Results and Lessons Learned from the Grounds for Health Program in Nicaragua:

A Community-Based Public-Private Model for Addressing Cervical Cancer

Key Message

The results of Grounds for Health's cervical cancer prevention projects in northern Nicaragua demonstrate the value of working with public and private partners, such as coffee businesses and local health authorities, who have shared interests and resources that can be combined to establish cervical cancer prevention services in remote communities.

Summary

Cervical cancer remains a major cause of mortality for women of reproductive age in low-resource countries, despite the fact that it is one of the few cancers that is easy to prevent with early screening and treatment. Grounds for Health is a non-profit organization that works in partnership with coffee businesses to reduce cervical cancer in low resource settings.

In 2007, following the publication of the World Health Organization's guidelines, *Comprehensive Cervical Cancer Control: A guide to essential practice*, which endorsed screening with visual inspection with acidic acid (VIA) followed by treatment with cryotherapy in pilot projects (1), Grounds for Health initiated demonstration projects using VIA and cryotherapy in Matagalpa, Jinotega and Madriz, Nicaragua. These projects were carried out in collaboration with local health authorities and coffee cooperatives in order to ensure the participation of women in low-resource communities where the need is highest. In this innovative community partnership model, Grounds for Health combined the mutual interests and resources of the coffee industry and local health authorities with a sustainable and effective approach to address traditional barriers to cervical cancer prevention in low-resource settings.

Although other organizations in Nicaragua have undertaken studies on VIA, and the Nicaraguan Ministry of Health (MINSA) has since published national norms on VIA (2), Grounds for Health's demonstration projects represent the most extensive applications of VIA and cryotherapy in the country. The purpose of this paper is to share the results and lessons learned from Grounds for Health's experience in order to inform future programming for locally sustainable cervical cancer prevention services in rural communities.

Through these demonstration projects, a network of 397 community health promoters received training to promote awareness and uptake of cervical cancer prevention services in rural communities; 100 providers received clinical training on VIA/cryotherapy; and 33 health clinics received equipment and supplies for cervical cancer prevention and control. The outcomes of these efforts provided 14,168 women with screening and 1,421 with preventative treatment for cervical cancer. Furthermore, the community partners including 6 coffee cooperatives and local health authorities, have continued to work together independently of Grounds for Health, engaging local doctors, nurses and community health promoters trained through the program to provide VIA and cryotherapy to women in rural, low-resource communities.

Background

Cervical Cancer

Worldwide, there are more than 530,000 new cases of cervical cancer diagnosed each year, 85% of which occur in developing countries (3). Though it is easily preventable through vaccination, screening and early treatment (4), cervical cancer is a leading cause of death among women in developing countries where many women have never been screened (5-6). Studies show that women who are poor are at highest risk for developing cervical cancer, yet the least likely to be screened (6). Nicaragua has the highest mortality and third-highest incidence of cervical cancer among all countries in the Western Hemisphere (2). Cervical cancer is the number one cause of cancer death in Nicaragua accounting for more than 420 deaths per year (3), more than three times the number of deaths from pregnancy and childbirth (7).

The Nicaraguan Ministry of Health (MINSA) is committed to decreasing the rate of mortality from cervical cancer and, since 1980, has had a national screening program in place using the Papanicolaou (Pap) test. However, in spite of the success of the Pap test and related treatment to reduce cervical cancer in high-resource countries, this program has not had the desired impact in Nicaragua and other developing countries, owing to low coverage, the difficulty of ensuring quality control standards, and most significantly, loss-to follow-up between screening and treatment (2).

According to an assessment conducted by the Pan American Health Organization in 2010, only 10% of women in Nicaragua have been screened with Pap (8). For women that are screened, insufficient laboratory resources means the test may not be processed adequately or on time. In Matagalpa, Madriz, and Jinotega, Grounds for Health observed pathology laboratories that were understaffed, underequipped and lacking in adequate quality control measures. In Madriz, Pap slides are sent from the municipal health centers to the regional laboratory, then to Estelí for processing, and back to the regional laboratory in Madriz for interpretation. Even if laboratory staff were able to keep pace with the current level of screening, they would need significantly more resources if coverage were to approach the 80% threshold needed to see a reduction in cervical cancer (9).

