

Implementing a Fee-for-Service Cervical Cancer Screening and Treatment Program in Cameroon: Challenges and Opportunities

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ABSTRACT

Background. Cervical cancer screening is one of the most effective cancer prevention strategies, but most women in Africa have never been screened. In 2007, the Cameroon Baptist Convention Health Services, a large faith-based health care system in Cameroon, initiated the Women's Health Program (WHP) to address this disparity. The WHP provides fee-for-service cervical cancer screening using visual inspection with acetic acid enhanced by digital cervicography (VIA-DC), prioritizing care for women living with HIV/AIDS. They also provide clinical breast examination, family planning (FP) services, and treatment for reproductive tract infection (RTI). Here, we document the strengths and challenges of the WHP screening program and the unique aspects of the WHP model, including a fee-for-service payment system and the provision of other women's health services.

Methods. We retrospectively reviewed WHP medical records from women who presented for cervical cancer screening from 2007–2014.

Results. In 8 years, WHP nurses screened 44,979 women for cervical cancer. The number of women screened increased nearly every year. The WHP is sustained primarily on fees-for-service, with external funding totaling about \$20,000 annually. In 2014, of 12,191 women screened for cervical cancer, 99% received clinical breast exams, 19% received FP services, and 4.7% received treatment for RTIs. We document successes, challenges, solutions implemented, and recommendations for optimizing this screening model.

Conclusion. The WHP's experience using a fee-for-service model for cervical cancer screening demonstrates that in Cameroon VIA-DC is acceptable, feasible, and scalable and can be nearly self-sustaining. Integrating other women's health services enabled women to address additional health care needs. *The Oncologist* 2017;22:850–859

Implication for Practice: The Cameroon Baptist Convention Health Services Women's Health Program successfully implemented a nurse-led, fee-for-service cervical cancer screening program using visual inspection with acetic acid-enhanced by digital cervicography in the setting of a large faith-based health care system in Cameroon. It is potentially replicable in many African countries, where faith-based organizations provide a large portion of health care. The cost-recovery model and concept of offering multiple services in a single clinic rather than stand-alone "silo" cervical cancer screening could provide a model for other low-and-middle-income countries planning to roll out a new, or make an existing, cervical cancer screening services accessible, comprehensive, and sustainable.

INTRODUCTION

Worldwide, invasive cervical cancer (ICC) is the second leading cause of cancer mortality among women [1]. In the past 5 decades, high-income countries have reduced the incidence and mortality of cervical cancer by approximately 80%, primarily through the implementation of cytologic screening programs (Pap smear) [2, 3]. In most African countries, the persistently

high mortality rate for ICC is largely due to a paucity of medical infrastructure and funding needed to successfully implement effective population-based screening [4, 5].

Because most low-and-middle-income countries (LMICs) lack the resources, infrastructure, and personnel required for conventional cytologic screening, the World Health

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Organization (WHO) endorses the use of visual inspection with acetic acid (VIA) or alternative screening methods available in these settings [6]. In order to reduce loss to follow-up, WHO guidelines recommend pairing visual inspection methods with same-day cryotherapy treatment for eligible pre-cancers, a “screen-and-treat” approach [6]. Various countries in Africa are currently in the early stages of exploring the best strategies for successfully implementing VIA for cervical cancer screening and developing appropriate screening and treatment algorithms [7].

Most cervical cancer screening programs have been implemented with high levels of international funding under the umbrella of HIV/AIDS clinics across Africa [8–16]. There are a variety of benefits to this approach, as it ensures access to this high-risk population, increases likelihood of program sustainability, potentiates the existing health care programs, and requires fewer upfront costs compared with stand-alone cervical cancer screening programs [17]. The largest “screen-and-treat” program in Africa is the Cervical Cancer Prevention Program in Zambia (CCPPZ), which began in 2006 and, as of 2014, has screened over 200,000 women for cervical cancer using VIA enhanced with digital cervicography (VIA-DC) [15, 18].

Despite attempting program sustainability through pairing with existing infrastructure such as HIV/AIDS clinics, many LMICs have been unable to start or sustain large-scale cervical cancer screening programs due to lack of grants, donations, or other external funding [19]. WHO acknowledges that although programs can initially be based on support from external donors, they will never become self-sustaining without a mechanism for funding when the external support ends [20]. In Africa, lack of political will, pressing needs from other diseases, and the overwhelming need to provide medical care for illness in the face of minimal financial and personnel resources often preclude implementation of preventive health services, even though prevention would reduce long-term health care costs [21]. Women in developing countries may be willing to contribute to the cost of their care. A study of HIV-positive women in Nigeria showed that after education about cervical cancer, 94.5% of 400 participants expressed willingness to pay for the screening [22]. In a program in Kenya, in which women were asked to pay a small fee for screening, it did not appear to affect attendance to cervical cancer screening clinics [23]. And in Ghana, after a project-sponsored period during which VIA screening was provided free-of-charge, a subsequent fee of approximately \$1 appeared to be acceptable to women [23]. Thus, a fee-for-service approach may be feasible for sustaining cervical cancer screening programs and other women’s health care needs in LMICs [23, 24]. The Cameroon Baptist Convention Health Services (CBCHS) is a nonprofit, faith-based health care organization that has provided medical services to millions of Cameroonians for over 60 years. In 1999, CBCHS initiated HIV services, now known as the AIDS Care and Prevention Program [25–27]. In 2007, in response to the large number of cervical cancer cases identified by CBCHS surgeons, the CBCHS founded the Women’s Health Program (WHP). Since its inception, the WHP cervical cancer screening initiative has provided cervical cancer screening for women in a country with the highest HIV prevalence in Western and Central Africa where ICC is the second leading cause of cancer mortality among women [1, 28]. The program is funded primarily through a fee-for-service

model in which women are asked to pay for the screening and other services they receive.

The WHP also recognizes other health needs of women attending their clinics. For example, in Cameroon, breast cancer is the leading cause of cancer mortality [1], there is an unmet need for family planning (FP) services [29], and experts believe that up to 50% of female infertility may be caused by pelvic inflammatory disease [30]. Using an integrated model, the WHP provides additional women’s health services, including raising breast cancer awareness and promoting early detection through clinical breast exam (CBE), FP counseling and methods, and diagnosis and treatment of reproductive tract infections (RTI).

