

## Acetic Acid Innovation

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In this era of advanced modern medicine, researchers and public health practitioners have the tools at their disposal to drastically reduce the burden of cervical cancer in the U.S. and around the globe. With the advent of two vaccines that protect women from certain strains of Human Papillomavirus (HPV) that are known to cause cervical cancer and genital warts, health professionals can ensure that the decline in cervical cancer cases and deaths, which has already reduced drastically since systematic screening measures were adopted in the 1960s, continues well into the future. Yet the high cost of these vaccines means that those in need of preventive medicine the most, those in developing nations, are once again excluded from the benefits that advanced medicine can bring. Recent investigation into low-cost, yet effective cervical cancer screening strategies have revealed promising alternatives to the traditional Pap test, such as visual inspection with acetic acid (VIA), which is cost-effective and linked to reductions in cervical cancer morbidity and mortality in several developing settings. Coupled with educational campaigns that aim to spread awareness on cervical cancer prevention and the importance of continual screening, this innovative screening method designed for low-resource settings may be able to even the playing field between wealthier countries and developing countries in the fight against cervical cancer.

Around the world each year, an estimated 493,000 women will be diagnosed with cervical cancer, of which, approximately 274,000 women will succumb. Cervical cancer is ultimately a story of health disparity; over 80% of these cases and deaths occur in developing countries, such as India, Bangladesh, Thailand, and many countries in sub-Saharan Africa (Palanu Wong, 2007). The release of a new vaccine that protects women from four strains of HPV, two of which cause approximately 70% of all cases of cervical cancer, has the promise to drastically reduce the burden of cervical cancer in countries that can afford the price (Saslow et al., 2007). The vaccine, commercially marketed under the name Gardasil<sup>®</sup>, has been shown to have a nearly 100% efficacy rate against the strains it protects against and is currently being administered to girls aged 9-26 in the U.S. Just this past October 2009 in the U.S., Gardasil was approved for use in males aged 9-26 for protection against two HPV strains that cause genital warts, and another rival vaccine, Cervarix<sup>®</sup>, was FDA approved for protection against the two most common HPV strains implicated in the development of cervical cancer (Associated Press, 2009). The high cost of these vaccines (around \$120 per dose), is prohibitive for implementation in low-resource settings; indeed, according to the WHO, India currently has no vaccination recommendations or plans for implementation, and there are no statistics available showing coverage among Indian women (WHO, 2009). Even without the high cost of vaccination, screening measures will still be necessary in the next few decades for those women who were out of the age range for vaccination and for those women already infected with HPV, in which case the HPV vaccine is likely ineffective.

The most tragic part of this savage inequity is that cervical cancer is almost entirely preventable with appropriate screening measures. The disparities in access to screening is seen

in the recent statistic stating that 75% of women in developed countries have undergone some type of screening in the past five years, compared to just 5% in the developing world (Tsu & Levin, 2008). Specifically for India, among rural populations, a sector that traditionally lacks preventive care, screening coverage only reaches 2.3% of the general female population aged 18-69 (WHO, 2009). Part of the problem lies in financial constraints in developing countries, in addition to limited human resources, competing health needs, and undeveloped infrastructure and the logistical capacity to develop a nationwide cervical cancer screening program. Furthermore, cervical screening faces multiple socioeconomic and cultural barriers, such as embarrassment during a cervical examination, limited financial resources to afford the exam or travel to the examination site, and fear of being told one has cancer or a sexually transmitted infection (STI), among others. Yet Tsu & Levin (2008) cite critical reasons for the importance of cervical cancer screening despite these obstacles. Women play a critical role in the well-being of their families, as they are often centrally involved in managing household matters, such as food security and wage earning. Families that suffer the loss of a mother or other young woman suffer emotionally and financially, and in some cases, the death of a female caregiver and provider can be outright devastating for a family's survival. Fortunately, innovative cervical screening methods designed specifically for low-resource settings may prevent these tragic losses.

Cervical cytology, including the traditional Pap smear exam most widely-used in developed countries, is expensive and oftentimes too logistically complex for wide implementation in developing settings. In its place, VIA has been shown to be cost-effective and easy to administer in resource-poor settings (Ahmed, Ashrafunnessa, & Rahman, 2008; Basu et al., 2006; Goldie, Kuhn, Denny, Pollack, & Wright, 2001; Mandelblatt et al., 2002; Palanu Wong, 2007; Wiwanitkit, 2009).