Over the past two decades research has shown that visual inspection with acidic acid (VIA) is as effective as the Pap test in identifying cervical cancer precursors and requires considerably less time and fewer resources (10). In particular, studies have shown that where the vaccine and the HPV test are not yet feasible due to cost, infrastructure, or logistics, screening with VIA followed by treatment of precancerous lesions with cryotherapy (freezing) is the most efficient and effective strategy for preventing cervical cancer (11). The advantage of VIA is that it yields an immediate result and can often be followed by treatment in the same visit. This approach is known as Screen and Treat or the Single Visit Approach and is an important strategy for reducing the large number of women who are screened but never receive the treatment necessary to prevent cancer. Another advantage is that VIA and cryotherapy can be easily taught, require no complex equipment and can be performed effectively by trained doctors, nurses and midwives (10). Finally, all of the supplies needed for VIA and cryotherapy can be purchased locally. The main challenge with this approach is that VIA has a relatively low specificity compared to Pap and HPV tests and does not provide a histological sample, which often leads to treatment of false-positives. However, consequences of overtreatment are mitigated with cryotherapy, which has very low risk of complications (12). The other challenge is

that cryotherapy devices are prone to technological problems such as clogging or blockage associated with the quality of the gas, or general equipment malfunction (13). Despite these challenges, compared to other methods, VIA and cryotherapy are relatively low-cost and, at the current time offer the best hope for increasing coverage of effective cervical cancer prevention services in Nicaragua.

The Coffee Industry and Cervical Cancer

Coffee is Nicaragua's most valuable agricultural product, representing about 30% of the total value of all agricultural exports (14). The coffee industry's workforce is reliant on adult women, who typically perform at least 70% of the fieldwork, harvesting, and sorting of coffee (15). In addition, coffee is grown in mostly rural mountainous areas, where cervical cancer prevention services are extremely limited. At the time Grounds for Health's project began in 2007, about 32% of cervical cancer deaths in Nicaragua came from the top coffee producing departments, Matagalpa, Jinotega, Estelí, Madriz and Nueva Segovia (7, 16). Existing cervical cancer prevention services in these regions were ineffective due to the challenges previously discussed relating to the Pap test and barriers to access faced by women living in rural areas (2). For these women, access to existing services was often limited by lack of knowledge, transportation, and availability of services.

Many coffee cooperatives, importers and roasters have come to recognize women's health and wellbeing as important components of socially responsible business practices and have incorporated initiatives to address gender disparities into their corporate sustainability plans. Many such initiatives fall under Fair Trade standards that require that producers promote social, economic and environmental development in their communities in exchange for receiving higher prices for their crop than non-Fair Trade producers. According to Fair Trade International, in order to receive Fair Trade certification, "All members of the organization need to have access to democratic decisionmaking processes and as far as possible participate in the activities of the organization. The organization needs to be set up in a transparent way for its members and must not discriminate against any particular member or social group (17)."

Because of the significant role played by women in coffee production, the application of these standards has contributed significantly to gender equity initiatives, resulting in increased access to cash, organizational benefits, and control over farm practices (18). In Nicaragua, the coffee industry's commitment to gender equality is evident in the organizational policies of many coffee cooperatives such as CECOCAFEN, PRODECOOP, SOPPEXCCA, and UCPCO. Each of these co-ops has gender equality initiatives, including promoting greater female representation among co-op leadership, savings and loans programs for women, special marketing of coffee produced exclusively by women, and women's health activities (19-22). CORCASAN and UCA San Juan are examples of smaller co-ops that have also prioritized women's health in their social development plans.

Program Description

Grounds for Health (Cultivando la Salud) is a nonprofit organization based in Waterbury, Vermont, whose mission is to reduce cervical cancer among low-income women in less-developed countries. Since 1996, Grounds for Health has worked in collaboration with coffee-growing communities in Mexico, Guatemala, Nicaragua, Tanzania and Peru. Over 200 coffee businesses and individuals provide funding for Grounds for Health programs.

