

Feasibility of Brigade-Style, Multiphasic Cancer Screening in Rural Honduras

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PURPOSE To evaluate the feasibility of brigade-style, multiphasic cancer screening in Honduras, exploring data from 3 screening events that each tested for multiple cancers on single occasions.

METHODS This series of 3 studies each used a single-arm, post-test–only design to explore the feasibility of implementing multiphasic, community-based cancer screening at the same rural location in 2013, 2016, and 2017. The 2013 event for women screened for 2 cancers (breast and cervix), and the 2016 event for women screened for 3 cancers (breast, cervix, and thyroid). The 2017 event for men screened for 5 cancers (skin, prostate, colorectal, oropharynx, and testes).

RESULTS Totals of 473 and 401 women participated in the 2013 and 2016 events, respectively, and 301 men participated in the 2017 event. Staffing for each event varied from 33 to 44 people and relied primarily on in-country medical students and local community members. High rates (mean, 88%) of compliance with referral for follow-up testing at clinics and primary care facilities were observed after the screening events.

CONCLUSION The multiphasic, community-based approach proved feasible for both women and men and resulted in high rates of compliance with follow-up testing. This approach appears highly replicable: it was conducted multiple times across the years with different screening targets, which could be further scaled elsewhere using the same technique.

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One contributor to the heavy burden of cancer in low- to middle-income countries (LMICs) is the low availability of early detection via regular screening. Three main challenges complicate attempts at early detection in LMICs. First, there often is little awareness of cancer risk in the population. Second, there are few screening programs, and those that exist may be limited to a clinic in 1 urban area of the country. Finally, the fragmentation of health systems makes adequate follow-up difficult, so it can be hard for patients who have a positive screening result to navigate the local health care system.

Rural areas of LMICs are particularly vulnerable to disparities in cancer control, often because of the geographic challenges in accessing prevention, screening, and treatment opportunities.¹ Multiphasic programs, in which multiple screening tests are applied at the same event,² have the potential to reach a large segment of the population when used within rural communities. Despite the logical appeal of such an approach, most screening programs focus on 1 type of cancer, and few studies report rates of participation in multiphasic screening across various

types of cancer.³ When mounting a multiphasic approach in an LMIC, one must consider issues related to finding adequate staff, educating and motivating the potential participants to attend, and designing a system to facilitate follow-up care.⁴

A long-standing participatory action research program provided an opportunity to explore the feasibility and potential benefits of implementing a multiphasic, community-based approach to cancer screening in a rural population. CLARO (Community-Led Action Research in Oncology) is a collaborative participatory action research program among Honduran health care providers, Honduran community leaders, and investigators and clinicians from the Dartmouth-Hitchcock Norris Cotton Cancer Center in New Hampshire.⁵ The CLARO team designed a group of studies to address the following research questions: (1) What barriers to participation in cancer screening will the rural Honduran community identify, and to what degree can those barriers be mitigated? (2) To what degree is it feasible to implement a multiphasic cancer screening program in a rural, nonclinical setting? (3) How many participants will be identified as “at risk for

ASSOCIATED CONTENT

Data Supplement Protocol

Author affiliations and support information (if applicable) appear at the end of this article.

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CONTEXT

Key Objective

To what degree is it feasible and practical to implement multiphasic, community-based cancer screening within rural Honduras?

Knowledge Generated

Screening event organizers should identify and implement customized strategies to reduce barriers to attending screening and adhering to follow-up testing recommendations. Screening event staffing requirements varied from 1 staff person for every 14 participants when screening for 2 cancers to 1 staff person for every 7 participants when screening for 5 cancers.

Relevance

The brigade-style model can be customized to meet individual community needs and deployed in clinical or nonclinical settings.

cancer,” and to what degree will they comply with referrals for clinical follow-up?