In VIA testing, a fresh solution of 3-5% acetic acid is applied to the cervix. If abnormal or pre-cancerous cells are present, they will turn white within a few minutes of acid exposure. This test requires minimum laboratory equipment, as acetic acid is readily available, and it can be administered by a variety of healthcare professionals, not limited to physicians. More importantly, VIA has been shown to be up to 90% effective in diagnosing precancerous cervical lesions (Ahmed et al., 2008). Another benefit to VIA screening is that a woman receives a diagnosis immediately after the examination, allowing for treatment in the same visit. This is crucial in that a second trip to the clinic for treatment will be unnecessary, preventing losses due to not following up the results from an abnormal test.

A safe and effective treatment option in low-resource settings following an abnormal VIA result is cryotherapy. In this procedure, any abnormal cervical tissue or precancerous lesions are killed by freezing. According to the Alliance for Cervical Cancer Prevention, cryotherapy cure rates can reach 85% or greater if administered correctly (Alliance for Cervical Cancer Prevention, 2007). Cryotherapy can also protect against future development of cervical dysplasia in women with a current HPV infection. Given the low morbidity associated with this procedure and the above-mentioned protective function, the treatment of women with false-positive VIA screening results is acceptable, given its subjective diagnostic nature; however, this does not take into account the possibly long-lasting mental turmoil of being told one has precancerous lesions, which some women may consider synonymous with cancer. Importantly, single-visit VIA screening followed by treatment, where appropriate, just once in a woman's

lifetime between the ages of 35-40, can lead to a 22-32% reduction in incidence of cervical cancer at about \$50 U.S. per year of life saved (Basu & Chowdhury, 2009).

In light of this evidence, a proposal to implement a VIA screening implementation program coupled with immediate treatment with cryotherapy using a single-visit approach follows. The setting will be the rural Dindigul district in Tamil Nadu state, South India, as this area currently has a high burden of cervical cancer and recent research in another rural area of India suggests that this method of screening will face limited socioeconomic or cultural barriers for implementation (Basu et al., 2006; Swaminathan et al., 2009). Currently, India carries approximately a quarter of the burden of cervical cancer in the world with 132,082 new cases each year and 74,118 deaths, making this setting appropriate for a public health intervention (WHO, 2009). The program will include an educational component based off of results from Perkins et al. (2007) who implemented a community-based education program to improve local knowledge regarding cervical cancer screening and to increase screening among at-risk women. Training and monitoring and evaluation will also be part of the program. Next follows several case-studies that examine the cost-effectiveness of VIA screening methods versus other alternatives and the successes of pilot VIA programs implemented in different developing nations. A look at educational components of the program and local attitudes and acceptance of this screening method in another rural region of India will follow.

Goldie et al. (2009) assessed the cost-effectiveness of different cervical cancer screening strategies using a mathematical model and a hypothetical cohort of South African women who had never before been screened for cervical cancer. Among the methods they examined were traditional cytology screening, HPV DNA testing, and VIA. They estimated years of life saved (YLS) and cost per YLS. For a 35 year-old woman who had never previously been screened, one VIA screening visit followed by same-visit cryotherapy reduced the incidence of cervical cancer by 26% and increased life expectancy by 0.84 months. This strategy was most effective in women in their mid-to-late 30s. This method had a price tag of \$50 U.S. per woman. The authors determined that a one-visit strategy (diagnose and treat simultaneously) was more cost-effective than 2 and 3-visit strategies. The authors conclude that for resource-poor countries where cost-effectiveness boundaries are low, a single lifetime screen for women around age 35 with VIA, followed immediately with appropriate treatment may be the best option.

A population-based simulation model was the method of choice in a cost-effectiveness study conducted by Mandelblatt et al. in 2002. Thailand was the country of choice due to its high cervical cancer incidence and mortality. The authors tested 7 different screening strategies with 6 different screening frequencies for each, making a total of 42 possible combinations for screening. Among these options, the authors examined VIA coupled with immediate cryotherapy treatment for abnormal results. Similar to Goldie et al., the authors of this study concluded that the most cost-effective method that they examined was VIA screening followed by immediate treatment. Among all the methods examined, screening 35-55 year old women once per 5 years with VIA coupled with immediate treatment saved the most lives at the lowest cost. They estimated that the entire annual cost for a screening program that covers all Thai women would cost \$0.79 per woman per year, or \$4.7 million total each year.