Between 2007 and 2014, Grounds for Health partnered with six coffee cooperatives and local health authorities in Matagalpa, Jinotega, and Madriz departments of Nicaragua to establish sustainable cervical cancer prevention programs in low resource communities. The program began when leaders of the SOPPEXCCA coffee cooperative in Jinotega identified cervical cancer as a problem in its member communities and invited Grounds for Health to collaborate. Subsequently, the CECOCAFEN cooperative in Matagalpa (in 2008), and four co-ops in Madriz— UCPCO, UCA San Juan, PRODECOOP, and CORCASAN (in 2011)—initiated collaborations with Grounds for Health. At each site, Grounds for Health and the local partners implemented a three-year program that aimed to strengthen the capacity of local health systems to screen and treat early signs of cervical cancer, increase awareness of the disease and services in the communities, and establish linkages between the health system and coffee growing communities. The expected outcome was that after approximately three years, the local partners would have sufficient capacity to continue the program independently of Grounds for Health.

In this innovative community-based approach, each partner is motivated to participate in order to fulfill an important objective of their organization's mission, and contributes information and resources critical to the success of the intervention:

- Coffee importers, roasters and consumers are motivated to protect the livelihoods of their supply chain and anxious to demonstrate responsiveness to consumers' demand for corporate social responsibility and sustainability. They bring outside funding and increased visibility to the issue.
- Cooperatives of coffee producers are motivated to provide value to their members through health and social projects. They offer social influence as a trusted community organization and important local business, and have infrastructure, vehicles and staff who are experienced in engaging with rural communities. The premium paid to farmers through Fair Trade certification provides the cooperatives with financial resources for social programs.
- Local health authorities are motivated by a mandate to decrease cervical cancer incidence by increasing coverage of preventive services in remote communities. They offer the resources of the existing health system, including clinics, providers, and healthcare managers.

Methods & Activities

At the beginning of each project, Grounds for Health brought all stakeholders to the table to develop partnership agreements delineating roles, responsibilities, and shared goals and objectives of the program. Grounds for Health worked with partners to:

- Train community health promoters associated with coffee cooperatives to increase awareness of the importance of cervical cancer prevention and recruit women in the target group.
- Train local doctors and nurses in VIA and cryotherapy and provide supportive supervision after training to ensure continued quality of care.
- Conduct Screen and Treat campaigns with local doctors and nurses for women in coffee growing communities.
- Donate cryotherapy equipment, speculums and other essential materials for cervical cancer prevention to local clinics and provide technical assistance in its use.

At the beginning of each program, the co-op partners helped identify the communities where screening and treatment services were most needed and recruited members of those communities to serve as community health promoters (CHPs). Selection criteria for community health promoters included: able to read and write; able to make a time commitment to the work; trusted and respected by others in the community; comfortable speaking in front of groups; willing to serve as a CHP for at least two years; and interested in helping women in their community.

With support from the co-ops, Grounds for Health trained the CHPs to give talks on cervical cancer screening and treatment in their respective communities, identify women in the target group for screening, bring them to participating health centers for cervical cancer prevention services, and coordinate with the co-ops and health providers to ensure follow-up for women with positive results. The trainings equipped the CHPs with the knowledge and skills necessary to address common misconceptions about cervical cancer in the community. With the backing of the cooperative, they were able to influence cultural barriers, including stigma, *machismo* and general mistrust of health services.

In all, 25 training workshops were held for community health promoters; 5 in Matagalpa, 6 in Jinotega, and 14 in Madriz. In Madriz, the CHP trainings were extended to the *Red Comunitaria*, the ministry network of volunteer health promoters, which were directed by local providers trained by Grounds for Health and equipped with curriculum and educational materials. A total of 397 individuals participated in the trainings (Table A).

Location	Trainings	Participants (first time)
Matagalpa	5	93
Jinotega	6	53
Madriz	14	251
Total	25	397

Table A: Summary of Community Health Promoter Trainings

In conjunction with the CHP trainings, Grounds for Health and the co-ops worked with the local ministries of health, known as SILAIS, to identify doctors and nurses to receive training in VIA and cryotherapy. The training consisted of 2 days of classroom instruction followed by 3-4 days of clinical practice in the form of a Screen and Treat campaign, in which community women of the target age were invited to attend. The curriculum was developed by Grounds for Health specifically for very-low resource settings and was based on the World Health Organization's Cervical Cancer Prevention and Control Guidelines and incorporated previously validated training materials from Jhpiego. US-based medical volunteers with expertise in women's health, or previously trained local providers, precepted the local doctors and nurses during the campaigns. Trainers used two standardized evaluation instruments to determine clinical competency and award certification in VIA and cryotherapy: a written pre/post-test and an evaluation of clinical skills developed by Jhpiego. To achieve certification, providers were required to obtain a score of at least 70% on the post-test and demonstrate competency as measured by a positive evaluation from the instructor on their checklist of clinical skills.