In this report, we document the strategies that have led to successful implementation of a nurse-led cervical cancer screening program using VIA-DC, describe programmatic challenges, make recommendations to optimize screening and treatment outcomes, and discuss the unique aspects of WHP model, including a fee-for-service payment system and the provision of other women’s health services.

METHODS

Health System and Infrastructure

The CBCHS facilities are an integrated health system for referral and support that consist of three tiers of service:

- Tier 1—Primary Health Centers: Approximately 50 small village clinics staffed by mother-child health aides and health promoters trained by CBCHS, but supported by their own villages.
- Tier 2—Integrated Health Centers: 26 community-based health centers staffed by CBCHS employees and administered by CBCHS.
- Tier 3—Hospitals: Seven hospitals staffed and administered by CBCHS.

WHP clinics are geographically distributed to provide services to a wide catchment area across four regions of Cameroon (Fig. 1). Services are offered in two settings:

- Stationary Clinics: Permanent clinics established in CBCHS integrated health centers or hospitals.
- Outreach Clinics: Temporary mobile clinics run out of primary health centers or integrated health centers in rural villages.

Data Management

WHP clinical data are collected on structured paper-based forms at the point-of-care and then sent to the CBCHS Regional Training Center in Mutengene for entry into a centralized electronic database [31]. In collaboration with data managers at CBCHS and the Department of Quantitative Health Sciences at the University of Massachusetts Medical School (UMMS), de-identified electronic medical records from March 2007 to December 2014 were retrieved and securely transferred to UMMS for data coding and analysis. Data from March 2007 through December 2013 did not include detailed information regarding CBE, FP, or RTI. In January 2014, the data collection forms were updated to capture these data. We performed a

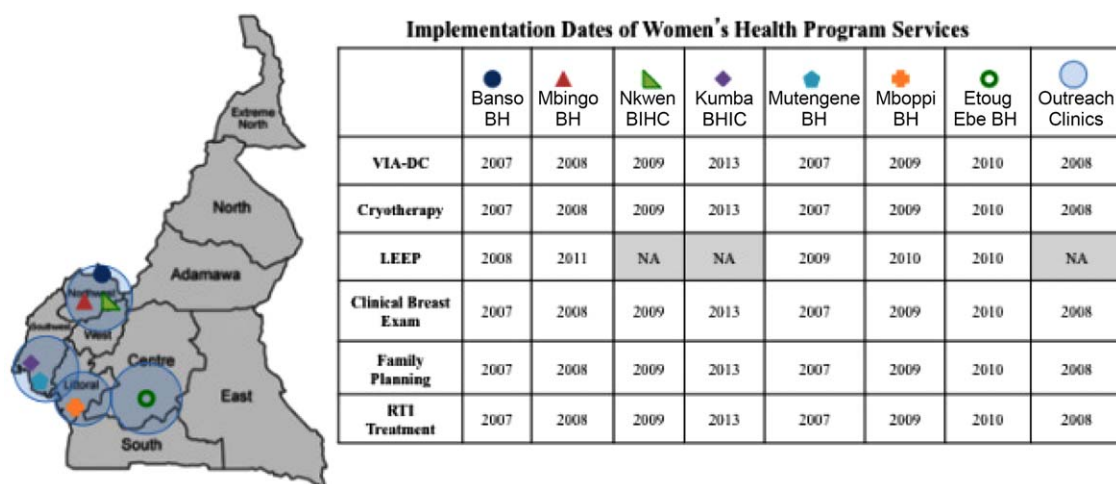


Figure 1. Map of seven Women's Health Program (WHP) locations in Cameroon. Each icon represents a stationary WHP clinic. The blue halos represent the approximate catchment area of stationary clinics and associated outreach clinics. Years represent the date that each service became available at the specified clinic location.

Abbreviations: BH, baptist hospital; BIHC, baptist integrated health center; LEEP, loop electrosurgical excision procedure; NA, services not available in the respective clinic; RTI, reproductive tract infection; VIA-DC, visual inspection with acetic acid enhanced by digital cervicography.

secondary analysis of data from January 2014 to December 2014 in order to report information on these services.

Training for Nurses and Peer Educators

There are four major staff roles in the WHP clinics:

- Peer Educators: Promote awareness of cervical cancer screening and other women's health services available at the WHP, provide education about cervical cancer screening, take medical history, set up exam rooms, and collect and clean used instruments.
- Nurses: Provide cervical cancer screening, cryotherapy, LEEPS, biopsy, referral of patients for further tests or treatment, and other women's health services.
- WHP supervisor: Provides training for nurses and peer educators, implements quality improvement efforts, manages WHP facilities.
- Physician consultants: Provide leadership and vision for WHP, input into medical records and database, recommend best practices, and help manage difficult cases, including radio/chemotherapy and histologic diagnosis.
- Data clerks and managers: Enter data, manage the database, and write reports.

Prior to launching the WHP in 2007, gynecologic oncologists from CCBPZ provided 2 weeks of onsite training in Cameroon for 11 nurses and 2 physicians [15]. Subsequently, the WHP supervisor spent 2 months with the CCBPZ in Zambia for further training. As of 2014, the WHP supervisor has trained an additional 14 nurses. The initial training includes observership and didactic classes on VIA-DC, cryotherapy, and loop electrosurgical excision procedure (LEEP). Nurses are required to show proficiency on a written exam and demonstrate competence in all aspects of VIA-DC procedures before beginning to screen women independently. The nurses are trained to perform biopsies and cryotherapy by observing and performing 15 satisfactory procedures under the supervision of an experienced

nurse-trainer. Nurses certified to perform LEEP must perform 50 or more LEEPs under direct supervision of a trained clinician.

As other women's health services are provided at the WHP, knowledge and skill requirements include proficiency in CBE, diagnosis and treatment of RTI, and provision of FP services. In addition to taking didactic training for all components of the WHP, new staff are apprenticed to more experienced staff at each clinic.

