

ORIGINAL RESEARCH ARTICLE

Towards cervical cancer elimination in Zambia: Stakeholder views on lessons learned, progress to date, and future needs and priorities

DOI: 10.29063/ajrh2023/v27i8.4

Ameck Kamanga^{1*}, Kutha Banda², Jessica Price³, Rosemary Masilani⁴, Monica Mutesa¹, Steven Nonde², Sandra Chilengi-Sakala², Kerry A. Thomson⁵, Elisabeth Vodicka³, Dorothy Lombe⁶

PATH, Lusaka, Zambia¹; National Health Research Authority, Lusaka, Zambia²; PATH, Seattle, WA, USA³; Ministry of Health, Lusaka, Zambia⁴; University of Washington, Seattle, WA, USA⁵; Regional Cancer Treatment Services, MidCentral District Health Board, Palmerston North, New Zealand⁶

*For Correspondence: Email: akamanga@path.org

Abstract

Zambia has strived to reduce cervical cancer-related burden through screen-and-treat services for detection and treatment of precancerous lesions. Understanding health system barriers and opportunities could strengthen further scale-up. We conducted semi-structured interviews with 23 stakeholders working in different levels and roles. Interviews covered program organization; screen-and-treat, referrals, and linkages; and unmet needs. Interviews were audio-recorded, transcribed, and coded on key themes. National leadership, establishment of provincial focal points, and effective partnerships were seen as accomplishments, while reliance on donor resources was a major concern. Somewhat competing priorities emerged: scaling-up existing screen-and-treat v. ensuring screen-positive women receive treatment. Supply chain issues, screening with HPV DNA testing, task-shifting for treatment, and linkages to invasive cancer care were important themes. Despite challenges, stakeholders recognized notable progress scaling up screen-and-treat services. Given realities of budget constraints and donor dependency, relative prioritization of screen-and-treat scale-up vs. linkages to care should be deliberated and task-shifting considered. (*Afr J Reprod Health* 2023; 27 [8]: 28-38).

Keywords: Cervical cancer, precancerous lesions, interview, treatment

Résumé

La Zambie s'est efforcée de réduire le fardeau lié au cancer du col de l'utérus grâce à des services de dépistage et de traitement pour la détection et le traitement des lésions précancéreuses. Comprendre les obstacles et les opportunités du système de santé pourrait renforcer la poursuite de la mise à l'échelle. Nous avons mené des entretiens semi-structurés avec 23 parties prenantes travaillant à différents niveaux et rôles. Les entretiens ont porté sur l'organisation du programme; dépistage et traitement, références et liens; et des besoins non satisfaits. Les entretiens ont été enregistrés, transcrits et codés sur des thèmes clés. Le leadership national, la mise en place de points focaux provinciaux et des partenariats efficaces ont été considérés comme des réalisations, tandis que la dépendance à l'égard des ressources des donateurs était une préoccupation majeure. Des priorités quelque peu concurrentes ont émergé : intensifier le dépistage et le traitement existants v. s'assurer que les femmes séropositives reçoivent un traitement. Les problèmes de chaîne d'approvisionnement, le dépistage par test ADN du VPH, le transfert des tâches pour le traitement et les liens avec les soins invasifs contre le cancer étaient des thèmes importants. Malgré les défis, les parties prenantes ont reconnu des progrès notables dans l'intensification des services de dépistage et de traitement. Compte tenu des réalités des contraintes budgétaires et de la dépendance aux donateurs, la priorisation relative de l'intensification du dépistage et du traitement par rapport aux liens avec les soins devrait être délibérée et le transfert des tâches envisagé. (*Afr J Reprod Health* 2023; 27 [8]: 28-38).

Mots-clés: Cancer du col de l'utérus, lésions précancéreuses, entretien, traitement

Introduction

Although largely preventable and curable if detected early, cervical cancer remains a leading cause of cancer-related death among women in low- and middle-income countries (LMICs)¹. The WHO recently issued a strategy towards cervical cancer elimination with global targets for primary

prevention though HPV vaccination, early detection through screening and immediate treatment of precancerous lesions, and treatment of invasive cancer². As countries operationalize the WHO strategy, sharing successes and challenges can offer cross-national lessons learned for meeting the 2030 targets. Zambia, which has one of the highest cervical cancer rates in the world^{3,4}, has been at the

forefront in scaling up cervical cancer prevention and treatment services. In partnership with the Centre for Infectious Disease Research in Zambia (CIDRZ), in 2006 the Ministry of Health (MOH) initiated the Cervical Cancer Prevention Program (CCPPZ) to offer “screen-and-treat” prevention services at public health clinics^{5,6}.