Grounds for Health conducted 1-2 clinical trainings annually at each project site, for a total of 16. In all, 121 individual providers received training, of whom 100 achieved competency in VIA, and 54 also achieved competency in cryotherapy (Table B). Providers who did not achieve competency in VIA include some providers who attended only a portion of the training as well as those that did not achieve the criteria defined earlier. Only providers who demonstrated competency with VIA and were based in locations where they would have access to cryotherapy were evaluated for competency in cryotherapy.

Location	Total Number of Clinical Trainings	Total Number of Individual Participants	Achieved Competency in VIA	Achieved Competency in Cryotherapy
Matagalpa	5	35	31	13
Jinotega	5	35	24	14
Madriz	6	51	45	27
Totals:	15	121	100	54

Table B: Summary of Clinical Trainings for Providers

Consistent with current WHO norms, every effort was made to recruit women at "highest risk" defined as those between 30-49 years of age who had never been screened or had not been screened in more than three years (9). Local providers were paired with a preceptor and performed screening, treatment and counseling services under their supervision. Women received screening with VIA and/or Pap, and treatment with cryotherapy. At all campaigns prior to 2011, a team of volunteer cytopathologists and cytotechnologists from the US set up a temporary lab to process Pap smears during the campaign and provided Pap results within the same week. Beginning in 2011, Pap testing was phased out and VIA was used as a stand-alone test whenever possible. Women with positive test results (acetowhite lesions with VIA, or CIN II or III with Pap) were offered immediate treatment with cryotherapy if the lesion covered less than 75% of the face of the cervix and did not extend into the endocervical canal or vaginal wall.

Beginning in 2010, doctors and nurses who achieved certification through the training received a VIA and cryotherapy registry log to track patients and record the number of VIA and cryotherapy procedures which they performed at their clinics following the training. Grounds for Health collected data on numbers of women screened with VIA and treated with cryotherapy by individual providers until the program was transitioned to local partners. Grounds for Health also provided supportive supervision to the local providers for 6 to 12 months following their initial training in order to help them integrate VIA and cryotherapy services into routine exams, reinforce their clinical skills, and identify gaps and solutions related to clinic space, time and supplies.

Finally, Grounds for Health donated cryotherapy equipment, speculums, biopsy punches, laboratory equipment for pathology services, and buckets for high-level disinfection to 33 health centers, hospitals or health posts throughout Matagalpa, Jinotega, Madriz, and other departments. Donations included 16 cryotherapy units, 17 biopsy punches, 332 speculums, as well as laboratory equipment (a microscope, microtome, and various supplies for processing Pap slides). Donations not only supported the health facilities where Grounds for Health worked, but also other facilities and or

referral facilities. The total value of all donations was \$55,990 (Table C). Grounds for Health staff provided technical assistance in equipment use and maintenance.

Table C: Donations to Health Centers

Equipment Donations	Matagalpa	Jinotega	Madriz	Other	Total
Cryotherapy units donated (value per unit is \$1,250)	6	3	6	1	16
Biopsy punches	4	3	4	6	17
Pathology lab equipment	1	1	1	0	3
Speculums donated (\$12 each)	50	35	247	0	332
Value of All Donations	\$24,219	\$10,703	\$18,218	\$2,850	\$55990
Total number health centers, hospital, or health posts equipped* (including small donations)	9	6	14	4	33

Results

As a result of Grounds for Health programs, over seven years 14,168 women received screening through campaigns or by Grounds for Health trained local providers outside of campaigns. In all, 2,391 (17%) women received a positive screening result (VIA positive or CIN 2 or 3), of whom 2,050 (86%) met the criteria for treatment with cryotherapy. Of those, 1,421 (69%) received treatment, and 616 (30%) were referred for cryotherapy.

