Community-Based Intervention to Improve Cervical Screening Services in Resource-Constrained Settings: Insights from the K4C Cervical Cancer Prevention Model in Uganda

Introduction

Uganda is ranked seventh amongst the countries having the highest cervical cancer incidences and is also reported to have the highest cervical cancer related mortality rates at 15.6 % as compared to 13.8 % for East Africa and 8.2 % globally (WHO, ICO 2010). With a population of 10.22 million women within the ages of 15 years or over at a risk of developing cervical cancer in Uganda, current statistics report that 6413 women are diagnosed with cervical cancer and 4301 die from the condition yearly (ICO/IARC Information Centre on HPV and Cancer - Uganda, 2018). Women with HIV have 6 to 8 times increased risk of cervical cancer (Clifford et al., 2016; Mbulawa et al., 2010; Pantanowitz & Michelow, 2011). In Africa, Uganda is only second to South Africa where 2,363 individuals get infected with HIV every week. In 2013, Uganda combined with Nigeria and South Africa accounted for close to 48% of all the new HIV positive cases in sub-Saharan Africa (Kharsany et al., 2016; UNAIDS, 2017).

Nonetheless, cervical cancer is preventable by public health programs such as Human Papilloma Virus (HPV) vaccination, regular screening, treatment of pre-cancerous lesions and follow-up care at early stages of the disease. (Jacqueline et al, 2000; Pfaff et al., 2018).

In 2010, the government of Uganda launched its strategic plan for cervical cancer prevention and control under the ministry of Health strategic plan for cervical cancer prevention and control 2010–2014. This strategic plan, aimed at reducing barriers of country wide cervical cancer control, with priority areas consisting of public education and advocacy, vaccination, screening and treatment of cervical precancerous lesions. Four of the seven goals were that by 2015;

- 90 percent of Ugandans would have been reached with IEC (information, education and communication) materials about cervical cancer.
- 80 percent of eligible girls aged 10–14 years would have been vaccinated against HPV in the implementing districts.
- 80 percent of eligible women aged 25–49 years would have been screened and treated for cervical precancerous lesions.
- 80 percent of eligible women with cervical precancerous lesions would have been provided with diagnostic services.

However only 5% of eligible women in Uganda have since been screened (Twinomujuni et al.,2015). Policy implementation has been challenging particularly with the absence of trained personnel, limited funding, lack of vaccines in rural and slum areas (Kirabira & Nagaddya, 2012; Mwaka et al., 2015; Ndejjo et al., 2016). These structural constraints are worsened by the fact that most Ugandan women are not only knowledgeable on the risk factors for cervical cancer but also the significance of timely screening, early diagnosis and timely management of cervical cancer (Lyimo & Beran, 2012). Worse still, majority of Ugandans do not regard themselves to be at risk of getting the cancer and have a great fear of being diagnosed with it (Abdullahi et al., 2009; Lyimo & Beran, 2012; Twinomujuni et al., 2015). Collectively, these factors thus probably expound in part the low levels of screening in Uganda and other African countries (Cervical Cancer Action 2007-2014 and Kahesa et al., 2012).

In this report, we present our experiences of implementing a community-based intervention to improve cervical screening services in resource-constrained settings.

Methods

Setting and Context

In 2015, nursing students from Liverpool on placement with Knowledge for Change (K4C) undertook outreach work with a local NGO: The Youth and Women's Empowerment Project (YAWE) involving cervical screening. The women they met while on outreach raised their concerns about access to cervical screening and the lack of treatment options if they received a positive screening result, and this initial consultation with potential service users initiated the design of the K4C cervical cancer prevention project in Kagote Health center III (Low level community facility). Additionally, learnings from an initial pilot intervention in Kampala, which highlighted concerns around any costs for the service being passed on to

women, further helped to develop the project. As such, 2017 saw the setting up of one of the first Cervical Cancer See-and-Treat services in the Ugandan public sector, providing free of charge screening and on-the-spot same day treatment for all women between 25 and 60 years. The service also collaborates with the Regional Referral Hospital for the most serious cases requiring biopsy to be referred to their facility also free of charge. The model combines the use of visual inspection under acetic acid (VIA) and the state-of-the-art technology in cervical screening (the mobile phone based Enhanced Visual Assessment 'EVA' system) with sustainable cold coagulation treatment in a task-shifting environment (focusing on midwifery and nursing staff). Services are delivered according to the Ugandan national and WHO cervical screening guidelines. The screening is conducted in a room adjacent to the laboratory and very close all the other facility clinics. The screening clinic operates every Thursday and Friday; and is offered to the women in the waiting area of the different clinics during the morning health talks.