The program built on existing HIV/AIDS care and treatment infrastructure and relied on trained nurses to perform visual inspection with acetic acid (VIA) and cryotherapy of eligible women with VIA-positive test results⁷. Women with cryotherapy-ineligible lesions were referred to Zambia’s University Teaching Hospital (UTH) for loop electrosurgical excision procedure (LEEP) or biopsy for histopathological evaluation. HIV-infected women were referred for cervical cancer screening, but the service was made available to all women of eligible age attending the clinic⁶. In 2006, digital cervicography was introduced to improve service quality⁷. Using commercial brand digital cameras, nurses were trained to share real-time digital images of the cervix with off-site experts for remote consultation. Between 2006-2013 services were expanded substantially⁸, demonstrating the effectiveness of leveraging HIV/AIDS investments to integrate cervical cancer prevention in public health clinics and setting the stage for national scale-up of nurse-led screen-and-treat services^{9,10}. By 2019 over 330,000 women were screened and the MOH projects 2.8 million to be screened by 2023.

Zambia’s National Cancer Control Strategic Plan: 2016-2021¹¹ lays out ambitious targets to reduce cervical cancer mortality by 25% by 2025. The plan focuses on expanding access to screening and treating precancerous lesions, entailing establishment of screen-and-treat sites in every district and at least one LEEP facility in every province. To maximize screening coverage and long-term program affordability, in 2019 the MOH began moving to HPV DNA testing as an alternative screening method due to its superior sensitivity and the option for self-sampling¹².

As the country transitions to the updated cervical cancer control strategy, it is useful to take stock of progress and challenges towards meeting goals articulated in the 2016-2021 Plan. To this end, we conducted a qualitative study with stakeholders involved in Zambia’s cervical cancer program to understand opportunities to improve program quality and linkages to treatment for pre-invasive

and invasive cervical disease. Women who screen positive take the pathways dependent on lesion type as illustrated in the conceptual framework shown in Figure 1.

Barriers navigating referral pathways potentially contribute to persistently high cervical cancer incidents in Zambia, despite having an established prevention program. Interrogating these barriers through the stakeholders’ perspectives highlight factors that should inform strategic response to improve access and quality of services.

We used the conceptual framework to guide the development of interview tools and analytic approaches.

Methods

Qualitative interviews were based on a conceptual framework for cervical cancer screening and treatment in Zambia (Figure 1). Stakeholders with direct roles in planning, managing, or implementing the program were invited to interviews, which took place between January and April 2022. Individuals were purposively selected to represent different national, provincial, and service delivery levels.

Semi-structured interview guides included questions about program organization, partnerships, and resources; screen-and-treat factors, referrals, and linkages; and needs to meet program goals. Parallel guides were tailored to the different stakeholder roles [insert link to supplements 1, 2, and 3]. Due to difficulties scheduling interviews with MOH stakeholders leading the cervical cancer program, we developed a presentation of key findings from other stakeholder interviews, accompanied by a short series of open-ended questions eliciting reactions to initial findings, e.g., “What plans and policies in Zambia already exist concerning [strategy X] proposed by the stakeholders?” [insert link to supplement 4_guide for MOH leaders].

Interviews were conducted in English, audio-recorded, and fully transcribed for coding in NVivo 12+¹³. One primary coder conducted initial thematic coding, verified by research assistants working in pairs and applying a consensus-based approach. Case-by-theme matrices were produced to identify common and divergent patterns across different stakeholders¹⁴. Participants included:

- Nine provincial focal point persons (FPP) responsible for overseeing provincial cervical

cancer programs, including integration with HIV/AIDS services, community outreach, health worker training, service delivery, and monitoring.

- Six service providers (SP) providing screen-and-treat services at the primary health level.
- Four technical assistance agency representatives (TA) providing direct support for cervical cancer infrastructure and service delivery at provincial and district levels.
- Three MOH leaders involved in planning and oversight of the national program.
- One clinical oncologist from the Cancer Disease Hospital (CDH) in Zambia.

Ethical approvals were obtained from PATH's Research Ethics Committee and the University of Zambia Biomedical Research Ethics Committee. After explaining the purpose and intent of the study, the nature of the questions, the expected duration of the interview, and the way in which the data would be used and the stakeholder's identity protected, written informed consent was obtained from every study participant. Confidentiality was ensured by coding responses and not including identifying information. Only the study team had access to lists of participants.

Results

Twenty-three stakeholders with clinical training and between one and 16 years of professional experience were interviewed.

Across the board, stakeholders acknowledged substantial progress made in Zambia's cervical cancer prevention efforts, but also discussed challenges, needs, and priorities to advance cervical cancer elimination in the country. Below we synthesize stakeholder views across key themes: program architecture and donor support, screen-and-treat scale-up, health systems challenges, improving LEEP services, and linkages to invasive cancer care. We highlight MOH leader feedback (see Text Boxes 1-4).