Table D shows the estimated target population (women aged 30-49) at each project site against the total number of women screened. Percentages shown are not an accurate reflection of screening coverage since some women were outside the target age group. Detailed breakdown of results, including women in the target group, and treatment are shown separately for campaigns and non-campaigns in tables E and F.

Population Served	Jinotega	Matagalpa	Madriz	All Sites
Estimated population aged 30-49 in project area ¹	28,848	30,283	15,142	74,273
Women screened (Campaigns and Non-Campaigns)	3567	6244	4,357	14,168
Percent of women screened	12.36%	20.62%	28.77%	19.08%

Table D: Population reached in catchment areas through campaigns and non-campaigns

Screen and Treat Campaigns

Grounds for Health and local partners conducted 16 Screen and Treat campaigns and two minicampaigns, providing services to 4,700 women. (Table E). Per WHO recommendations, Grounds for Health prioritized screening coverage over frequency, aiming to ensure as many women aged 30-49 received at least on screening test in their lifetime. Across all sites, 66% of women were ages 30-49, and 56% of women were considered to be within the target group for the program based on age and prior screening history. Women outside of the target group who arrived at the campaign were not turned away, but received screening if time and resources permitted as well as counseling on the appropriate interval for repeat testing.

As shown in bold in Table D, a total of 665 women (14%) were identified with positive results during campaigns. Of these, 532 (80%) women met the criteria for same day treatment with cryotherapy, and of those, 519 (99%) received immediate treatment. Women with positive results not eligible for cryotherapy at the time of screening (most commonly due to large lesion, pelvic infection, or menstruation) were either scheduled to return for cryotherapy within 2 weeks, or were referred for further diagnostic testing and follow-up at the regional hospital, or through Clinica Fara, a private clinic in Matagalpa. Twelve (0.26%) women were suspected of having an invasive cancer and were immediately referred to the regional hospital for further evaluation and then to Bertha Calderon Hospital in Managua for treatment.

In Jinotega, where the program began, only 64% of women were deemed eligible for immediate treatment compared with 88% and 88% in Matagalpa and Madriz respectively. This is most likely due to the gradual increase in providers' comfort and confidence in VIA and cryotherapy. As the program expanded to Matagalpa and Madriz, and new evidence supporting VIA and cryotherapy emerged, providers became more confident in the effectiveness of the procedures and their own abilities.

¹ Estimates for eligible population derived from 2005 census by age, multiplied by growth factor of 8.1% for Jinotega and Matagalpa for estimated 2010 population, and by 16.2% for estimated 2014 population in Madriz. Project area for Jinotega includes: Jinotega, Wiwili, Bocay, Pantasma and El .Cua. For Matagalpa: Matagalpa, La Dalia, San Ramon, Ciudad Dario and Sebaco. For Madriz all 9 municipalities are included.

Table E: Women Screened through Campaigns

Screening and Treatment Uptake from Campaigns	Jinotega	Matagalpa	Madriz	Total
Women screened during Grounds for Health campaigns	1625	1347	1728	4700
Women within target age group (age 30-49) ²	65%	77%	83%	66%
	(957/1472)	(707/923)	(1432/1728	(3096/4700)
Women within priority group based on age and screening history (age 30-49 and 3 or more years since last screening, or history of abnormal screening results) ²	41%	61%	67%	56%
	(598/1472)	(567/923)	1086/1615	2251/4010
Women associated with coffee cooperative ²	70%	88%	74%	74%
	(1036/1472)	(814/923)	(1199/1406)	(3049/3801)
Women with positive VIA+ or CIN 2 or 3)	14%	18%	12%	14%
	(220/1625)	(239/1347)	(206/1728)	(665/4700)
Women with positive result who met criteria for same day treatment with cryotherapy ³	64%	88%	88%	80%
	(140/220)	(211/239)	(181/206)	(532/665)
Women with positive result appropriate for cryotherapy	93%	99%	99%	99%
who received immediate treatment with cryotherapy	(130/140)	(209/211)	(180/181)	(519/532)
Women with positive result who did not meet criteria for same day treatment and were scheduled for future cryotherapy, or referred for further diagnostics or treatment (e.g., pelvic infection, lesion too large, menstruation)	36% (80/220)	10% (25/239)	12% (24/206)	19% (129/665)
Women with suspected cancer – referred for further diagnosis and treatment	0.18%	0.52%	0.12%	0.26%
	(3/1625)	(7/1347)	(2/1728)	(12/4700)