METHODS

This series of 3 studies each used a single-arm, post-test-only design^{6,7} to explore the implementation of multiphasic cancer screening during 3 screening events at the same location in 2013, 2016, and 2017. The research team consisted of oncologists from La Liga Contra el Cancer in San Pedro Sula, Honduras; community leaders within El Rosario, Honduras; and investigators at the Dartmouth-Hitchcock Norris Cotton Cancer Center in New Hampshire. The roles of team members are listed in Table 1. The studies were approved by the institutional review boards of Dartmouth College and Universidad Católica de Honduras.

The model for brigade-style, community outreach health care is well known throughout LMICs and has been used for years within Honduras.⁸ It refers to a system of organized individuals united to efficiently accomplish a specific goal. The Honduran PESCA (Program of Prevention and Education in Health and Cancer) group of medical students was organized, trained, and managed by oncologists at La Liga Contra Cancer to do outreach for cervical cancer screening (ie, Pap test) in urban community settings (ie, schools and churches) 40 weekends per year. Women identified with pre- or invasive cervical cancer by cytology are encouraged to attend a follow-up clinic at La Liga Contra Cancer. In

2013, the CLARO team committed to an initial attempt to scale-up a PESCA screening, taking it farther afield into a rural mountainous region in Honduras, where cervical screening had been unavailable.⁹ Previous community development work provided existing relationships, and local leaders were eager to host a free, large-scale cancer screening event for women that they determined should be called a “jornada” (Spanish for a day of work). Recognizing that this cancer screening jornada would be the first and potentially only cancer screening for recruited participants, it made sense to make the day as useful as possible, so low-tech breast cancer screening (ie, education and clinical examination) was coupled with cervical cancer screening.¹⁰ Health education modules related to breast self-examination and labor and delivery also were integrated into the event.

The first jornada for women (in 2013) screened for 2 cancers (breast and cervix), and the second jornada for women (in 2016) screened for 3 cancers (breast, cervix, and thyroid). After that event, local leaders asked when the CLARO team planned to “do something” for the men. That query sparked the expansion to the 2017 men’s jornada, which screened for 5 cancers (skin, prostate, colorectal, oropharynx, and testes). The increasing number of organ targets across the years represents the ability to leverage growing support from local leaders to mount more complex jornadas and thus provide better value for participants. Disease-site targets and screening methods were selected

TABLE 1. Division of Responsibilities Among Research Team Members

Responsibilities		
Community Leaders El Rosario, Honduras	Honduran Oncologists, La Liga Contra el Cancer	Investigator, Norris Cotton Cancer Center
Logistics	Joint selection of screening targets	
Promotion/marketing	Train medical students	Research leadership
Community liaison	Clinical screening	Project management
Supervision of volunteers	Pathology	Onsite coordination
Encourage compliance with follow-up testing	Data entry	Data analysis
	Clinical follow-up	

by the CLARO research team in consideration of these key characteristics: high cancer prevalence in Honduras, ability to screen onsite with tests that are portable and durable, and ability of oncologists to provide clinical follow-up in Honduras.

Participant recruitment was based primarily on simple photocopied flyers and community leader outreach to other community leaders. Twelve villages were targeted with flyers and leader-leader phone calls, though participation was not limited to those villages. The host village leader (in El Rosario, Yoro, Honduras) telephoned peers in other communities to explain the opportunity and request that her peer provide a rough headcount of women or men who intended to participate. When the host village leader calculated close to 400 participants (the anticipated capacity of the event), she stopped making calls.

Additional strategies were enlisted in 2017, when participation by men was expected to be somewhat lower, given the less frequent use of and comfort with medical care reported by men in Latin America.¹¹ To counteract that prevailing tendency, the local leaders asked teens in their community-based leadership program to spread information about the jornadas in the target communities. Armed with flyers, they rode the bus or walked to each community to talk with men and women about the benefits of the men's jornada and cancer screening. These outreach efforts targeted both men and women, under the assumption that women would have the ability to positively influence the men in their families and increase receptivity to the event.