Program architecture and donor support

Stakeholders described several structural aspects of program as successes to date. These included articulation of national policies and plans, strong leadership, and partner collaboration. Formation of the National Cervical Cancer Working Group—

which brings together MOH leadership, technical experts, and development partners for program review and planning—was offered as an example. Establishment of provincial cervical cancer focal points was also identified as essential to progress. That the focal points are “embedded” in the MOH, despite being funded by the US Centers for Disease Control and Prevention, was perceived as a strength and example of partner collaboration.

At the same time, donor dependency was the most pervasive program challenge described by stakeholders. Despite wide acknowledgement of development partner contributions and collaborative relationships, every stakeholder interviewed noted one or multiple concerns about the program's vulnerability inherent in heavy reliance on donor resources for screening and treatment of precancerous lesions:

Financing, that's a source of worry. I wish we could find our feet and do these things on our own. Nearly the whole [screen-and-treat] program is dependent on partners. (FPP_006)

Health providers emphasized the breadth of dependency on donor funding for screen-and-treat services and the potential negative impact when donor-funded projects end or transition. The extended quote illustrates the extent of dependency and consequent concerns:

We started with [NGO X], which supplied equipment.... When [NGO X] left, it became very difficult to purchase some equipment. Now, [NGO Y] came in and they're the ones who bought the thermal coagulators and the loops for LEEP. Getting supplies from the government has been difficult, so we only hope [NGO Y] will continue, because most facilities don't even have enough speculums.

...When you don't have an [MOH] impress, it's difficult to buy consumables. I'm afraid when [NGO Y] goes, things like gloves, cotton will be difficult to find, and vinegar as well. Apparently [NGO Y] is assisting with these things—actually, every month.

...A woman may come from very far and you find a lesion that needs treatment at the hospital. But they don't have transport money. If we had [a vehicle] we could take them, and it would assist [with other things], even the like collection of HPV samples we

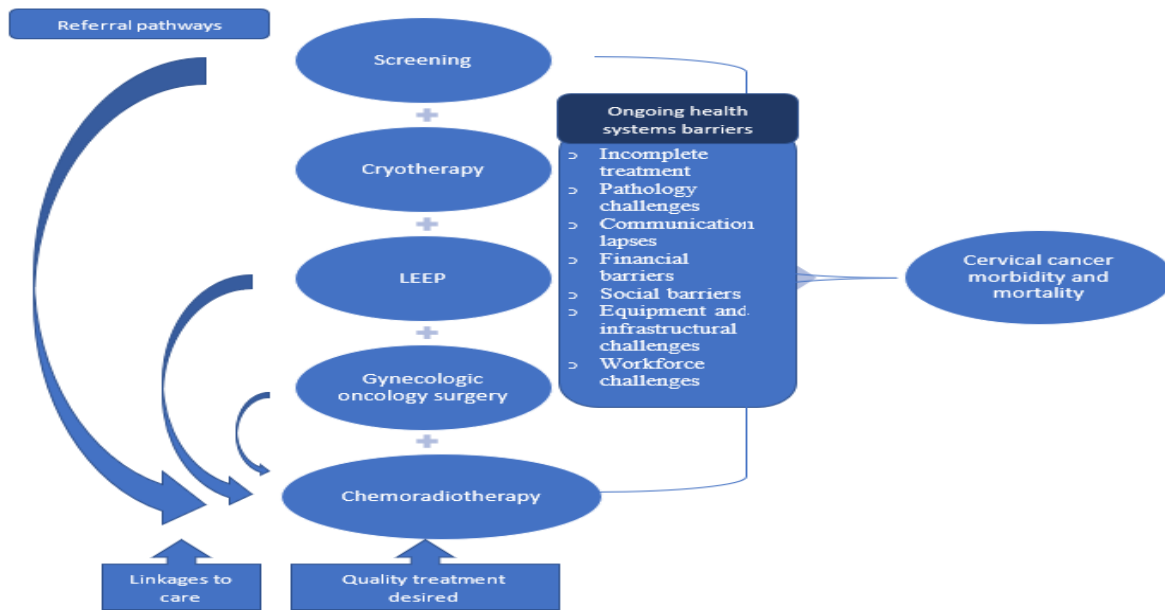


Figure 1: Conceptual framework

Text Box 1: MOH leader views increasing government of Zambia funding for screen-and-treat

MOH leaders were realistic about the need for continued donor support to finance Zambia’s cervical cancer program and were confident that “when the sector is doing well, you will always attract partners.” At the same time, all of the leaders were clear-eyed about the risk of donor fatigue and the importance of increasing government funding for decentralized screen-and-treat services. Emphasizing that it is time to “put our money where our mouth is” and commit government budget for decentralized screen-and-treat services, predicated on changing district-level perceptions “that cervical cancer is for partners.”