Continuation of Services by Trained Providers

In 2010, to assess whether local providers were continuing to use VIA and cryotherapy and the long-term feasibility of the model, Grounds for Health began tracking the productivity of local providers who had been trained by the organization. The cumulative results, shown in Table F, indicate that 9,468 women received screening with VIA through ongoing services during the monitoring period. As shown in bold, 1726 (18%) VIA positives were identified, of which 1518 (88%) met the criteria for cryotherapy. Of those eligible for cryotherapy, 902 (59%) received treatment and 616 (41%) were referred for cryotherapy. Treatment rates were lower for women seen outside of campaigns since few providers, including those with cryotherapy units, were able to use

 $^{^{2}}$ Age, screening history and association with coffee cooperative not available for all campaigns. Percentages are based on campaigns for which data is available.

³ Eligibility for same day treatment with cryotherapy was determined by lead clinicians and required that the lesion not cover more than 75% of the face of the cervix, extend into the endocervical canal or vaginal wall. Other common reasons a patient was determined to be ineligible included: pelvic infection, pregnant, menstruating, or other history indicating referral was necessary.

the single visit approach during routine services. Of the VIA positive results documented by local providers, 65 (4%) did not have any documentation of having received treatment or a referral. As these services were provided by local ministry of health providers at their clinics where patient record keeping was not standardized, Grounds for Health was unable to track the outcome of each woman with positive screening results.

Screening and Treatment Uptake Outside of	Jinotega	Matagalpa	Madriz	Total
Campaigns	(2010-2011)	(2010-2011)	(2011-2014)	
Women screened with VIA by local providers trained by GFH outside campaigns	1942	4897	2629	9468
Women within target group (age 30-49 or HIV positive)*	N/A	N/A	95% (2491/2629)	N/A
Women with no prior screening test	N/A	N/A	27% (720/2629)	N/A
Women with VIA positive result	15%	20%	18%	18%
	(294/1942)	(970/4897)	(462/2629)	(1726/9468)
Women with positive result who met criteria for treatment	79%	94%	82%	88%
with cryotherapy	(232/294)	(909/970)	(377/462)	(1518/1726)
Women with VIA positive result who received treatment with cryotherapy.	42%	63%	62%	59%
	(97/232)	(570/909)	(235/377)	(902/1518)
Women with VIA positive result referred for cryotherapy	58%	35%	38%	41%
	(135/232)	(339/909)	(142/377)	(616/1518)
Women with VIA positive result who did not meet criteria for cryotherapy and were referred for further diagnostics or treatment (e.g., lesion too large)	17% (49/294)	6% (55/970)	8% (39/462)	8% (143/1726)
Women with VIA positive without documentation of follow-up (no documentation of cryotherapy, referral for cryotherapy, or referral for further diagnostics or treatment)	4% (13/294)	1% (6/970)	10% (46/462)	4% (65/1726)
Women with suspected cancer – referred for further	0.31%	0.12%	0.49%	0.26%
diagnosis and treatment	(6/1942)	(6/4897)	(13/2629)	(25/9468)

Table F: Women Screened by Local Providers Outside of Campaigns

The graphs below show the outcome of training activities as measured by the average volume of screening and treatment procedures performed per trained provider each quarter, beginning in 2010. At all sites, some variation in the quarterly productivity is attributed to seasonal events that temporarily decreased demand for screening services, such as the coffee harvest and campaigns staffed by foreign medical brigades. Similarly, the provider's ability to maintain consistent supply of services were influenced by seasonal vaccination campaigns, compilation of annual reports, and

other priorities. In short, there was a variety of factors influencing provider's productivity throughout the year.