Continuing on with the Thai theme, Palanuwong (2007) conducted a cross-sectional study looking at whether or not the VIA single-visit approach (VIA/SVA) would increase access to cervical cancer prevention services among Thai women from five low-resource provinces. The

results showed that in all five provinces, screening coverage increased significantly in the first year after the program began. Table 2, below, shows the effects on screening coverage before and after program implementation. The high spike in coverage soon after the program was implemented indicates the general acceptance of this screening technique among Thai women. In terms of cost savings, for every VIA/SVA visit substituted for a Pap smear, \$7.33 U.S. was saved, which means a total savings of \$362,300 U.S. in the first year following the implementation of the VIA/SVA program.

**Table 2** Comparisons of screening coverage of women aged 30–60 between the year before and the first year of the visual inspection by acetic acid/single-visit approach implementation

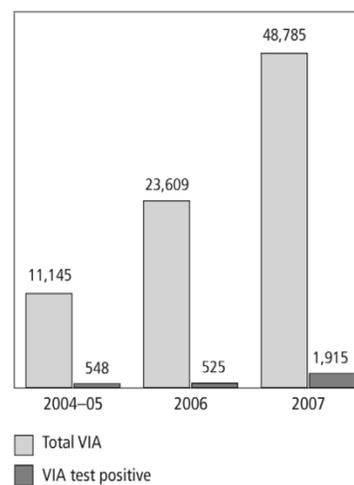
Province	Before implementation			The first year		
	Total visits	New visits†	Coverage (%)	Total visits	New visits	Coverage (%)
Roi-et	11 755	8 734	3.5	14 883	13 289	4.8*
Nongkai	5 993	5 747	3.4	16 760	16 316	9.0*
Yaso-thorn	4 476	4 315	4.1	9 485	8 970	7.6*
Surathani	3 979	3 756	2.1	12 234	11 725	6.0*
Amnartchareon	4 483	4 326	5.7	4 506	4 393	5.5**
Total	30 686	26 878	3.4	57 868	54 693	6.4*

†The new visits of the year before implementation were estimated using percentage repetition of Pap smear, as shown in Table 3.  
Chi-squared test \* $P < 0.001$ , \*\* $P = 0.230$ .

Source: Palanu-wong, B. (2007). Alternative cervical cancer prevention in low-resource settings: Experiences of visual inspection by acetic acid with single-visit approach in the first five provinces of Thailand. *Aust N Z J Obstet Gynaecol*, 47(1), 54-60. doi: 10.1111/j.1479-828X.2006.00680.x

Cervical cancer is the most common reproductive cancer among women in Bangladesh, comprising 22-29% of all female cancers in the country. Recently a screening program that involved VIA and cryotherapy was introduced in the country in order to combat this disease (Ahmed et al., 2008). This study importantly assessed the attitudes towards cervical screening before the program was implemented in the pilot districts. After finding that 84% of the women interviewed were interested in cervical screening and that healthcare providers were willing to provide cervical screening, the pilot program was implemented in 16 districts. By June 2008, 44 districts had started the program, and the goal for 2010 is to reach all 64 districts in Bangladesh. This program provided the appropriate training for service professionals that would administer the VIA test, as well as the equipment needed for VIA screening and cryotherapy treatment. Figure 1, below, shows the success of the program in the rising number of VIA visits from 2004-2007. The authors conclude that despite the initial success of the program, several issues still remain, including the false-positives from VIA testing given its subjective nature and the continued training and skill development of service providers. In addition, an effective and comprehensive monitoring program was needed to accurately measure the program's progress. This article does not comment on the cost-effectiveness of this strategy compared to other strategies or the sustainability of such a program in the long-term, both of which are necessary in evaluating the usefulness of any health intervention.

Figure 1. Number of women screened using visual inspection with acetic acid (VIA) at existing service delivery points, Bangladesh, 2004-05, 2006, 2007



Source: Ahmed, T., Ashrafunnessa, & Rahman, J. (2008). Development of a visual inspection programme for cervical cancer prevention in Bangladesh. *Reprod Health Matters*, 16(32), 78-85. doi: 10.1016/S0968-8080(08)32419-7