We do have a budget but it’s not extensive. Ninety percent of the screen-and-treat budget is partner driven, but almost 100% of cancer treatment is government funded. It’s up to us to coordinate partners and the parliament and our committees. Going forward, we need to see a cervical cancer budget line in each district action plan to reflect screen-and-treat services. (MOH leader_002)

are just depending on [NGO Y]. I don’t know what will happen when they go. (SP_002)

Other service providers emphasized dependency on “outreaches usually sponsored by our partners” and even mobile phone airtime for client follow-up when needed.

Provincial focal points raised similar and additional concerns about partner dependency, a few framing their concern as compromised country ownership:

You’ll find this partner comes in and says, “Me, I just want to work in XXX district,” and you can’t change anything, especially if they’re the ones who

provide equipment. They’re like, “No, we want here,” and there’s nothing you can change. So, they are mak[ing] decisions [for the province]. (FPP_001)

The practical issues of piecing together coherent provincial plans—specifically, managing programmatic overlaps and gaps—from different and ephemeral donor projects were more often stressed:

Partner collaboration is a challenge. Some provinces have a lot of partners interested in cervical cancer, but in others, there are very few. Some are more interested in HIV. Then we’ve got

one-off partners that come and go. It all depends on where partners are located. We've tried with a few [HIV-focused] partners, but how much are they putting in the cervical cancer program? (FPP_004)

In their turn, stakeholders representing technical assistance partners expressed challenges that arise when donor mandates and targets do not conform to plans or timelines established by the province:

Some challenges we have are from our own organization. Maybe our target is to screen 50 women in a week, so we work on that timeline. Our MOH partners don't have that same time consciousness—they'll maybe just want to screen 15. When you want to work hand-in-hand, this can cause a problem. (TA_001).

Finally, all stakeholders recognized the importance of screening HIV-infected women. While leveraging HIV donor funding for cervical cancer care was generally viewed positively, most individuals also had concerns about equity: “the scale is tilted towards the HIV-positive ones.” Noting that “a lot of these projects are US funded,” one stakeholder working at the national level explained:

*If they screen an HIV-negative woman, maybe it doesn't count [towards donor targets], so they don't really insist on it. But, **of our patients who actually have cervical cancer, 50% of them are HIV-negative.** We just need to find a way to eliminate that HIV-negative versus HIV-positive thing on the ground.* (CDH_001)

Others described the focus on highly vulnerable, HIV-positive women as “a good thing” but “a double-edged sword”:

*. . . sometimes you find that **women are shunning the screening because of fear of HIV stigma.** For me, I'd love it if they just went in and said, 'Let's screen all women.' Like I said, most of this program is supported by donors and their interest is [in] HIV-positive patients.* (FPP_006)

In sum, while stakeholders overwhelmingly viewed the scale-up of screen-and-treat through donor funded HIV projects as a success, they also expressed the need for greater government commitment reflected in MOH budget lines:

I wish we had monies allocated towards the fight against cervical cancer now. We're looking at elimination, so let's have money allocated towards it. (FPP_008)

Screen-and-treat program scale-up

Scaling up same-day treatment of “small” lesions with VIA was roundly seen as a major success. However, virtually all stakeholders acknowledged that more was needed to “give every woman of reproductive age a chance to be screened”:

We've managed to screen a lot of women and treat precancerous lesions in most of them, meaning to say, we've prevented a lot of women from developing cancer. We still need to reach more. (FPP_003)

We are still finding a lot of big lesions and the positivity rate of HPV at 30%, that's a big number. That's a sign that not enough women are being screened. (TA_003)

Intensifying community awareness, reaching more women through outreach, scaling up VIA to all districts, and integrating screening into other service points (“for women in outpatient services complaining of that backache or discharge”) were suggested ways to increase screening coverage.

Two distinct priorities for the screen-and-treat program were identified. On one hand, the possibility to prevent cervical cancer through VIA with immediate treatment led most stakeholders to emphasize screening far and wide (in “communities,” “churches,” “all districts”). On the other hand, the country's limited capacity to follow-up treatment of precancerous lesions requiring LEEP led others to emphasize the need to focus on treatment gaps. Two provincial focal points framed the issue explicitly as alternative priorities:

As an ethical imperative: We are ethically responsible to the women already screened and informed that they may have a developing precancerous lesion. We need to attend to these women so that we don't have psychological issues arising. (FPP_009)