In Matagalpa, the relative consistent performance of providers compared to Jinotega and Madriz may be attributed in part to population density around four health centers: San Ramon, Waslala, Dario, and Policlinica. Each of these health centers serve major population hubs, each much larger than the two largest municipalities in Madriz. In addition, Matagalpa had a highly motivated community partner, CECOCAFEN, whose community health promoter network actively recruited women for services and coordinated mini-campaigns with local providers. The dotted line shown in quarters 6 and 7 indicates a period of increased staff support for community engagement and close monitoring by project staff which may have helped drive demand for services and motivate providers. Although Grounds for Health stopped collecting routine screening data at this site, follow-up visits with providers in Waslala, La Dalia, Sebaco and Lacayo Farfan in 2013 revealed that all four sites were still actively doing VIA and cryotherapy.

In Jinotega, we observed an increase in the average number of women screened and treated during the second quarter and third quarter of data collection, followed by a sharp decline in the fourth, and then steady improvement through to the close of the program. Notes from this period indicate there were a number of personnel changes around the time of the decline, which left no providers certified in cryotherapy at any of the treatment sites. Productivity picked up following additional trainings in the 6th quarter. It is unknown whether productivity remained high after the program was transitioned to local partners, though key informants indicate that it has been difficult to maintain services outside the urban center of Jinotega and Grounds for Health has received repeated requests for additional trainings and more cryotherapy units.

Productivity in Madriz was monitored for the full three year program cycle. The slow start was due in large part to an unexpected shortage of gas tanks at the onset of the program, and lack of support from a municipal health director. Productivity picked up in Q5 with the expansion of the program to new municipalities with more supportive local health authorities. The dip in Q6 corresponds to the onset of the coffee harvest plus the year-end reporting cycle for local health professionals. There is evidence of some decline in the final year of the program. Informants suggest this may be due in part to pressure to perform more Pap tests. Grounds for Health will continue monitoring provider productivity in Madriz.





* Quarters are for Jan 2010 – Oct 2011 for Matagalpa and Jinotega, and Oct 2011 – Sept 2014 for Madriz

Discussion and Lessons Learned

Through these demonstration projects, Grounds for Health and local partners sought to put research in practice by using the evidence-based recommendations of the World Health Organization and the scientific community in order to design effective cervical cancer prevention programs in low-resource settings. The lessons learned through this experience align with many of the research findings discussed at the beginning of this paper, while at the same time offer valuable insight on the importance of community involvement and key elements for program sustainability. The following lessons learned are derived directly from Grounds for Health's experience in Nicaragua and are supported by staff and outside experts in the area of cervical cancer prevention.

Using VIA and cryotherapy in low resource settings

VIA and cryotherapy are highly acceptable to providers and patients in Nicaragua

Grounds for Health's experience in Nicaragua was consistent with the exhaustive body of evidence that has demonstrated the feasibility and acceptability of VIA and cryotherapy around the world (10-12). Grounds for Health did not observe any serious adverse outcomes from VIA or cryotherapy, and there was a high acceptability of VIA among both providers and women seeking screening. Many women and providers expressed preference for VIA over Pap because of the rapid results. Most importantly, by using VIA, the program was able to link screening with treatment, often in a single visit, thereby ensuring that women with positive results received complete preventative care.

Materials for VIA and cryotherapy are locally available and affordable

Once Grounds for Health made the initial investment in training and equipment, the local ministries of health and community partners were able to maintain the program for relatively little cost. The supplies needed to maintain services--vinegar, gas, cotton swabs, gloves and disinfectant--are available locally and, with encouragement from Grounds for Health, most of local health authorities were willing and able to purchase the supplies on an ongoing basis. Although there was a shortage of tanks for a period of time which resulted in delays in establishing cryotherapy at some health centers, once the tanks were in place, the local health directors and coffee partners assumed responsibility for refilling tanks.

Using VIA in place of the Pap test can increase screening coverage

Grounds for Health initially offered both Pap and VIA to all women during campaigns, but then scaled back Pap testing as the body of evidence showing the effectiveness of VIA grew. The decision to reallocate resources from Pap testing to VIA allowed the program to focus on expanding services into previously unreached areas, and ultimately reach more women with fewer resources. Furthermore, using VIA for the majority of women allowed the more targeted use of the limited Pap resources for women in whom VIA was not an option due to early menopause.

Supportive supervision is essential to ensure providers maintain competency in VIA and cryotherapy

Grounds for Health found that quality assurance was best achieved through routine supportive supervision of trained providers for a period of 6- 12 months following the initial training. Refresher trainings that brought doctors and nurses together for a review of key principles and clinical practice also provided a way to deliver continuing support and help providers develop a peer support network, share experiences, and promote continued practice.

