including basic food groups and sources of nutrients. Students tried to find culturally relevant examples of foods comprising a complete diet; however, the *parteras* still could not apply the information to counseling a patient on well-balanced antenatal nutrition. Instead, they would share examples of soups and teas given to promote healing and recuperation according to local cultural practices.

### Learning style

The Mexican doctor and nurse overseeing the training and CFHI's partners in Puerto Escondido informed students that the *parteras* learned more effectively through activities than formal presentations. This message was reinforced throughout the week. The *parteras* enthusiastically joined group activities, generating pictorial lists of risk factors or placing pictures of pregnancy symptoms on poster boards representing the three trimesters. During sessions on physical exam skills, the *parteras* learned best by doing; for example, during the session on determining fetal lie, many of the *parteras* began teaching each other the medical students' models, accurately assessing the fetal position (simulated by a doll under a sheet) and demonstrating external cephalic version maneuvers if the fetus was malpositioned.

### Clinical reasoning

Students attempted a clinical reasoning exercise with the participants on postpartum hemorrhage (PPH). The exercise began with a description of the three main causes of PPH and the examinations necessary to determine the source of bleeding (i.e., palpating the uterus, examining the perineum, and checking the placenta to ensure it was removed completely). After a call and response-style review, the participants broke into small groups to evaluate a hypothetical patient who was bleeding after delivery. A brief description of the delivery was given, and the *parteras* were asked what to do next. Inevitably, the participants responded, "Take her to the hospital," rather than check for the source of bleeding. Even when walked through the steps again and shown pictures representing uterine atony, retained placenta, and perineal lacerations, the participants remained firm in their response. Through discussions with the

supervising physician and nurse we learned that the Mexican Ministry of Health has emphasized rapid referral for PPH and that most *parteras* are concerned about repercussions for delaying transport for any reason. We were therefore unable to determine if the *parteras* had difficulty with clinical reasoning, if our lesson was unclear, or if their responses were due to a prioritization of referral resulting from the government's recommendations for prompt hospital transfer.

### Connection with students

The *parteras* appeared to enjoy working with the students. *Parteras* would seek out students on breaks and at lunch, excited to share experiences. One interesting connection came on the first day of training. The leaders began the session with an icebreaker in which participants passed string throughout the circle, creating a “web” within the group. Each person was invited to share a few lines about him or herself. While the medical students expected participants to be shy, they instead enthusiastically told stories about their communities and had to be prompted to move on to the next participant.

Some of the most joyous moments of the training occurred during breaks, when the students would lead line dances to re-energize the group. The *parteras* were grateful for these “exercise classes” and requested them each day. The *parteras* were similarly excited to teach the students and would frequently share an herbal remedy or a different obstetric method to broaden the students' knowledge. At the end of the training, many of the *parteras* shared their gratitude for the teaching. Some requested students' e-mail addresses so they could use a family member's e-mail account to stay in touch (few of the *parteras* had personal access to a computer).

## Discussion

Participants in a four-day training program led by local physicians, public health officials, and visiting U.S. medical students, under the auspices of a longitudinally engaged global health partnership between an international education program provider in the U.S. and local stakeholders, demonstrated statistically significant improvements in self-reported knowledge of and ability to perform certain obstetric tasks in five of 12 topics outlined by the Mexican Ministry of Health. These results are notable partly because of their content but mostly because they exist at all: This pilot represented an innovative way of assessing the impact of training programs on illiterate and innumerate lay health workers, using limited time and resources.

Increasingly, medical students are seeking opportunities abroad to hone their diagnostic skills in low-resource settings, to observe cultural differences in administration of care, and to have sustainable impacts on communities with fewer resources than their own (Association of American Medical Colleges [AAMC], 2012; Rassiwala et al., 2013). Students who participate in clinical rotations may indeed fulfill the first two of these three goals but often miss the final one. Expanding medical student experiences abroad to include training programs for local community-based health workers, when done in concert with local health experts and facilitating organizations, may be an important step in improving student experience and building relationships with communities, while providing meaningful impacts. Our reflections further support the integration of U.S. medical student global health education and service into existing health systems' clinical and training efforts (AAMC, 2012).