The proposal presented here will incorporate an educational campaign similar to the successful radio and educational program implemented in three communities in Honduras, another country with a high incidence of cervical cancer (four times that of the U.S.) (Perkins, Langrish, Stern, & Simon, 2007). In these communities, radio listening is high, as most families own a battery-powered radio and nearby are two local radio stations. During hour-long broadcasts on these stations, the importance of cervical cancer screening was emphasized, as well as when a woman should go in for screening. These hour-long broadcasts were supplemented with short radio messages that reinforced the more important points regarding cervical cancer screening. Surveys before and after these radio broadcasts revealed that knowledge regarding the topic increased following the program. Table 2, below, shows these significant results. The authors also concluded that screening behaviors also increased subsequent to the radio broadcast among women aged 30 and over, as seen in Table 3, below. The proportion of women who had not been screened in the past two years increased from 30% before the radio program to 65% afterwards. The program also included a 45-minute lecture training component of community nurses. The results from the study indicated that there was a significant gain in knowledge following this training, and that nurses retained much of this knowledge when surveyed again two years later. The authors conclude from the success of this program that media sources may be useful intervention targets for women in developing countries at-risk for cervical cancer and in need of screening measures.

**TABLE 2. Cancer screening knowledge prior to and following radio broadcasts, Honduras, 2003**

Question	Response	Group 1: Community knowledge prior to radio broadcasts (n = 124)	Group 3: Knowledge and behavior following radio broadcasts (n = 233)	P value <sup>a</sup>
Have you heard of cervical cancer?	Yes (%) <sup>b</sup>	96 (78%)	212 (91%)	0.0004
How do you prevent cervical cancer?	Correct (%) <sup>b, c</sup>	59 (69%)	163 (79%)	0.001
What is the purpose of the pap smear?	Correct (%) <sup>b, d</sup>	11 (46%)	142 (61%)	< 0.0001

<sup>a</sup> Chi-square analyses were performed.

<sup>b</sup> Percentages are based on the number of complete responses. Cell totals may be less than the total number in the group.

<sup>c</sup> Correct answers included "Gynecological exams" and "Pap smears."

<sup>d</sup> Correct answers included "Detection of cancer."

**TABLE 3. Cancer screening behavior prior to and following radio broadcasts, Honduras, 2003**

Characteristics	Group 2: Screening behavior prior to radio broadcasts (n = 243)	Group 3: Knowledge and behavior following radio broadcasts (n = 233)	P value <sup>a</sup>
Number of women age 30 and over (%) <sup>b</sup>	154 (64%)	170 (74%)	0.02
Number of women with no Pap test in 2 or more years (%) <sup>b</sup>	72 (30%)	151 (65%)	< 0.0001

<sup>a</sup> Chi-square analyses were performed.

<sup>b</sup> Percentages are based on the number of complete responses. Cell totals may be less than the total number in the group.

Source for Tables 2 and 3: Perkins, R. B., Langrish, S., Stern, L. J., & Simon, C. J. (2007). A community-based education program about cervical cancer improves knowledge and screening behavior in Honduran women. *Rev Panam Salud Publica*, 22(3), 187-193.

Evidence from Basu et al. (2006) suggests that implementation of a long term cervical screening and treatment program will be generally well-tolerated among women in a rural region of India. This study implemented a VIA screening program among age-eligible women in Bengal, India, and the authors importantly assessed satisfaction with the program among treated women through follow-up interviews shortly (median time 22 days) after the initial screening. The proposal presented here will use the results from these satisfaction interviews in order to improve certain aspects of the Dindigul program.

The program implemented between 2003 and 2004 in Bengal, India was highly successful (Basu et al., 2006). A total of 2,184 women were screened during the program, of which 247 (11.3%) women had a positive VIA result. These women were then offered colposcopy services in the same sitting. Fortunately, no woman presented with invasive cervical cancer, but 46 women were diagnosed with cervical intra-epithelial neoplasias (CIN 1-3), which may have progressed to cervical cancer if not detected through screening, highlighting the importance of screening in saving lives. Tables 3, 4, and 5, below, highlight the findings from the satisfaction survey component of the study. Overall, 64.7% of women included in the study were satisfied with the service, and 5.6% were very satisfied. Approximately 24.3% said they were somewhat satisfied but improvements were needed. Table 6, below, lists the most common suggestions provided for improving the services. Notably, the women included in the study expected treatment for other medical problems at the time of their screening, and this must be addressed in order to achieve success. Other reasons for the program's success were the accessibility and affordability of the screening.