Screening and treatment sites should be strategically selected and supported.

The data on long-term productivity of providers after training, while incomplete, underlines the importance of selecting sites and providers that will see sufficient clients to maintain skills. It has been estimated that a VIA trained provider needs to see 20 clients per month (60 per quarter) in

order to maintain skills; very few of the 100 providers we trained have continued to serve this many women.

A medical records system can help to improve patient tracking and follow-up

Most of the health facilities and hospitals that participated in the demonstration projects have systems for counting and reporting out on the number and type of services provided, but they do not have a system to track women who need to return for follow-up. One solution, which is used in El Salvador and other countries, may be to provide all women age 30-49 with a cervical cancer prevention card to carry with them to appointments. This card could be integrated with health facility records and used to verify screening history and ensure appropriate follow-up.

The importance of community partnerships and engagement

Community partners can facilitate acceptance and access to services in hard to reach areas

By engaging coffee cooperatives in planning and implementation, community outreach and education, and using co-op vehicles for transportation when necessary, the program benefited from immediate entry and acceptance in rural communities, and ensured local ownership and commitment. The co-ops helped to increase awareness and acceptability of cervical cancer prevention services among rural communities and address barriers to access. After campaigns, each partner played an important role in ensuring that services remained accessible to women who were unable to attend, and in coordinating follow-up for women with referrals. Co-operatives often used Fair Trade premiums to support community health promoter trainings, transport women to services, provide economic support to families with women suffering from cancer, and to refill empty gas tanks to ensure timely treatment and continuation of services.

Campaigns reinforce community partnerships

Campaigns proved central to the project, as they gave visibility to the collaboration between the coffee cooperatives and local health authorities, and an opportunity for each partner to demonstrate their commitment to the program, thereby helping to reinforce the relationship. Co-ops provided logistical support, as well as food and transportation when necessary to ensure that women in remote areas were able to access the services. Local health authorities provided the venue for the campaigns, the healthcare personnel and support staff, and also helped to recruit women for services. Moreover, campaigns supported the fundamental capacity building goals of the program by providing an opportunity for the community health promoters, doctors, and nurses to practice the skills learned during their respective training, while also providing direct services to women.

Community health promoters can address social barriers and reduce loss to follow-up

Community health promoters from coffee cooperatives as well as the Red Comunitaria (the ministry network of community health promoters) played an important role in educating community members about the importance of cervical cancer prevention, correcting misconceptions, addressing social barriers such as *machismo*, and coordinating with providers to bring women to care. They also helped to reduce loss to follow-up by ensuring that women received necessary follow-up testing and treatment, which is fundamental to addressing cervical cancer. The close social ties of the community health promoter to his or her community often means that they personally know and

care about the women who need follow-up, and are therefore motivated to ensure that she receives the care she needs. Though coffee cooperatives are Grounds for Health's natural partner, this model can be extended to other cooperatives, agricultural businesses, or community organizations such as churches.

Conclusion

The results of this program provide evidence that a community partnership model involving coffee cooperatives, local health authorities, and doctors and nurses trained in the Screen and Treat approach, is a viable long-term solution for cervical cancer prevention in rural and low-resource settings of Nicaragua. Within the three-year commitment that Grounds for Health made in each of its project sites, the partners successfully developed a cadre of doctors and nurses competent in VIA and cryotherapy; a network of community health promoters who were respected in their communities and connected to local doctors and nurses; greater awareness of cervical cancer in rural communities; and a strong coalition of other local groups dedicated to cervical cancer prevention.

In Matagalpa, Jinotega, and Madriz, coffee cooperatives and local health authorities have continued to work together to ensure women in rural communities have access to screening and treatment services. Independently of Grounds for Health, co-ops and local providers have conducted clinical trainings, Screen and Treat campaigns, opportunistic screening and treatment, and community outreach. Through these local partnerships, cervical cancer prevention services can be strengthened and extended to ensure that they reach all women. Developing local capacity, strong community networks, and leveraging local resources for cervical cancer prevention promotes not only the health of women, but also supports the health and sustainability of their children, livelihoods, and communities.

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