Recruitment of Women for Cervical Cancer Screening

Women are primarily recruited at CBCHS health care facilities or in established outreach locations. WHP nurses and peer educators also make periodic presentations to churches, social groups, and at markets and other community gatherings. They educate people on positive health-seeking behaviors, the importance of cervical cancer screening, the availability and efficacy of treatment options for precancerous lesions, and the other women's health services available at the WHP. Women located near a stationary clinic are serviced at the location most convenient to them. To reach out to rural communities, after getting approval from the district medical officer, WHP nurses visit the "fon/chief" (village or district leader) to educate him on the services offered at the WHP clinics and obtain permission to hold an outreach clinic in his district. If the fon/chief agrees, the nurses work with a local primary clinic or integrated health center, if available, and with other community stakeholders to set dates, location, and other logistics for the outreach clinic, which may last up to 1 week. The nurses/peer educators make a pre-clinic visit to register women who want the services and sometimes collect a down payment to ensure the women attend their scheduled screening session(s). This also allows the nurses to plan how many staff and how much equipment, reagents, and supplies to bring.

Cervical Cancer Screening and Treatment Protocol

The WHP protocol for cervical cancer screening is modeled after the CCBPZ program in Zambia but has been adapted to meet the unique needs of the CBCHS system and patients in Cameroon [15, 32, 33]. The WHP offers cervical cancer

Table 1. Fees charged for screening and treatment services at WHP clinics in U.S. Dollars

Service	Banso	Mbingo	Nkwen	Mutengene	Mboppi	Etoug-Ebe	Kumba	Outreach ^a
VIA/VILI-DC	6	6	7	8	8	8	7	3
Cryotherapy	50	25–42	42–50	50	50	50	50	25
LEEP ^b	67	67	NA	84	84	100	NA	NA
Biopsy	25	25	25	25	25	25	25	25
Clinical breast exam ^c	No cost	No cost	No cost	No cost	No cost	No cost	No cost	No cost
Breast ultrasound	20	20	20	20	20	20	20	NA
Breast fine needle aspirate	20	20	20	20	20	20	20	20
RTI diagnosis	No cost	No cost	No cost	No cost	No cost	No cost	No cost	No cost
RTI antibiotic treatment ^d	1–20	1–20	1–20	1–20	1–20	1–20	1–20	1–20
Family planning counseling	No cost	No cost	No cost	No cost	No cost	No cost	No cost	No cost
Family planning method ^e	1–4	1–4	1–4	1–4	1–4	1–4	1–4	NA

Low-cost fees, stratified based on the financial status of the community being served, were charged for screening and treatment in order to sustain the program. Prices have been converted from Central African CFA Francs to U.S. Dollars (1 U.S. Dollar equivalent to approximately 600 CFA Francs in 2016. Prices rounded to nearest dollar).

^aPrices at outreach clinics were varied depending on the perceived financial status of women in the community.

^bCost of LEEP included procedure and cost of review by pathologist.

^cNo cost if patient is undergoing VIA-DC screening, otherwise approximately \$2 fee.

^dVaries depending upon antibiotic regimen and requirement for partner treatment.

^eVaries depending upon method provided.

Abbreviations: LEEP, loop electrosurgical excision procedure; NA, services not available; RTI, reproductive tract infection; VIA, visual inspection with acetic acid; VILI-DC, visual inspection with Lugol's iodine enhanced by digital cervicography.

screening to HIV-positive women ≥ 21 years old and to women with HIV-negative or unknown status if ≥ 25 years old. Pregnant women are excluded from screening except when they present signs and symptoms suspicious for ICC.

At presentation, the peer educator/nurse obtains written consent from the patient to screen for cervical cancer, treat lesions with cryotherapy when indicated, and biopsy lesions that are suspicious for cancer. Demographic information and medical history, including cervical cancer risk factors and self-reported HIV status, are collected. A nurse then performs an exam of external and internal genitalia. Cervical cancer screening takes place during a speculum exam. Acetic acid is applied to the cervix for 2 minutes and is followed by visual inspection for lesions. Detection of distinct acetowhite epithelium, as outlined in WHO guidelines, is considered VIA-positive [6]. To confirm VIA, Lugol's iodine is applied to the cervix and visual inspection is performed (VILI). Digital cervicographs are taken both before and after application of acetic acid (VIA-DC) and after Lugol's iodine (VILI-DC) using an inexpensive digital camera with a macro-conversion lens, as previously described [34]. During the screening, the nurse shows the woman real-time images of her cervix on a TV monitor and educates her about the findings. The digital cervicographs are stored as an electronic file using a unique identification number. The files may be used for comparison with previous cervicographs, for follow-up of treatment outcomes, and for nurses' review and quality improvement.

Results of VIA-DC and VILI-DC are separately classified as negative, positive, inadequate, or uncertain. Inadequate screens are those in which the visible ectocervix is completely negative for acetowhite changes, but the clinician could not visualize the entire transformation zone, most commonly because the squamocolumnar junction (SCJ) is beyond view up the endocervical canal. Women with inadequate screens are advised to return for follow-up in 1 year. Uncertain lesions include those with

suspected cervicitis, severe atrophic changes, or other difficult-to-diagnose abnormalities. Women with cervicitis are first treated for infection then asked to return for VIA/VILI-DC after completing treatment. Women with difficult-to-diagnose abnormalities, such as severe atrophic changes, atypical squamous metaplasia covering a large ectropion, cervical fibroids, or other atypical cervical findings, are usually biopsied.

Women with VIA/VILI-DC-positive screens are offered same-day treatment in keeping with WHO recommendations [6, 35]. Lesions that meet strict low-risk criteria are eligible for same-day cryotherapy. Lesions that are suspicious for cancer are biopsied. Lesions that are not suspicious for cancer but cover $>75\%$ of the transformation zone, extend beyond view in the endocervical canal, or are too large to be covered by the cryoprobe are treated with LEEP. LEEP procedures are performed by WHP nurses at CBCHS hospitals, where general surgery backup is available.

All biopsy and LEEP specimens are preserved in 10% formalin and sent for histopathology at Yaoundé Gyneco-Obstetric and Pediatric Hospital or at Buea Regional Hospital. The histology results are reported according to the Richart cervical intraepithelial neoplasia staging system [36]. Nurses communicate histopathologic results to clients and arrange for appropriate follow-up/referral for specialty care.