As a programmatic imperative: We want clinics to offer all the basic services, where they are able to screen and, if they find a positive lesion, do

cryotherapy or LEEP, probably on the same day. We should desist from just doing VIA. Let's not be too much in a hurry opening clinics just to have [screening] numbers. (FPP_006)

Health system challenges

Despite enthusiasm for the screen-and-treat program, stakeholders involved in day-to-day implementation described several challenges that undermine the quality and quantity of services. Many cited interruptions in basic supplies (e.g., reagents, vinegar), with one pointing out:

If you scan for cervical cancer on the essential medicines list, not a single item is there. (FPP_004)

In addition to strengthening cervical cancer supply management, lack of equipment (cameras and lenses for digital cervicography, outreach kits, computers, digital devices for record keeping, etc.) or badly functioning equipment were commonly cited service barriers. Developing maintenance and replacement schedules and ensuring access to prompt repair and backup equipment were offered as solutions to these challenges. Less frequently, poor internet access, lack of electricity, and inadequate space were also mentioned.

Getting to the “next level”: improving LEEP access and addressing patient barriers

Regardless of these challenges, stakeholders generally indicated VIA with immediate provision of cryotherapy or thermal ablation “doesn’t [pose] much challenge,” this was because:

... we're able to treat [the lesions] then and there. Even when we go for outreaches, we carry those machines and treat as we see them. (TA_004).

On the other hand, missed opportunities for treating women who present at VIA clinics with lesions requiring LEEP was among the most consistent themes. Unavailability of services and inefficient referral processes were frequently cited:

*The LEEP clinic, which has been left to doctors, has brought a lot of problems for our clients. That's why we are maybe getting less than 50% of those needing treatment, **because we miss out with client appointments. [The women] fail to come back when***

the doctor comes, and by the time they do, they already have invasive cervical cancer. If the nurses doing the screening could treat [with LEEP] then and there—like at UTH—then treatment would be 100%. (SP_001)

Every service provider and most focal points noted that LTFU was common among women who are asked to return for LEEP or referred to another facility. Women who do make their appointments are sometimes turned away, typically due to the LEEP provider “seeing other clients,” “too busy with emergencies,” or “attending a meeting.”

Once the opportunity is missed to provide LEEP “then and there,” multiple patient-centered barriers come into play. The various issues described by the VIA nurse quoted extensively below reflect the kinds of patient barriers cited by other stakeholders:

Sometimes it's just fear. You tell them, 'You've got a precancer lesion' and they think it's cancer don't come back. They just say, 'No me, I've got cervical cancer and it's better I just die like that.' The other factor is communication breakdown. People don't have phones and others opt not to answer when you call them to check.

Then again, we tell our women to abstain from sexual contact for at least six weeks to allow the cervix to heal. That brings tension in their homes. They have to obtain consent from their spouses. When they go home and tell the spouse they don't come back because he refuses. It's very crucial that they make their own choices. I don't know how the government can come in to help these women be treated without consent from their husbands.

*Then the other thing is distance and **lack of transport** where they stay. The most common problem is transport. (SP_002)*

All VIA nurses mentioned some combination of the factors described above, a few adding that the absence of symptoms delays treatment-seeking. Increasing access to same-day LEEP was a predominant theme to minimize LTFU, indicated in suggestions to “equip all districts,” “make LEEP close to VIA sites,” “link LEEP to every outreach,” “offer LEEP daily,” “remove theatre requirements for LEEP facilities,” strengthen

Text Box 2: MOH leader views increasing skilled staff for screen-and-treat

Like other stakeholders interviewed for this study, MOH leaders remarked on significant progress made scaling up screen-and-treat services, while also noting the gap of providing LEEP due to LTFU. Task shifting the LEEP to people who are there all the time—the nurses and clinical officers—was supported by all three leaders who stressed the importance of the quality of training and health worker skills:

When people are very, very well trained, not having a theatre becomes less of an issue. I can tell you from my own experience receiving women referred who were bleeding terribly. The women survive not because the referring facility has a theatre, but because the provider has the right skills. (MOH Leader_004)

At the same time, task shifting was not considered a panacea for the severe health worker shortage in Zambia:

Task shifting is working, but improving our human resources is a bigger challenge. We are still very far from where we need to be as we add services with expanding the infrastructure. (MOH Leader_003)

Text Box 3: MOH leader views opportunities and challenges in transitioning to HPV DNA Testing

All MOH leaders spoke of the potential value in shifting to mass screening using self-sampling approaches with HPV testing, while at the same time calling for strong evidence of its effectiveness and appreciating the programmatic challenge ahead:

Let's approach it this way, all of us combined, government and partners, we are reaching 20% of the women we need to screen. And the cost of VIA is not cheap. It requires trained health workers. If we were to test all the women who need screening, it will detect only the ones who need to be treated, so whereas with VIA I may need three nurses, with mass screening I may only need one. We need to ensure our data will inform us, but we should not compare [VIA with HPV testing] at this time. (MOH Leader_002)