Onsite at the jornadas, attendees were each given a zip plastic bag with a "scorecard" that would serve as their health record with their name, identification number, and times of entry and exit for the event. They carried the bag with them as they moved through the screening activities. These scorecards were used to help manage the participant flow through the various screening stations, lunch, and education programs. A decision was made to use a paper-based system each year to avoid relying on unreliable electricity for computers. After each jornada, medical students who participated in the screenings entered the study data in the permanent digital database.

Analysis

Research team documentation of the planning process was reviewed to (1) summarize the barriers to participation and the strategies that were implemented to mitigate those barriers (research question 1) and (2) describe the staffing and roles that were performed at each jornada (research question 2). Descriptive statistics were used to summarize the characteristics of participants and the rates of participation in screening and compliance with referrals to the cancer center (research question 3).

RESULTS

Barriers to Participation and Mitigation Strategies

Table 2 lists the barriers that local leaders identified when planning the jornadas. The primary barriers to participating in the jornada and participating in additional testing at the cancer center were rather similar: Many would have to travel a distance to access the service, which can be difficult in the context of poverty, and most would likely have

TABLE 2. Barriers to Participation and Mitigation Strategies

Community-Identified Barrier	Strategy to Mitigate Barrier
In the screening Jornada	
Unaware of benefits of cancer screening	Inform local leaders who share information
Fear of outsiders	Local leaders recruit participants
Lack of comfort with screening or medical care	Local leaders explain screening processes; local teens market the event to families
Poverty	Free screening and additional testing
	Free hot lunch
Distance to screening site	Free bus
Requires investment of time	Two-day weekend event
	Break into modules to manage flow
	Add education to add value and minimize "downtime" between screening
	Provide gift as token of appreciation for patience
With regard to compliance with referrals for additional testing	
No postal system or e-mail and severely limited telephone access	Referrals for further testing provided to participants at Jornada
Distance to cancer center	Travel by public bus
Unsure of the process and the value of compliance with referral	Leaders arrange for small groups to travel together
Poverty	Clinical screening and evaluation are free

low awareness of the benefits and process of cancer screening and testing. The research team surmounted those barriers by having community leaders explain the process and arrange for transportation for their community (ie, a bus, paid for by the study funds). Once at the jornada, every attempt was made to make it a pleasant and productive event. Utility was maximized by anticipating “choke-points,” when participants would be waiting in line for their next screening, and using that time to teach cancer prevention modules. A hot lunch and a parting gift (ie, toiletries for women in 2013 and 2016 and a machete file for men in 2017) were other features to convey respect for the participants who had committed to participate in the full event. Participants who needed to have follow-up screening were reminded with a personalized, hand-delivered letter and subsequently matched with other community members so that they could make the 4-hour trip by foot and public bus to La Liga for testing together.

Feasibility of Implementing the Jornada

Table 3 presents the roles and credentials of the jornada staff. It was a priority of the CLARO team to include medical trainees in the cancer screening activities, because it was useful for capacity building in the Honduran health system and long-term professional development. The number of staff increased each year as word of the jornada’s positive atmosphere spread ($n = 33, 39,$ and 44 in each progressive year). Though the number of people needed for some roles remained stable across the years (eg, project management), the number of screeners and courtesy guides increased as the number of organs targeted at each jornada increased.

The majority of the roles were filled by local Hondurans. Of note, the roles were filled by a diverse group of people, from local teenagers (who served as courtesy guides) to community members (serving as cooks, cleaners, logistics, and supervision) to medical students (health educators and screeners) and health care professionals (clinical lead; pathologists; clinicians to treat emergent issues, such as an infected wound). The roles filled by Hondurans were evenly split between those that were financially compensated and those that were filled by volunteers. Notably, the roles that were compensated were not limited to the clinical roles; the local women who cleaned the building and cooked the meals were paid.

To build a system for jornadas that could be replicated in any LMIC, we used commonly available spaces in a local clinic, school, and community center and arranged the physical set-up to preserve confidentiality. Classrooms with desks and chairs served as intake areas and for delivery of educational modules. Other classrooms cleared of furniture and equipped with temporary exam cubicles framed with wood and shower curtains (built by host community members) became screening areas. The local clinic provided space for consultation on participants’ emergent

issues, a temporary pathology laboratory, privacy for prostate screening, and space for confidential consultation with the oncologist as appropriate. The local community center afforded space for an ongoing communal luncheon for participants when they completed the study activities.