Protocol for Other Women's Health Services

In order to raise breast health awareness, promote early detection of breast cancer, and promote down staging of disease burden at diagnosis, the WHP provides CBE followed by breast ultrasound for women with a positive exam [37–39]. FP services are offered in accordance with WHO guidelines [40, 41]. RTI diagnosis and treatment are offered in accordance with WHO guidelines [42]. Our clinical database captures only the services that women who present for cervical cancer screening

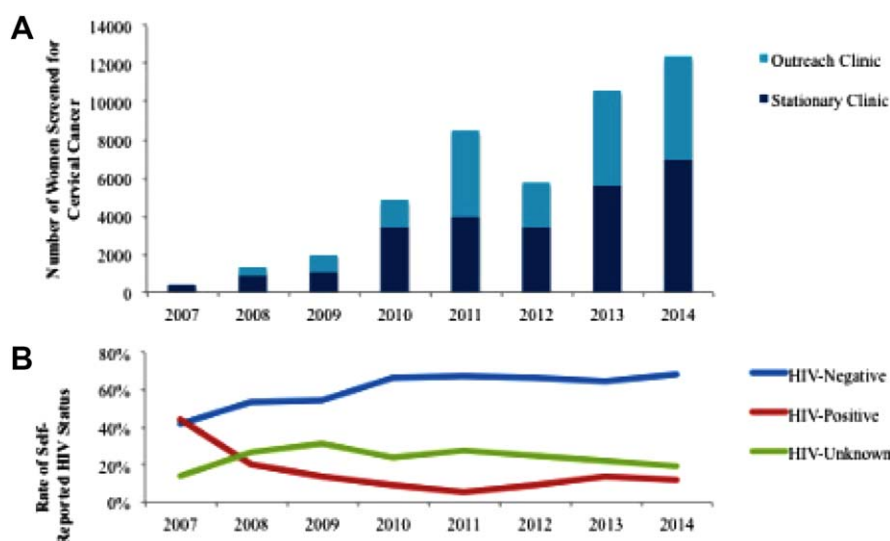


Figure 2. Women's Health Program (WHP) enrollment and HIV status by year. **(A):** Total number of women screened for cervical cancer at the WHP outreach and stationary clinics. **(B):** Rate of self-reported HIV status.

undergo; however, CBE, FP, and RTI treatment are administered to additional women.

Fee-for-Service and Sustainability

A fee is charged for most services provided by the WHP (Table 1). The fee is determined by a sliding scale based on the financial status of the community being served. However, the current practice for women who cannot afford to pay is to either screen and treat them at no or reduced charge or to ask them to pay later after the service is provided.

The CBCHS furnishes clinic space for the stationary WHP clinics in integrated health centers and hospitals at no charge, sterilization of equipment for a fee, and clinical support as needed. The WHP would not be sustainable without the infrastructure provided by CBCHS. Temporary WHP outreach clinic space is typically donated by the health center or community being served.

Quality Improvement

As part of quality improvement and program scale-up, all new WHP nurses are trained, supervised, and mentored by experienced WHP nurses until they demonstrate competency in VIA/VILI-DC, cryotherapy, biopsy, and other women's health services. WHP nurses meet on a quarterly basis to review cervicographs and arrive at a consensus opinion on cervicograph quality, interpretation, and treatment/follow-up plans.

RESULTS

Patient Population and VIA-DC Screening Results

From March 2007 through December 2014, 46,048 women visited WHP clinics for cervical cancer screening. Of these women, 44,979 (97.7%) underwent screening with VIA-DC. The number of women screened at WHP clinics increased nearly every year (Fig. 2A), from 349 in 2007 to 12,191 in 2014. In 2012, the number screened decreased due to implementation of an human papillomavirus (HPV) vaccination demonstration project in WHP clinics, which temporarily altered the allocation of resources and effort of staff [43]. The dramatic increase in the number of women screened for cervical cancer was enabled by

expanding WHP's stationary clinics from one initial clinic in 2007 to seven total clinics by 2010 (Fig. 1).

Based on self-report, HIV-positive women comprised 11.0% of our screened sample. Of the remaining patients, 65.6% were HIV-negative and 23.5% were HIV-status unknown. In 2007, HIV-positive women comprised 44.1% of the women screened, because the initial screening targeted HIV clinics. However, the percentage of HIV-positive women fell to 19.8% in 2008 and stabilized between 5.3%–13.9% in the subsequent years, as the WHP promoted cervical cancer screening to women from the general population (Fig. 2B).

Of the 44,979 women screened, 66.8% were VIA-DC-negative, 9.0% were VIA-DC-positive, 22.0% were VIA-DC-inadequate, and 2.2% were VIA-DC-uncertain (Fig. 3). However, screening results varied over time. The percentage of women diagnosed as VIA-DC-negative varied inversely with the percentage diagnosed as VIA-DC inadequate, which peaked in 2011 at 39.2% when senior staff were pulled to work on the HPV vaccine project. The percentage of women diagnosed as VIA-DC-positive decreased from 19.2% in 2007 to 7.6% in 2014. The percentage of women diagnosed as VIA-DC-uncertain remained relatively stable.

Of the 4,042 total women who were VIA-DC positive, 754 (18.7%) received same-day cryotherapy (Fig. 3); however, we do not know what proportion of the 4,042 women who screened VIA-positive were eligible for cryotherapy by WHO criteria or how many women received cryotherapy at follow-up visits. As of 2014, over 500 LEEPs have been performed by WHP nurses without any adverse events reported.

Other Women's Health Services

Of 12,390 women screened in 2014, nearly all women (99.4%) underwent CBE, and 98.3% had normal exams; 4.7% were treated or already on treatment for RTI, 18.6% were interested in learning more about safe and modern FP methods, and 2.9% were provided a method at the visit (Table 2).