We will need to create great awareness like we did for family planning. We can use these methods to target women's groups and churches to make sure women seek to know their results and understand the importance of treatment. [Given the high cost of HPV DNA testing] I don't think this will be done in the next 10 years. There's a reason more developed countries have not gone forward with HPV testing. We must ensure that we don't throw away our old screen-and-treat knowledge. (MOH Leader_004)

follow-up (e.g., “budget for nurse cell phone airtime”), and “transport support” for referred patients. Most importantly, however, stakeholders emphasized the critical shortage of LEEP providers. Training more providers, creating dedicated cervical cancer care positions, and task shifting LEEP to nurses were solutions offered in this regard.

Integrating HPV testing as a primary screening strategy

Following WHO's recommendation², Zambia is in the early stages of introducing HPV testing as an

alternative cervical cancer screening method. Ten of the 23 stakeholders interviewed worked in provinces where HPV testing had been introduced and were able to share their views about this transition. Six of these 10 individuals remarked on the superiority of HPV testing compared to VIA, specifically noting “more accuracy” and the potential to “cover as many women as possible for initial screening.” At the same time, several raised concerns about LTFU linked to batched processing of HPV tests:

The biggest threat I see with HPV testing [is] LTFU of clients. We get a specimen today, take it to the

lab, and then we wait at least a week or two weeks. Within these weeks, many clients will not be found again. If there was a point-of-care HPV test where a woman comes, we get the specimen, and test it before she leaves, [then] we [would] know whether or not to treat. (FPP_005)

In addition to LTFU while waiting on lab results, some stakeholders questioned the ability of clients to collect high-quality samples under self-collection models with HPV testing. Most also had concerns about sustainability of HPV testing, noting that its introduction was entirely donor-dependent and was more costly compared to VIA due to the expensive test reagents and equipment that “are not easily available in Zambia.”

Linkages to invasive cancer care

The most varied and pervasive challenges detailed by stakeholders pertained to “the last mile” of cervical cancer care—treatment of women diagnosed with invasive disease. Obstacles to care were described for each step of the care cascade, beginning with diagnosis. While acknowledging that care is improving as more labs are set up and pathologists placed in the provinces, long delays in processing histopathology results from the central lab was identified as a major stressor for women and nurses alike. Citing delays of six months to more than a year, nurses describe feeling “guilty” having to repeatedly tell women their results have still not come and, when they do arrive, the disease may have already progressed (“you even find the patient is already dead”). While development partners can expedite the lab process, continuing to increase and decentralize histopathology capacity in the country was a top priority expressed by all.

Once diagnosed, the lack of patient transport to CDH was a clear barrier to care, prompting one focal point to suggest:

These women should be considered ‘critical’ and provided with an ambulance. Now they are considered clients who can move on their own, with their own transport. That’s wrong. (FPP_002)

Whether on their own or with transport support, women who make it to the hospital often confront treatment delays, sometimes sent home and “asked to return after six months.” Without treatment at

CDH, some patients “seek traditional medicine and other things.” Weak communication between referral facilities and the CDH may worsen the problem, suggested by the CDH stakeholder we interviewed:

We don’t [always] know that the patient has been referred. When she turns up, we receive and support them, but there are so many things that need to be done before she should come to the CDH. It needs to start from the periphery. (CDH_001)

Efforts to improve linkages, for example, formation of a multidisciplinary team that meets weekly to review referred cases, “has not really taken off,” though informal methods (e.g., email exchanges) have proven somewhat effective for keeping track of test results and patient status.

Beyond travel, costs for women living outside of Lusaka is a major invasive cancer treatment barrier:

You’re asking them to move from their district to Lusaka. They need somewhere to stay. They need to feed themselves. They need transport to and from the hospital. That alone is a big hindrance. The question is, can the government offset this cost? Or provide a facility to accommodate and feed them? (FPP_005)

The need to bring invasive cancer treatment closer to where women live was emphasized by all. Recognizing the challenges of building the needed infrastructure and specialized workforce for this care, the notion of “going easy” in the decentralization approach was simultaneously stressed:

Instead of opening full-fledged cancer hospitals, we could identify the degrees and levels of certain conditions which can be treated in satellite facilities in the provinces. For example, if you have a stage 1 or stage 2 cancer, let that be treated in a satellite facility. (FPP_005)

Placing a small number of treatment centers to serve multiple provinces was also suggested. Whatever approach is adopted, stakeholders were clear that achieving “the last mile” will require more oncologists, pathologists, labs, and cancer care infrastructure in a health system that is already “quite over-stretched.”