**Table 3. Pain/discomfort During the Screening Test**

	Total (498)	< 45yr (383)	> 45yr (115)
No pain/discomfort	371 (74.5%)	311 (81.2%)	60 (52.2%)
Slight discomfort	104 (20.9%)	62 (16.2%)	42 (36.5%)
Moderate pain	21 (4.2%)	10 (2.6%)	11 (9.6%)
Severe pain	2 (0.4%)	0 (0.0%)	2 (1.7%)

**Table 4. Test-related Problems after Screening**

	Total (498)	Biopsy (33)	No biopsy (465)
Vaginal discharge	60 (12.0%)	7 (21.2%)	53 (11.4%)
Burning	29 (5.8%)	3 (9.0%)	26 (5.6%)
Vaginal bleeding	19 (3.8%)	12 (36.4%)	7 (1.5%)

**Table 5. Reasons for Not Being Completely Satisfied**

Reasons for dissatisfaction	No. of responders (%)
1. Post-screening problems (discharge, bleeding)	69 (46.6)
2. Long waiting time at the clinic	63 (42.6)
3. Other health problems not taken care of	57 (38.5)
4. Pain during screening	23 (15.5)
5. Too much trouble for too little gain	14 (9.5)
6. Privacy inadequate	13 (8.8)
7. Examined by male doctor	5 (3.4)
8. Unhappy with staff behavior	3 (2.0)
9. Unhappy with the set up	1 (0.7)

Multiple responses were allowed

**Table 6. Suggestions Received for Improvement of the Services (in order of frequency)**

1. Other health problems should be taken care of
2. Female doctors preferred as service provider
3. Adequate privacy should be maintained
4. Staff behavior should be more cordial
5. More information needed about cervical cancer screening
6. Medicines should be provided free of cost
7. Male family members should be invited to awareness meetings
8. Children should also be examined
9. Clinics in the afternoon will be more convenient
10. Referral for treatment to a local hospital is preferred to a city hospital

Source for Tables 3-6: Basu, P., Ghoshal, M., Chattopadhyay, K., Mittal, S., Das, P., Choudhury, D., et al. (2006). Cervical screening by visual inspection with acetic acid (VIA) is well accepted by women--results from a community-based study in rural India. *Asian Pac J Cancer Prev*, 7(4), 604-608.

The Dindigul district in Tamil Nadu state in South India was chosen for the screening program because of the high burden of cervical cancer in the district and the surrounding region. The Chennai cancer registry reports the highest crude incidence rate of cervical cancer, at 24.2 cases per 100,000 persons, than all other reporting cancer registries in India. Dindigul district, like Chennai, is located in Tamil Nadu state in South India, and has high rates of cervical cancer that are stratified by education level (Swaminathan et al., 2009). The authors of the Swaminathan et al. study determined an inverse relationship between cancer incidence and level of education, as illustrated in Table 3, below. Disregarding the highest education level rates because of inadequate sample size, one can still see that women with no education were at higher risks for developing cervical cancer than a woman with some education. This is most likely explained by the fact that uneducated women do not learn of preventive health measures, such as

screening, and they often do not have the financial resources to access these services as more educated women are able to. This association with education level also signifies that an educational component as part of a screening program could potentially add great value to the program. The Basu et al. (2006) study, cited above, concluded that the VIA screening coupled with immediate treatment was well-tolerated in the rural setting of Bengal, India, which suggests similar satisfaction may be obtained in Dindigul district, where approximately 700,000 of the 973,000 workers in the district are rural workers (“District Profile,” 2008).

**Table 3**  
Education specific crude incidence rates of major cancers, Dindigul Ambilikal Cancer Registry, 2003-2006, women.

Education level	Education specific crude incidence rate per 100,000 person years (number of incident cancer cases)					
	All sites	Cervix (916)	Breast (446)	Ovary (133)	Mouth (108)	Stomach (101)
Education (in years)						
Nil	111.8 (1590)	48.1 (684)	10.8 (153)	10.2 (215)	5.6 (80)	5.4 (77)
≤5	57.4 (458)	17.8 (142)	17.8 (142)	2.8 (53)	2.1 (17)	1.9 (15)
6-12	50.8 (359)	11.9 (84)	17.3 (122)	2.6 (45)	1.4 (10)	0.9 (6)
>12	103.1 (72)	8.6 (6)	41.5 (29)	3.2 (6)	1.4 (1)	4.3 (3)

Note: Italicized values are based on scanty numbers.