Program Sustainability

To sustain the program, the WHP charges fees for all services offered, utilizes existing CBCHS infrastructure, and relies to a

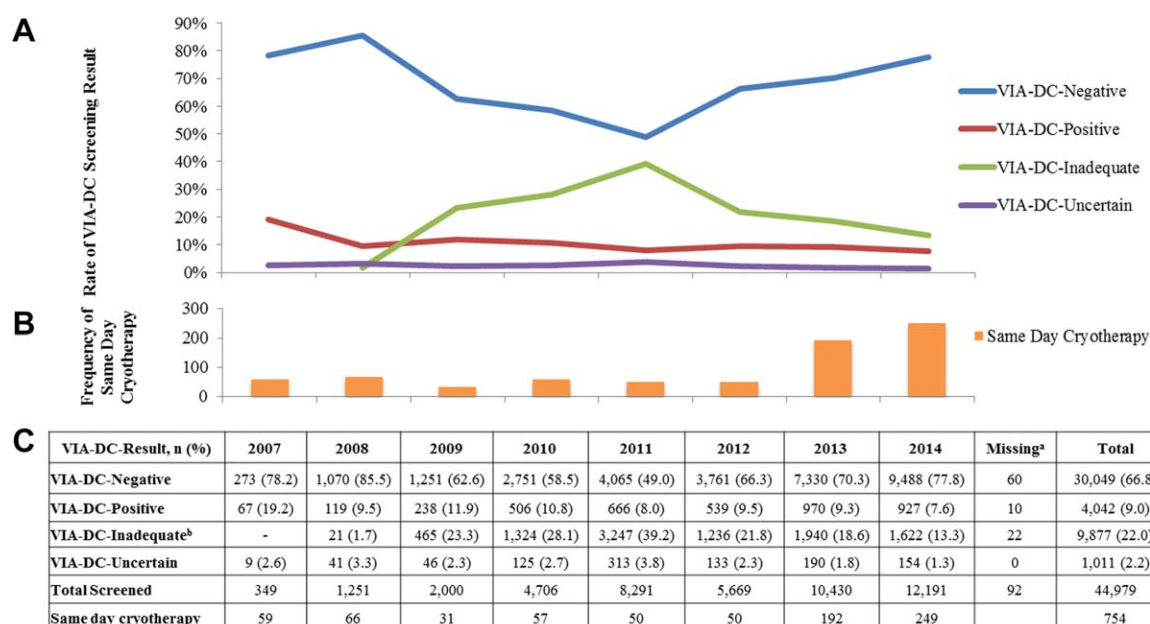


Figure 3. Women's Health Program VIA-DC screening outcomes and cryotherapy reported by year. There were 44,979 women screened with VIA-DC from 2007–2014. **(A):** Screening outcomes were categorized as VIA-DC-positive, -negative, -inadequate, or -uncertain. **(B):** Number of women who underwent same-day cryotherapy for VIA-DC-positive lesions. **(C):** Tabulated frequency and rate of VIA-DC results by year; frequency of same-day cryotherapy by year. ^aMissing data include women whose screening year was not recorded. ^bData for inadequate category were not systematically collected until 2009.

Abbreviations: VIA-DC, visual inspection with acetic acid enhanced by digital cervicography.

limited extent on donations from external donors, private institutions, and individuals (approximately \$20,000 per year). Over \$100,000 was collected in fees in 2014.

Table 3 summarizes challenges and lessons learned from the implementation of cervical cancer screening using VIA-DC, programmatic improvements that have been implemented, and recommendations for further improvement at CBCHS, which could be adopted by other LMICs running similar programs.

DISCUSSION

The WHP has successfully implemented the largest nurse-led screen-and-treat cervical cancer screening program in Cameroon. The WHP screening program has two unique aspects: a fee-for-service model for sustainability and simultaneous delivery of other women's health services for more comprehensive/integrative health care. The funding model and concept of offering multiple services in a single clinic rather than stand-alone "silo" cervical cancer screenings should provide new insight for other LMICs who plan to make an existing or new cervical cancer screening program more accessible, sustainable, and/or comprehensive.

The WHP's nearly 8 years of experience clearly demonstrates that VIA-DC is acceptable, feasible, scalable, and likely sustainable, but has limitations. For example, we identified a high rate of inadequate VIA-DC results (22.0%). The technique has known limitations, particularly for older women, whose SCJ has migrated into the endocervix; WHO recommends stopping screening at age 50 years for this reason [44]. Furthermore, the term "inadequate" is not a standard category in VIA programs. For example, if the SCJ is not visible but the ectocervix is normal, the CCPPZ practice is to classify the results as negative [17], which may in some cases be false-negative. Although it is rare to find pathology in the endocervix if the ectocervix is

visibly normal, even in the presence of minimally abnormal cytology [45], it would be useful to determine optimal, low-cost screening methods that offer a more specific diagnosis for older women. Improved training can also affect outcomes. This is demonstrated by the increase in inadequate results (39%) when experienced nurses were pulled away from VIA-DC screening clinics in 2011 in order to run the CBCHS HPV vaccination program [43]. Upon return of these nurses to the clinic in 2012, the inadequate rates fell to 22.0%. Inadequate rates fell further, to 13.1% in 2014, upon additional training of WHP nurses to better expose the endocervical canal.

The 2014 WHO cervical cancer screening guidelines include multiple algorithms for HPV, VIA, and cytologic testing sequences for low-resource settings [6]. WHP is exploring the possibility of using HPV nucleic acid testing as a primary screen, followed by VIA-DC of HPV-positive cases. However, the currently available HPV diagnostic tools have significant limitations in low-resource settings; they require either sending specimens to distant reference laboratories or running 30–90 specimens in a batch, making same-day "screen-and-treat" strategies impractical. Furthermore, cost of HPV testing is currently prohibitive, and requirement for electricity and refrigeration increases infrastructure needs. Thus, new rapid diagnostic tools are urgently needed for cervical cancer screening to be effective and robust in LMICs.