Text Box 4: MOH leader views strengthening linkages to invasive cancer care

MOH leaders were aware of referral system challenges raised by the nurses and focal points interviewed. As one leader put it:

If you look at our national data, we have nearly 3,000 cervical cancer patients diagnosed every year. At CDH we are only seeing around 900 patients in a year. So where are the 70% going? These are patients with histological results, and they are still sitting out there somewhere. We need to make these patients recognize the urgency of staging and consider where it should be done. (MOH Leader_002)

Understanding the realities of patients' lack of resource and apprehensions about going to a big city, especially with little financial resources, MOH leaders emphasized ongoing efforts to bring cancer care closer to where women live. While working to place at least one gynecologist with surgical skills per province over the coming 5 to 7 years, the leaders described an immediate-term solution using a multi-disciplinary team (MDT) made up of focal points, histopathologists, oncologists, and social workers to review cases and guide decisions to provide patients with care as close to home as possible:

We are discussing strategies with the UTH and focal points so we don't have to give every woman a letter [referral to CDH]. The MDT discusses each case and CDH people advice district providers on what can be done for the patient before she has to move to the CDH. We haven't fully implemented this yet but by getting everyone on board we can do a better job.

Discussion

In sharing their experiences providing screening and treatment for precancerous lesions, the stakeholders interviewed for this study confirm notable progress scaling up recommended strategies^{5-7,15} in Zambia⁸. Establishment of nurse-led screen-and-treat services in nearly every district was regarded as a major accomplishment and model for other LMICs⁷. Furthermore, despite Zambia's reliance on foreign aid to scale-up of the program, leveraging partner contributions and existing healthcare infrastructure^{9,10} was broadly recognized as effective¹⁶.

More valuable to inform program strengthening and expansion are stakeholder descriptions of challenges encountered. As relates to VIA with same-day treatment using cryotherapy or thermal ablation, shortages of basic supplies suggest inadequate integration of screen-and-treat into MOH financing and supply chain systems. Screen-and-treat staff shortages underscore the need to reconsider nurse-level staffing configurations (e.g., assigning dedicated VIA nurses vs training more multi-task nurses). Health worker gaps are most acutely felt in cases requiring LEEP. Efforts described by MOH leaders to increase the number of nurses and clinical officers trained to provide LEEP are timely and may help reduce missed opportunities linked to LTFU. Expanding use of

HPV testing for screening could increase early detection of precancerous lesions. However, mixed understanding of the rationale for the strategy indicates a need to clarify the value of HPV testing to reduce program cost and burden on the health system while improving outcomes¹⁷. For HPV self-collection strategies to succeed, meticulous planning will be required to sensitize women in sample collection and to establish test kit outreach, drop-off, and follow-up systems.

As relates to invasive cancer care, the manifold challenges described by stakeholders spotlight infrastructural, human resources, and other health system gaps to make this level of care available to a largely rural public. Commitment to strengthening the multi-disciplinary team initiative to provide services closer to where women live is needed and ultimately could provide a valuable roadmap for other countries working to improve their cervical cancer programs.

Finally, whether for screen-and-treat, histopathology, or invasive cancer care, the most pervasive challenge cited by the stakeholders was a shortage of skilled health workers. Describing such shortages as "the major bottleneck to poor people worldwide with regard to benefiting from the fruits of modern medicine," Binagwaho and colleagues¹⁸ call for a "paradigm shift in global health partnership" allowing LMICs to better address their human resource needs with foreign assistance

dollars. The Zambian government and its development partners have made phenomenal progress delivering cervical cancer screening services to women throughout the country. Improving and expanding on these efforts in a way that is sustainable, however, may require updating the partnership that put the program in place. Identifying health worker gaps as the urgent matter that it is, and negotiating development assistance to support long-range country plans to fill these needs¹⁸, may be the most viable strategy for improving cervical cancer care coverage in Zambia while advancing self-sufficiency.

This study's in-depth examination of the status of Zambia's cervical cancer program with key stakeholders directly involved in the program's implementation produced important insights to inform planning and programmatic action. Despite the small sample, the stakeholders interviewed represented a wide geographical range and diversity of expertise and roles in the program. At the same time, the small, purposive sample limits the conclusions that can be drawn from the study. More systematic implementation research is needed to produce a more complete picture of needs and opportunities to advance cervical cancer care in Zambia.

Acknowledgements

We wish to thank the German Federal Ministry of Education and Research for financial support of this research under AWD-439283 (Ref-No. 2020 62 156). We also sincerely thank the study participants for their time and research assistants from the National Health Research Authority. Finally, we extend our thanks to PATH colleagues who provided helpful feedback on early versions of the manuscript.