Source: Swaminathan, R., Selvakumaran, R., Vinodha, J., Ferlay, J., Sauvaget, C., Esmy, P. O., et al. (2009). Education and cancer incidence in a rural population in south India. *Cancer Epidemiol*, 33(2), 89-93. doi: 10.1016/j.canep.2009.06.012

The screening program in Dindigul district will begin with initial training and education of local healthcare workers in the region on VIA screening methods and cryotherapy treatment. Female nurses will be provided with the most training, in order to reduce the embarrassment associated with having a pelvic examination performed by a male stranger. Nurses and other healthcare workers will be taught how to diagnose cervical neoplasias; however, some subjectivity will inevitably remain, but past studies cited above suggest that this is still a viable alternative to Pap testing or no screening method at all. Since the effectiveness of cryotherapy diminishes with increasing lesion size, all neoplasias that cover 75% or more of the cervix will forego cryotherapy and be referred for alternative treatment (Tsu & Pollack, 2005). One limitation of VIA is that with increasing age, it becomes progressively more difficult to view the area being examined, or the squamocolumnar junction (SCJ), and Pap smear testing should be used on older women to prevent misdiagnoses (Palanuwong, 2007). After the training and teaching of the nurses and healthcare workers, funds for the program will be used to ensure that treatment will be free for all participating women and that there are enough clinics or screening centers in the district to prevent issues of inaccessibility. To address other health needs, women that attend screening at the clinics and screening centers will also have the chance to be treated for other medical conditions, which will hopefully prevent the dissatisfaction found in the previous study in Bengal where women were disappointed that medical treatment for other ailments was not available at the time of the screening. In addition, counseling provided by the workers providing the screening services is needed to ensure that screened women understand the results of their test, when they should report back for another test, and how to protect oneself from HPV and other STIs. In the case of women undergoing cryotherapy treatment, counseling is especially needed to alert these women that safe sex practices, such as condom use or preferably abstinence, need to be followed after treatment for a short time, as the freezing treatment may temporarily be associated with an increased risk of STI infection; a study looking

into this association is currently underway in South Africa with HIV/AIDS, the results of which will affect program policy in Dindigul if an association is found (Tsu & Pollack, 2005).

The educational component to the general public will follow the methods employed in Perkins et al. (2007) in Honduras. If research on the ground suggests that most families at all socioeconomic levels have battery powered radios and that radio is an important means of information dissemination in the district, then frequent radio broadcasts could potentially be a viable strategy for educating the public on the importance of cervical cancer screening. The program implementers would work closely with radio broadcasters and establish a working contract that specifies the length and frequency of these broadcasts.

The third part of the program will involve monitoring and evaluation. Every woman that is screened will receive a card to leave feedback on and to rate her comfort and satisfaction of the screening and treatment, if applicable. These cards will be critically evaluated, and changes will be made accordingly to better accommodate the needs and preferences of the women being screened. Measures will be put in place to monitor the impact of the program over time to ensure that the VIA/SVA and treatment with cryotherapy is indeed alleviating the burden of cervical cancer disease over time. This would ideally involve a centralized reporting bureau or office that keeps track of the total number of women screened, outcomes of the screenings, and treatment outcomes, if applicable. This would require clear lines of communication between the screening centers and the reporting office and the creation of a uniform system of reporting between the different screening sites.

As the evidence cited above from previous case studies suggests, the VIA/SVA with screening and treatment in one visit has the potential to significantly reduce the burden of cervical cancer in low-resource settings if administered correctly, while remaining cost-effective for countries with limited healthcare budgets. Educational components of health interventions and appropriate training of nurses and other healthcare workers is an essential part of any successful health program. By training mostly female nurses and providing affordable and easy access to treatment centers as well as additional medical treatment for other health conditions if solicited, this program will remain sensitive to the cultural and socioeconomic characteristics of the intervention population. With a well-managed monitoring and evaluation system in place, public health officials will be able to keep track of the progress the program makes in alleviating the burden of cervical cancer and be able to make improvements from the feedback.

While VIA screening and cryotherapy treatment methods are far from flawless, the most recent evidence available suggests that these strategies are the most viable and cost-effective for implementation in resource-poor settings. Improvements in VIA screening, such as creating a more objective diagnostic measure, should continually be sought even after the program is implemented. In time, better diagnostic and screening measures will be discovered and can replace VIA screening when the evidence suggests better alternative methods are out there. Hopefully, the HPV vaccines will become more affordable for developing nations in time, and national immunization programs will cover all eligible women. Until that time comes, however, the screening and treatment methods discussed in this proposal have the opportunity to save thousands of lives from a disease that is almost 100% preventable if appropriate measures are taken. Importantly, this program will provide developing nations the opportunity to even the playing field and end the health disparities that still persist to this day.

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