HIV-positive women have an increased risk for a positive cervical cancer screen and for progression of precancerous lesions to ICC; thus, knowledge of HIV status helps the WHP triage patients for screening and treatment. The WHP relies primarily on self-reported HIV status, and over 23% of women screened by the WHP did not know their HIV status. Although staff referred women who self-identified as HIV-negative or unknown to trained HIV counselors for testing, they were unable to confirm whether the women were actually tested. To

Table 2. Utilization of women's health services by 12,390 women attending Women's Health Program (WHP) clinics in 2014

Category	n (%)
Breast health	
Underwent clinical breast exam	12,319 (99.4)
Finding:	
Normal breast exam	12,108 (98.3)
Nipple retraction	9 (0.1)
Discoloration	3 (<0.1)
Mastitis	5 (<0.1)
Mass	73 (0.6)
Axillary lymphadenopathy	4 (<0.1)
Nipple discharge	9 (0.1)
Other finding	25 (0.2)
Management:	
Referral for further evaluation	16
Referral for breast ultrasound	20
Referral for FNA	44
Reproductive tract infections	
Received or currently on treatment for reproductive tract infection	580 (4.7)
Candida	147 (25.3)
Trichomonas	89 (15.3)
Bacterial Vaginosis	51 (8.8)
Cervicitis	123 (21.2)
Pelvic inflammatory disease	159 (27.4)
Genital ulcer	4 (0.6)
Family planning	
Interest in learning more about safe/modern family planning methods	2308 (18.6)
Patient was provided a family planning method	359 (2.9)
Counseling	94
Male Condoms	13
Female condoms	5
Depo-provera	9
Oral contraceptive pill	14
Intrauterine device	171
Implant	47
Tubal Ligation	1
Vasectomy	1
Other family planning method	2
Calendar method	0
Total number who presented for VIA-DC screening in 2014	12,390

In addition to cervical cancer screening, women's health services, including clinical breast exams, family planning, and treatment of reproductive tract infections, are offered at WHP clinics.

Abbreviations: FNA, fine needle aspirate; VIA-DC, visual inspection with acetic acid enhanced by digital cervicography.

overcome this, in 2015, the WHP began offering same-day HIV counseling and testing to women whose HIV status was unknown or who tested negative more than a year prior. HIV-positive women are then referred to the AIDS Care and Treatment Clinics.

Our experience has shown that, if cervical cancer control programs offer other women's health services like CBE, FP, or RTI treatment, they will be utilized. Although breast cancer screening with mammography is not feasible in most LMICs at

this time, CBE is an effective way of increasing awareness about breast cancer and possibly down staging disease burden at diagnosis and requires few resources [46]. While only 19% and 4.7% of women screened for cervical cancer desired information about FP or needed treatment for RTI, respectively, the WHP provided these services to many other women who were not screened for cervical cancer (e.g., under age 25 and ineligible for cervical cancer screening). In 2015, the WHP had 8,058 FP visits, of which 4,345 were first visits and 3,185 were revisits,

Table 3. WHP cervical cancer prevention intervention: challenges, lessons learned, solutions implemented, and recommendations for additional improvement at Cameroon Baptist Convention Health Services, which could be adopted by other low-and-middle-income countries running similar programs

Challenges	Lessons learned	Solutions implemented	Recommendations
Lack of access to screening and treatment	<p>Women in rural areas are underserved.</p> <p>High rate of VIA-DC inadequate results makes treatment decisions more difficult.</p> <p>A high proportion of women screened do not know their HIV status (23%).</p>	<p>WHP created an outreach program using a renovated ambulance or local buildings to provide clinical services.</p> <p>WHP trained providers in techniques to fully visualize the cervix and transformation zone to reduce inadequate results.</p> <p>WHP referred women who did not know their HIV status for counseling and testing but did not follow up to determine their HIV status.</p>	<p>Provide all outreach clinics in local buildings where possible, as ambulance maintenance and operating costs are prohibitive.</p> <p>If HPV testing is available and affordable, integrate it with VIA-DC: women who are both HPV-negative and VIA-DC-negative or inadequate should follow up in 3–5 years; HPV-positive and VIA-DC-negative women should follow up in 1 year or should be treated with cryotherapy.</p> <p>Offer same-day rapid HIV testing that is integrated into WHP services so that appropriate clinical care can be provided based on current HIV status.</p>
Lack of resources	<p>Although many women and families are able to pay fees for screening and treatment of precancers, fees are a barrier to services for many poor patients.</p> <p>Cryotherapy is not always available: CO₂ gas is expensive and difficult to get, tanks are bulky and difficult to transport, and cryoguns malfunction and need to be repaired.</p> <p>Women have health needs beyond cervical cancer screening.</p>	<p>When WHP recognized that fees were a barrier, women who could not afford to pay were screened and treated at no or reduced charge or asked to pay later.</p> <p>WHP acquired two thermal coagulation machines. Trained nurses treat with thermal coagulation instead of cryotherapy. Advantages include portability, uses commercial electricity or a portable generator, does not require expensive CO₂ gas and heavy tanks.</p> <p>WHP offers family planning services, treatment of reproductive tract infections, and breast cancer screening</p>	<p>Implement income-stratified fee-for-service program with safety net for women unable to pay. Determine whether your institution can subsidize fees and still be self-sustaining.</p> <p>Convert to universal use of thermal coagulation instead of cryotherapy by acquiring more thermal coagulation machines and training more nurses in their use.</p> <p>Systematically assess unmet family planning needs for all women of reproductive age who receive care through your institution and strive to provide same-day services.</p>
Sensitizing spouses and communities in a culturally appropriate manner	<p>Lack of understanding of the importance of detecting and treating precancers.</p> <p>Barriers to same-day cryotherapy include 4-week abstinence period, lack of funds to pay fees, and need to get spousal, family, or relatives' approval.</p>	<p>WHP nurses and knowledgeable peer educators conduct community sensitization campaigns prior to offering outreach clinics.</p> <p>Community and client sensitization includes information on treatment side effects, including the need for 4 weeks of abstinence.</p>	<p>Expand education to all patients receiving care at health facilities, especially HIV-positive patients.</p> <p>Educate both men and women on the importance of cervical screening and treatment and the fees charged.</p> <p>Allow women to make a phone call from the clinic to discuss same-day treatment with their husband prior to being screened.</p> <p>Ensure that women with treatable precancer receive treatment regardless of ability to pay.</p>
Follow-up data on the outcomes of treatment are lacking	Outcomes of treatment cannot be determined with the current medical record system in WHP clinics.	WHP developed follow-up forms, which were systematically implemented in 2013, and data were entered into a database linked to the enrollment data.	Obtain external funding to set up an appointment system and develop and implement active follow-up of women who need treatment or who have received treatment.