Several conclusions could be drawn regarding those topics in which participant knowledge and ability decreased during training. First, trainings could have increased confusion, causing the *parteras'* understanding to become muddled. Participants may have overrated their knowledge of the topic prior to the lesson and, after learning more, become aware of their overestimation. Similarly, upon realizing the scope of a topic, participants may have felt less confidence in their mastery. We suspect the decreased post-intervention knowledge of postpartum care and nutrition was due to the latter two explanations. Regarding the postpartum period, particularly postpartum hemorrhage and infection, *parteras* have been taught to immediately refer any bleeding patient to a health center. Prompt referral is certainly appropriate, especially because many of the *parteras* live hours from established medical facilities, and

transport time may be substantial. Still, if *parteras* can make basic assessments and engage in cause-specific treatments while awaiting or during transport, mortality rates may be lowered. In relation to nutrition, *parteras* were unaware of the categorization of foods and many of the specific needs during pregnancy—in spite of being quite knowledgeable about traditional foods and taboos. It is possible that in being exposed to more information, the *parteras* realized that nutrition is a much broader topic than they originally thought.

Student observations suggest that *parteras* are both accepting of and enthusiastic about partnering with medical students as instructors and that they are willing to both teach and learn in a reciprocal model. Participants were dedicated to improving their skills throughout the session and were receptive to new information. Furthermore, *parteras* recognized the connections with students as longer lasting than one training period and tried to maintain global connections at the training's conclusion.

This program assessment was limited by several factors. First, in general, self-reported knowledge and ability are not necessarily reflections of true capacity. More extensive measures, such as those listed earlier, with role-plays and checklists, simulations, and interviewer-administered tools will be needed to draw firm conclusions. Self-confidence and self-assessment are recognized as important components of clinical mastery, connecting clinical knowledge with effective practice (Kukulu, Korukcu, Ozdemir, Bezci, & Calik, 2013). Self-confidence has been connected to improved academic performance and clinical competence in nurses, as well as leadership skills (Craven, Marsh, & Debus, 1991; Hay, Ashman, & van Kraayenoord, 1997; Sasat et al., 2002). Self-confidence has not been measured in lay health workers, so connections between self-perception of skills and actual practice have yet to be described; however, based on a review of the literature, it is reasonable to conclude that this is a proxy for improved clinical care.

The timeframe of the study also limited its generalizability. Data were collected only at two times, both during the training, and could not be extrapolated to draw conclusions about the *parteras* once they returned to their villages. For these reasons, we cannot draw conclusions from this data about how this intervention affected the health of the community. Finally, several difficulties arose with even the most basic assessment due to illiteracy and innumeracy. Any study conducted within this population will likely face similar barriers to capturing participants' perspectives, and we believe we have accurately captured *parteras'* experiences.

In spite of these challenges, this program assessment provided valuable insights into one form of global service-learning. As the outcomes suggest, medical students traveling abroad can provide valuable services through training programs for lay health care workers, and can assess the impact of these programs on participants who are both illiterate and innumerate. Partnering with local health officials and organizations to facilitate logistics and continuity in global relationships is crucial for ensuring that training reflects local recommendations and is sustained.

In summary, we believe training programs for lay health workers led by medical students, with oversight from local health professionals and facilitating organizations, are both welcome and impactful. Allowing students to lead meaningful global service-learning projects has the potential to create lasting ties among individuals, institutions, and international communities.

### Author Note

M. Alexandra Friedman, Feinberg School of Medicine, Northwestern University; Dana R. Gossett, Feinberg School of Medicine, Department of Obstetrics and Gynecology, Northwestern University; Isabella Saucedo, Child and Family Health International; Shayna Weiner, Feinberg School of Medicine, Pulmonary and Critical Care Medicine, Northwestern University; Mimi Wu Young, Feinberg School of Medicine, Northwestern University; Nick Penco, Child Family Health International; Jessica Evert, Department of Family and Community Medicine, University of California, San Francisco.

M. Alexandra Friedman is now affiliated with Women and Infants Hospital, Brown University.

## Correspondence

Correspondence regarding this article should be addressed to Alex Friedman, MD, Women and Infants Hospital, Brown University, 101 Dudley Street, Providence, RI 02905. Phone: (803) 479-7653. E-mail: [mfriedman@wihri.org](mailto:mfriedman@wihri.org)

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