The average physical space for a gynecologic examination cubicle was 22.5×2.0 m, enough to place the exam table and a flat surface for medical items, paper forms, and a trash disposal bin. Special care was taken to preserve privacy, particularly when a large room was to be fitted with several cubicles. Battery-operated headlamps were used for cervical screening, which avoided the need for electricity in each cubicle.

Participants and Screening Results

Table 4 presents the characteristics of the people attending each jornada who signed a consent form indicating their willingness to contribute their information to the study. Each jornada was conducted in El Rosario, but the reach of the event spread far beyond that host community. Only 19% to 35% of the participants each year were residents of El Rosario, where the jornada was conducted.

Table 5 presents the results of the screening and compliance with additional testing. Notably, the vast majority of jornada attendees participated in every type of screening offered. In both women’s jornadas, participants at the breast screening area began their encounter with an educational module on how to do a breast self-exam and then were offered a clinical breast exam if they were concerned about a potential breast problem. In 2013, 238 of the 437 participants requested a clinical breast exam. Of that group, many women were having problems with lactation and wanted to discuss their concerns with a physician. This created a tremendous backlog unrelated to cancer screening. In the 2016 jornada, lactating women were not offered clinical breast exams, which greatly reduced the number requested. By 2017, at least 97% of the men participated in each screening activity.

Summed across all 3 events, there were 190 patients in which additional testing at the cancer center or with a primary physician was warranted. The majority of those positive screenings were for cervical cancer ($n = 128;$ 67%). In 167 instances (88%), the participant presented for additional testing at a later date.

DISCUSSION

The purpose of this series of studies was to explore the feasibility and scalability of a replicable, multiphasic screening event targeting multiple types of cancer in rural settings. While attempting to target the common challenge of LMICs related to lack of infrastructure to conduct cancer screening and provide follow-up testing and care,¹² our team also strategized ways to minimize the individual-level barriers that could affect participation in the jornadas. The barriers identified by this community were similar to others

TABLE 3. Staffing at Each Jornada

Job Title	Role	No. of Staff per Event				Volunteer or Paid	HN or US
		2013 Event (n = 473)	2016 Event (n = 401)	2017 Event (n = 301)	Credentials		
Project manager	Clinical lead	1	1	1	MD	Paid	HN
Project manager	Logistics lead	1	1	1	MEd	Paid	US
Project manager	Scientific lead	1	1	1	PhD	Paid	US
Data manager	Data management	1	1	1	Student	Volunteer	US
Screening personnel	Clinical screening, accrual, surveys, and data entry	6	10	15	Medical students or MD	Volunteer	HN
Health educator	Mini classes on cancer prevention topics	2	2	2	Medical students	Volunteer	HN
Clinician	Treat emergent issues in participants	1	1	1	Nurse	Paid	HN
Pathologist	Analysis of samples in HN	1	1	1	MD	Paid	HN
Community leader	Promotion, volunteer supervision, logistics	8	8	8	Local leaders	Volunteer	HN
Cook	Meal preparation	3	3	3	Local women	Paid	HN
Cleaner	Maintenance of facilities	2	2	2	Local women	Paid	HN
Courtesy guide	Wayfinding, line management, information	6	8	8	Local teens	Volunteer	HN
Total		33	39	44			

Abbreviations: HN, Honduras; MD, Doctor of Medicine; MEd, Master of Education; PhD, Doctor of Philosophy; US, United States.