Abbreviations: HPV, human papillomavirus; VIA-DC, visual inspection with acetic acid enhanced by digital cervicography; WHP, Women's Health Program.

and these data are not captured in the cervical cancer screening database. Through offering these additional services, the WHP has expanded its reach and role in the community and its public health impact. In 2015, Cameroon's maternal mortality ratio was 590 per 100,000, 12th highest in the world [47]. Many of these deaths are preventable through FP, now commonly called "healthy timing and spacing of pregnancy."

Currently, most cervical cancer screening services in African countries are wholly funded by donors and tend to operate as stand-alone projects with an uncertain future [7, 48]. While other program models may assume that screening in LMICs is only feasible if provided at no cost to the patient and therefore are primarily dependent on grants or donors, there is evidence to show that women and families in LMICs may be willing to pay a fee for these services [22, 23]. The WHP, despite charging fees, has experienced an increase in patient volume for cervical cancer screening nearly every year since its establishment in 2007. However, we have identified that fees are barriers to uptake of same-day treatment. Similarly, a recent report shows that nearly one fifth of patients presenting to a CBCHS surgical clinic with a treatable condition did not ultimately receive needed surgery, due in part to financial factors [49]. This challenge undermines the value of VIA-DC screening and is a significant shortcoming of the WHP that is being actively addressed. For example, WHP considered bundling the cost of treatment into the screening fees, as a strategy to eliminate the additional cost of treatment for women who require it, but this raised the cost of screening to a level that was a barrier to most women. Thus, an ongoing challenge is how to structure fees so that all women can afford to be screened, and those with indications for treatment can receive it regardless of ability to pay, while still generating enough income to sustain the program. In Banzo, one of the seven WHP clinics, same-day cryotherapy rates increased from 6% to 52% between 2012–2013 through an increase in patient and provider education on the importance of treatment and having women pay later for the cost of treatment.

CONCLUSION

The WHP's 8 years of experience using a fee-for-service model for cervical cancer screening clearly demonstrates that using VIA-DC in Cameroon is acceptable, feasible, and scalable. The

fee-for-service payment system has allowed for a nearly self-sustaining program and may serve as a model for other LMICs that require a cost-recovery model to implement cervical cancer screening. Integration of other women's health services into cervical cancer screening programs can facilitate access to more comprehensive care.

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REFERENCES

1. Ferlay J, Soerjomataram I, Ervik M et al. GLOBOCAN 2012: Cancer incidence and mortality worldwide: IARC cancerbase no. 10. International Agency for Research on Cancer; 2013. Available at <http://globocan.iarc.fr>. Accessed on March 29, 2017.
2. Lynge E, Rebolj M. Primary HPV screening for cervical cancer prevention: Results from European trials. *Nat Rev Clin Oncol* 2009;6:699–706.
3. Saslow D, Runowicz CD, Solomon D et al. American Cancer Society guideline for the early detection of cervical neoplasia and cancer. *CA Cancer J Clin* 2002;52:342–362.
4. Perlman S, Wamai RG, Bain PA et al. Knowledge and awareness of HPV vaccine and acceptability to vaccinate in sub-Saharan Africa: A systematic review. *PLoS One* 2014;9:e90912.
5. Denny L, Quinn M, Sankaranarayanan R. Chapter 8: Screening for cervical cancer in developing countries. *Vaccine* 2006;24(suppl 3):S71–S77.
6. World Health Organization. WHO guidelines for screening and treatment of precancerous lesions for cervical cancer prevention. Supplemental material: Grade evidence-to-recommendation tables and evidence profiles for each recommendation. Geneva: WHO, 2013.
7. Adefuye PO, Broutet NJ, de Sanjosé S et al. Trials and projects on cervical cancer and human papillomavirus prevention in sub-Saharan Africa. *Vaccine* 2013;31(suppl 5):F53–F59.
8. Busingye P, Nakimuli A, Nabunya E et al. Acceptability of cervical cancer screening via visual inspection with acetic acid or Lugol's iodine at Mulago Hospital, Uganda. *Int J Gynaecol Obstet* 2012;119:262–265.
9. Elit L, Baigal G, Tan J et al. Assessment of 2 cervical screening methods in Mongolia: Cervical cytology and visual inspection with acetic acid. *J Low Genit Tract Dis* 2006;10:83–88.
10. Evans D, Menezes C, Mahomed K et al. Treatment outcomes of HIV-infected adolescents attending public-sector HIV clinics across Gauteng and Mpumalanga, South Africa. *AIDS Res Hum Retroviruses* 2013;29:892–900.
11. Firnhaber C, Mayisela N, Mao L et al. Validation of cervical cancer screening methods in HIV positive women from Johannesburg South Africa. *PLoS One* 2013;8:e53494.
12. Horo A, Jaquet A, Ekouevi DK et al. Cervical cancer screening by visual inspection in Cote d'Ivoire, operational and clinical aspects according to HIV status. *BMC Public Health* 2012;12:237.
13. Huchko MJ, Bukusi EA, Cohen CR. Building capacity for cervical cancer screening in outpatient HIV clinics in the Nyanza province of western Kenya. *Int J Gynaecol Obstet* 2011;114:106–110.
14. Mutyaba T, Mirembe F, Sandin S et al. Evaluation of 'see-and-treat' strategy and role of HIV on

cervical cancer prevention in Uganda. *Reprod Health* 2010;7:4.

15. Mwanahamuntu MH, Sahasrabudde VV, Pfaendler KS et al. Implementation of 'see-and-treat' cervical cancer prevention services linked to HIV care in Zambia. *AIDS* 2009;23:N1–N5.

16. Ramogola-Masire D, de Klerk R, Monare B et al. Cervical cancer prevention in HIV-infected women using the "see and treat" approach in Botswana. *J Acquir Immune Defic Syndr* 2012;59:308–313.

17. Mwanahamuntu MH, Sahasrabudde VV, Blevins M et al. Utilization of cervical cancer screening services and trends in screening positivity rates in a 'screen-and-treat' program integrated with HIV/AIDS care in Zambia. *PLoS One* 2013;8:e74607.

18. Parham GP, Mwanahamuntu MH, Kapambwe S et al. Population-level scale-up of cervical cancer prevention services in a low-resource setting: Development, implementation, and evaluation of the cervical cancer prevention program in Zambia. *PLoS One* 2015;10:e0122169.