References

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA and Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2018 Nov;68(6):394-424.
2. WHO. Global strategy to accelerate the elimination of cervical cancer as a public health problem. 2020.
3. Bruni L AG, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX and de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Zambia. Fact Sheet. 22 October 2021. 2021 [cited 2023 January 3]; Available from: <https://hpvcentre.net/statistics/reports/XWX.pdf>.
4. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A and Bray F. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin*. 2021 May;71(3):209-49.
5. Mwanahamuntu MH, Sahasrabudde VV, Pfaendler KS, Mudenda V, Hicks ML, Vermund SH, Stringer JS and Parham GP. Implementation of 'see-and-treat' cervical cancer prevention services linked to HIV care in Zambia. *Aids*. 2009 Mar 27;23(6):N1-5.
6. Pfaendler KS, Mwanahamuntu MH, Sahasrabudde VV, Mudenda V, Stringer JS and Parham GP. Management of cryotherapy-ineligible women in a "screen-and-treat" cervical cancer prevention program targeting HIV-infected women in Zambia: lessons from the field. *Gynecol Oncol*. 2008 Sep;110(3):402-7.
7. Parham GP, Mwanahamuntu MH, Pfaendler KS, Sahasrabudde VV, Myung D, Mkumba G, Kapambwe S, Mwanza B, Chibwasha C, Hicks ML and Stringer JSA. eC3--a modern telecommunications matrix for cervical cancer prevention in Zambia. *J Low Genit Tract Dis*. 2010 Jul;14(3):167-73.
8. Parham GP, Mwanahamuntu MH, Kapambwe S, Muwonge R, Bateman AC, Blevins M, Chibwasha CJ, Pfaendler KS, Mudenda V, Shibemba AL, Chisele S, Mkumba G, Vwalika B, Hicks ML, Vermund SH, Chi BH, Stringer JS, Sankaranarayanan R and Sahasrabudde VV. 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(4):e0122169.
9. Mwanahamuntu MH, Sahasrabudde VV, Kapambwe S, Pfaendler KS, Chibwasha C, Mkumba G, Mudenda V, Hicks ML, Vermund SH, Stringer JS and Parham GP. Advancing cervical cancer prevention initiatives in resource-constrained settings: insights from the Cervical Cancer Prevention Program in Zambia. *PLoS Med*. 2011 May;8(5):e1001032.
10. Mwanahamuntu MH, Sahasrabudde VV, Blevins M, Kapambwe S, Shepherd BE, Chibwasha C, Pfaendler KS, Mkumba G, Vwalika B, Hicks ML, Vermund SH, Stringer JS and Parham GP. 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(9):e74607.
11. Zambia Ministry of Health. National Cancer Control Strategic Plan: 2016-2021. 2016.
12. Nyambe A and Lubeya MK. Cervical cancer and HIV in Zambian women. *Lancet Glob Health*. 2021 Jun;9(6):e734-e5.
13. QSR International Pty Ltd. NVivo (released in March 2020), <https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home>. 2020.
14. Gale NK, Heath G, Cameron E, Rashid S and Redwood S. Using the framework method for the analysis of qualitative data in multi-disciplinary health research.

- BMC Medical Research Methodology. 2013 2013/09/18;13(1):117.
15. Parham GP, Mwanahamuntu MH, Sahasrabudde VV, Westfall AO, King KE, Chibwesa C, Pfaendler KS, Mkumba G, Mudenda V, Kapambwe S, Vermund SH, Hicks ML, Stringer JS and Chi BH. Implementation of cervical cancer prevention services for HIV-infected women in Zambia: measuring program effectiveness. *HIV Ther.* 2010;4(6):703-22.
 16. Holme F, Kapambwe S, Nessa A, Basu P, Murillo R and Jeronimo J. Scaling up proven innovative cervical cancer screening strategies: Challenges and opportunities in implementation at the population level in low- and lower-middle-income countries. *International Journal of Gynecology & Obstetrics.* 2017;138(S1):63-8.
 17. Randall TC and Ghebre R. Challenges in Prevention and Care Delivery for Women with Cervical Cancer in Sub-Saharan Africa. *Frontiers in Oncology.* 2016 2016-June-28;6.
 18. Binagwaho A, Kyamanywa P, Farmer PE, Nuthulaganti T, Umubyeyi B, Nyemazi JP, Mugeni SD, Asimwe A, Ndagijimana U, Lamphere McPherson H, Ngirabega Jde D, Sliney A, Uwayezu A, Rusanganwa V, Wagner CM, Nutt CT, Eldon-Edington M, Cancedda C, Magaziner IC and Goosby E. The Human Resources for Health Program in Rwanda — A New Partnership. *New England Journal of Medicine.* 2013;369(21):2054-9.