TABLE 4. Participant Characteristics by Year

Characteristic	Data by Year		
	2013	2016	2017
Sex, No. (%)			
Female	473 (100)	401 (100)	NA
Male	NA	NA	301 (100)
No. of communities represented	31	52	38
Residents of the host community, No. (%)	167 (35)	78 (19)	63 (21)
Mean age (SD), years	41.1 (13.7)	42.1 (14.7)	49.5 (15.9)
Mean education (SD), years completed	4.3 (2.9)	4.7 (3.0)	4.2 (3.2)

Abbreviations: NA, not applicable; SD, standard deviation.

noted within LMICs: lack of understanding of process and benefit of screening,^{1,13,14} investment of time,¹⁴ distance,^{1,14} and costs.¹

The local Honduran leaders had a strong emphasis upon the use of social capital to mitigate barriers. Specifically, they recruited by telephone and word of mouth and coordinated transportation for groups of people to reduce anxiety and a sense of being singled out. This person-to-person process of advertising within communities has been found to be more effective than mass mailings and cold telephone recruiting in other rural settings.¹⁵ The community hosting the event also prioritized the provision of a hot lunch and a token gift as a way to convey respect for staff and participants and the importance of the event as a mechanism of health promotion within the community. The importance of culturally sensitive community engagement for dissemination and sustainability of screening efforts in LMICs has been noted as a key component of the degree to which implementation efforts succeed or fail.^{1,12} As such, the events were feasible to execute and became more complex across the years, offering more screening targets and opportunities for health education.

The high rates of participation in each screening activity suggest that having multiple components (ie, education, lunch, screening stations) and courtesy guides who could engage in wayfinding and redirection helped improve the throughput and crowd control. Also, the strategic decision to recruit men by marketing the men's jornada to families possibly enlisted the social capital of wives and mothers in encouraging men to attend and participate fully in the event. The repeated reliance on the Honduran local staff, including in volunteer and paid capacities, fostered the scalability, as the local leaders had great ownership and investment in the process throughout the years.

Although these events were staged within the same community in all of the years, the facilities and techniques used could be packaged and used in other rural villages throughout the country. The CLARO team is developing a toolkit for the jornada approach that will be tested in other villages and at urban factories within the next 2 years. The

jornada approach is not limited to cancer screening; a similar approach has been piloted in Honduras for vision screening and for children (vision, hearing, vaccination, basic medical screening; unpublished data). Combining cancer screening with screening for other noncommunicable diseases, such as hypertension or diabetes, has practical appeal and could maximize the potency for health promotion, though it would require collaboration between primary care and oncology providers to ensure an accessible pathway for additional testing and care.

To reduce the burden of cancer in a country, screening must be followed by diagnostic testing and treatment. The participants had high rates of follow-up testing, possibly in response to active attempts to mitigate barriers to their engagement in subsequent care. This is comparable to screening initiatives in other rural locations that start with a village-based encounter. For example, there was a 83% compliance rate for follow-up care after cervical cancer screening in rural Thailand.¹⁶

Conclusions from this report should be tempered by considering the limitations of the study design. First, it is possible that the number of people complying with follow-up testing is higher than we recorded, because we did not have access to records of primary care providers—with whom participants may have visited for follow-up instead of the cancer center. Second, we do not have data about the outcome of the follow-up testing, leaving us unable to assess the effectiveness of cancer screening. Finally, a single-arm, post-test-only design does not allow us to specifically test the efficacy of screening or of individual implementation strategies (eg, provision of lunch *v* inclusion of health education), nor does it allow us to control for threats to internal validity, such as the word-of-mouth marketing that occurred between each event. However, the fact that the screening events were replicated 3 times provides evidence to suggest that the process is scalable and sustainable.

In conclusion, the jornada approach proved feasible for both women and men and resulted in high rates of compliance to follow-up testing. The jornada approach appears