19. Gakidou E, Nordhagen S, Obermeyer Z. Coverage of cervical cancer screening in 57 countries: Low average levels and large inequalities. *PLoS Med* 2008;5:e132.

20. World Health Organization. Cervical cancer screening in developing countries: Report of a who consultation. Geneva: WHO, 2002.

21. Denny L, Prendiville W. Cancer of the cervix: Early detection and cost-effective solutions. *Int J Gynaecol Obstet* 2015;131(suppl 1):S28–S32.

22. Dim CC, Onyedum CC, Dim NR et al. Cervical cancer screening among HIV-positive women in Nigeria: An assessment of use and willingness to pay in the absence of donor support. *J Int Assoc Provid AIDS Care* 2015;14:241–244.

23. Bradley J, Barone M, Mahé C et al. Delivering cervical cancer prevention services in low-resource settings. *Int J Gynaecol Obstet* 2005;89(suppl 2):S21–S29.

24. Kakaire T, Schlech W, Coutinho A et al. The future of financing for HIV services in Uganda and the wider sub-Saharan Africa region: Should we ask patients to contribute to the cost of their care? *BMC Public Health* 2016;16:896.

25. Ekouevi DK, Stringer E, Coetzee D et al. Health facility characteristics and their relationship to coverage of PMTCT of HIV services across four African countries: The PEARL study. *PLoS One* 2012;7:e29823.

26. Henley C, Forgewei G, Welty T et al. Scale-up and case-finding effectiveness of an HIV partner services program in Cameroon: An innovative HIV prevention intervention for developing countries. *Sex Transm Dis* 2013;40:909–914.

27. Stringer EM, Ekouevi DK, Coetzee D et al. Coverage of nevirapine-based services to prevent mother-to-child HIV transmission in 4 African countries. *JAMA* 2010;304:293–302.

28. UNAIDS. Global report 2013: UNAIDS report on the global AIDS epidemic. Geneva: UNAIDS, 2013.

29. Ajong AB, Njotang PN, Yakum MN et al. Determinants of unmet need for family planning among women in urban Cameroon: A cross sectional survey in the Biyem-Assi Health District, Yaoundé. *BMC Womens Health* 2016;16:4.

30. Leke RJ, Oduma JA, Bassol-Mayagoitia S et al. Regional and geographical variations in infertility: Effects of environmental, cultural, and socioeconomic factors. *Environ Health Perspect* 1993;101(suppl 2):73–80.

31. DeGregorio GA, Bradford LS, Manga S et al. Prevalence, predictors, and same day treatment of positive VIA enhanced by digital cervicography and histopathology results in a cervical cancer prevention program in Cameroon. *PLoS One* 2016;11:e0157319.

32. Gaffikin L, Blumenthal PD, Emerson M et al. Safety, acceptability, and feasibility of a single-visit approach to cervical-cancer prevention in rural Thailand: A demonstration project. *Lancet* 2003;361:814–820.

33. Sellors JW, Sankaranarayanan R, eds. Colposcopy and treatment of cervical intraepithelial neoplasia: A beginner's manual. Lyon, France: IARC, 2003.

34. Manga S, Parham G, Benjamin N et al. Cervical cancer screening in Cameroon: Interobserver agreement on the interpretation of digital cervicography results. *J Low Genit Tract Dis* 2015;19:288–294.

35. World Health Organization. Comprehensive cervical cancer control: A guide to essential practice. 2nd ed. Australia: WHO, 2014.

36. Richart RM. Cervical intraepithelial neoplasia. *Pathol Annu* 1973;8:301–328.

37. Anderson BO, Yip CH, Smith RA et al. Guideline implementation for breast healthcare in low-income and middle-income countries: Overview of the Breast Health Global Initiative Global Summit 2007. *Cancer* 2008;113:2221–2243.

38. Yip CH, Smith RA, Anderson BO et al. Guideline implementation for breast healthcare in low- and

middle-income countries: Early detection resource allocation. *Cancer* 2008;113:2244–2256.

39. Sankaranarayanan R, Ramadas K, Thara S et al. Clinical breast examination: Preliminary results from a cluster randomized controlled trial in India. *J Natl Cancer Inst* 2011;103:1476–1480.

40. World Health Organization Department of Reproductive Health and Research (WHO/RHR), Johns Hopkins Bloomberg School of Public Health/Center for Communication Programs (CCP). Family planning: A global handbook for providers. 2011 update. Baltimore and Geneva: WHO, 2011.

41. World Health Organization. Medical eligibility criteria for contraceptive use. 5th ed. Geneva: WHO, 2015.

42. World Health Organization. Guidelines for the management of sexually transmitted infection. Geneva: WHO, 2003.

43. Ogembo JG, Manga S, Nulah K et al. Achieving high uptake of human papillomavirus vaccine in Cameroon: Lessons learned in overcoming challenges. *Vaccine* 2014;32:4399–4403.

44. World Health Organization. Prevention of cervical cancer through screening using visual inspection with acetic acid (VIA) and treatment with cryotherapy: A demonstration project in six African countries: Malawi, Madagascar, Nigeria, Uganda, the United Republic of Tanzania, and Aambia. Geneva: WHO, 2012.

45. Goksef BP, Akbayir O, Numanoglu C et al. Evaluation of endocervical canal in women with minimal cervical cytological abnormalities. *J Low Genit Tract Dis* 2013;17:261–266.

46. Denny L, de Sanjose S, Mutebi M et al. Interventions to close the divide for women with breast and cervical cancer between low-income and middle-income countries and high-income countries. *Lancet* 2017;398:861–870.

47. Otto HW, Schuitmaker N, Lamm B et al. Infants' social experiences in three African sociocultural contexts. *Child Dev* 2016 [Epub ahead of print].

48. Adewole I, Martin DN, Williams MJ et al. Building capacity for sustainable research programmes for cancer in Africa. *Nat Rev Clin Oncol* 2014;11:251–259.

49. Lerman BJ, Alsan M, Chia NJ et al. Beyond infrastructure: Understanding why patients decline surgery in the developing world: An observational study in Cameroon. *Ann Surg* 2016 [Epub ahead of print].

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