TABLE 5. Screening Targets, Methods, and Results for Each Jornada

Organ	Primary Screening Method at Jornada	Secondary Screening Method at Jornada	Year of Jornada: No. Screened		Year of Jornada: No. Compliant With Additional Testing/Total No. Screened Positive (%)	Available Follow-Up Clinical Diagnostics and Therapies in Honduras
			Positive/Total No. Screened (%)	Positive (%)		
Skin	Visual inspection	Biopsy onsite	2013: NA	2013: NA	2013: 1/2 (50)	Diagnostic: biopsy and IHC
			2016: NA	2016: NA	2016: 2/2 (100)	Therapy: dermatology, surgery, radiotherapy
			2017: 2/293 (0.007)	2017: 2/2 (100)	2017: 2/2 (100)	Therapy: dermatology, surgery, radiotherapy
Testes	Manual inspection	NA	2013: NA	2013: NA	2013: 1/2 (50)	Diagnostic: clinical exam, biopsy and IHC
			2016: NA	2016: NA	2016: 1/2 (50)	Therapy: refer to urology
			2017: 2/298 (0.007)	2017: 2/2 (100)	2017: 2/2 (100)	Therapy: refer to urology
Breast	Breast self-exam, self-referral	Clinical breast exam	2013: 12/238 (0.05)	2013: 10/12 (83)	2013: 10/12 (83)	Diagnostic: imaging, biopsy, IHC
			2016: 17/308 (6)	2016: 17/17 (100)	2016: 17/17 (100)	Therapy: surgery, radiotherapy, chemotherapy, hormone therapy
			2017: NA	2017: NA	2017: NA	Therapy: surgery, radiotherapy, chemotherapy, hormone therapy
Colorectal	Survey based on international standards, family history	Fecal occult blood test	2013: NA	2013: NA	2013: NA	Diagnostic: endoscopy, biopsy and IHC
			2016: NA	2016: NA	2016: NA	Therapy: surgery, radiotherapy, chemotherapy
			2017: 2/301 (0.007)	2017: 2/2 (100)	2017: 2/2 (100)	Therapy: surgery, radiotherapy, chemotherapy
Oropharynx	Visual inspection	Photography for telepathology in US	2013: NA	2013: NA	2013: NA	Diagnostic: referral to ENT for diagnosis and biopsy
			2016: NA	2016: NA	2016: NA	Therapy: surgery, radiotherapy
			2017: 0/295 (0)	2017: NA	2017: NA	Therapy: surgery, radiotherapy
Thyroid	Manual palpation	NA	2013: NA	2013: NA	2013: NA	Diagnostic: clinical exam, ultrasound, biopsy
			2016: 7/396 (0.02)	2016: 3/7 (43)	2016: 3/7 (43)	Therapy: surgery, palliative radiotherapy
			2017: NA	2017: NA	2017: NA	Therapy: surgery, palliative radiotherapy
Prostate	Personal and family history survey	Digital rectal exam	2013: NA	2013: NA	2013: NA	Diagnostic: clinical exam, biopsy
			2016: NA	2016: NA	2016: NA	Therapy: surgery, radiotherapy or referral to urology if benign
			2017: 20/301 (0.07)	2017: 11/20 (55)	2017: 11/20 (55)	Therapy: surgery, radiotherapy or referral to urology if benign
Cervix	PCR test for high-risk HPV	Pap test if high-risk HPV+	2013: 78/473 (16)	2013: 73/78 (94)	2013: 73/78 (94)	Diagnostic: clinical exam, colposcopy
			2016: 50/401 (12)	2016: 48/50 (96)	2016: 48/50 (96)	Therapy: surgery, radiotherapy, chemotherapy
			2017: NA	2017: NA	2017: NA	Therapy: surgery, radiotherapy, chemotherapy

Abbreviations: ENT, ear, nose, and throat; HPV+, human papillomavirus positive; IHC, immunohistochemistry; NA, not applicable; PCR, polymerase chain reaction; PSA, prostate-specific antigen.

highly scalable; it was replicated across the years with different screening targets. In addition, as the events grew more complex, greater numbers of local staff were engaged with no noticeable loss of efficiency. When planning events using the jornada approach, communities can identify their unique rate-limiting factors (eg, large numbers of people, smaller spaces) and adjust the components in response

(eg, offer a 3-day event, adjust the number of screening tests). High levels of engagement by local community members appears to be a key ingredient to the success of the jornada model. Community-engaged research models could be used to inform and guide future attempts at implementation of cancer screening programs in LMICs.

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