Despite these, the screening coverage remained poor, with only 148 women attending the service in the first 16 months of the project (June 2017- September 2018).

As a response to these challenges; encouraging women to come into facilities and achieving high levels of follow-up in Kabarole, the project received funding from the Department for International Development (DfID) Small Charities Fund (SCCF) in October 2018.

K4C thus embarked on a multimethod approach to implement a sustainable and effective community-based intervention to improve the quality and utilization of the cervical screening services in Kabarole. This was supported by the administration of the health facility, the District Health Officer and Health Commissioner (MOH). Additionally, ethical approval was obtained from the research ethics committee of the University of Salford, UK.

The project aimed to develop and roll out this service with Kagote health center at the hub and extending into the community including providing a service underpinned by principles of respectful care to the local prison, to high risk women (including prostitutes) and the local university. Through this expansion, K4C planned to attract hard-to-reach women and achieve a high rate of successful follow-ups. As such, this project offered significant opportunities for scale-up to extend coverage of cervical cancer screening, encourage women to trust their local health facilities and reduce mortality from cervical cancer.

Objectives

1. To collect baseline data on community awareness and current use of screening services in Fort Portal
2. To assess the impact of the K4C cervical screening model.
3. To establish a sustainable intervention to promote implementation of an integrated cervical screening approach in the HIV clinic.

Results

Overview

The funded project commenced with a 2-week training of health workers in cervical screening, treatment of precancerous lesions, health education and awareness-raising. This included a 1-day pilot screening 'camp' at both Katojo and Bukuuku Health centres. Thereafter, the screening service continued at Kagote health center III every Thursday and Friday, and later expanded to Bukuuku health centre IV on the 6th March 2019, with regular screening activities every Wednesday. Additionally, the project conducted a community awareness survey and clinical outreaches (about 17) to different health facilities within the region e.g. Mucwa and Katojo health centres. As such, all project activities from October 2018 to April 2020 were evaluated in this report.

Activity 1: Community Awareness Survey

The existence of a fully functional screen and treat program at the facility (Kagote), as seen earlier on, had drawbacks related to low turn up for cervical screening amongst women in rural Fort Portal. As such, a door to door community awareness program commenced from 1st April to 24th September 2019 to raise awareness about cervical cancer prevention and map the distribution of eligible population and screening coverage. It was carried out in the rural area of Fort Portal municipality covering 8 selected villages i.e. Kagote, Rwengoma, Kibimba, Boma, Njara, Mukubo, Nyabukara, Kyamukerege. It is important to note that these villages selected for the survey did not represent the actual catchment area of Kagote Health Centre since there is no specific boundaries for the catchment area and everyone has a right to access health services at any Health facility of their choice. As such, the survey might have included people that fall outside the selected catchment area.

Nonetheless, the survey involved household visits by two trained midwives and two community health workers (VHTs) interviewing sexually active women (18-65 years)

recording and storing the information digitally using a mobile device with GPS feature that remotely senses and records the location of each household visited in form of coordinates. After the interview with the woman, the midwife together with a VHT health educated the woman about cervical cancer prevention, encouraging them to attend cancer screening and answering any other health related questions. Thereafter, using spatial analysis software (ArcGIS), georeferenced data of women/household location was processed and analyzed systematically producing a visual map highlighting the distribution pattern of women eligible for cervical cancer screening in all households visited during the survey. Microsoft excel was also used to analyze data generating statistical results from the awareness survey such as population density and demographic characteristics.

2014 eligible women/households were reached with a cumulative total of 2969 females aged between 18 years and 65 years living in all households visited. Of the 2014 women interviewed during the survey, 1612 women had never attended cervical screening services. There was however an increasing trend in the attendance of screening among women in the last three years from 2017 but those that attended screening more than three years ago had never gone back for rescreening as recommended. Additionally, about 98% (1981) of the total women interviewed were aware about the cancer as compared to only 2% (33) were never informed about the disease.

Nonetheless, all women interviewed during the survey were able to get a better understanding of cervical cancer from a trained health worker.

Map 1 below shows the distribution pattern of eligible women as well as the coverage of cervical cancer awareness in the community basing on the GPS points collected during data collection. Areas highlighted on the map with dense population of women reached during the awareness survey was associated with distance to main town/market, cheap residential accommodation availability and easy access to social services such as health facilities and schools. Areas highlighted on the map with women sparsely distributed especially in Boma and Kabundaire was related to unavailability of cheap residential building and most buildings are being used for commercial purposes and offices.

Map 1.

Cervical cancer awareness coverage and distribution pattern of eligible women in the community
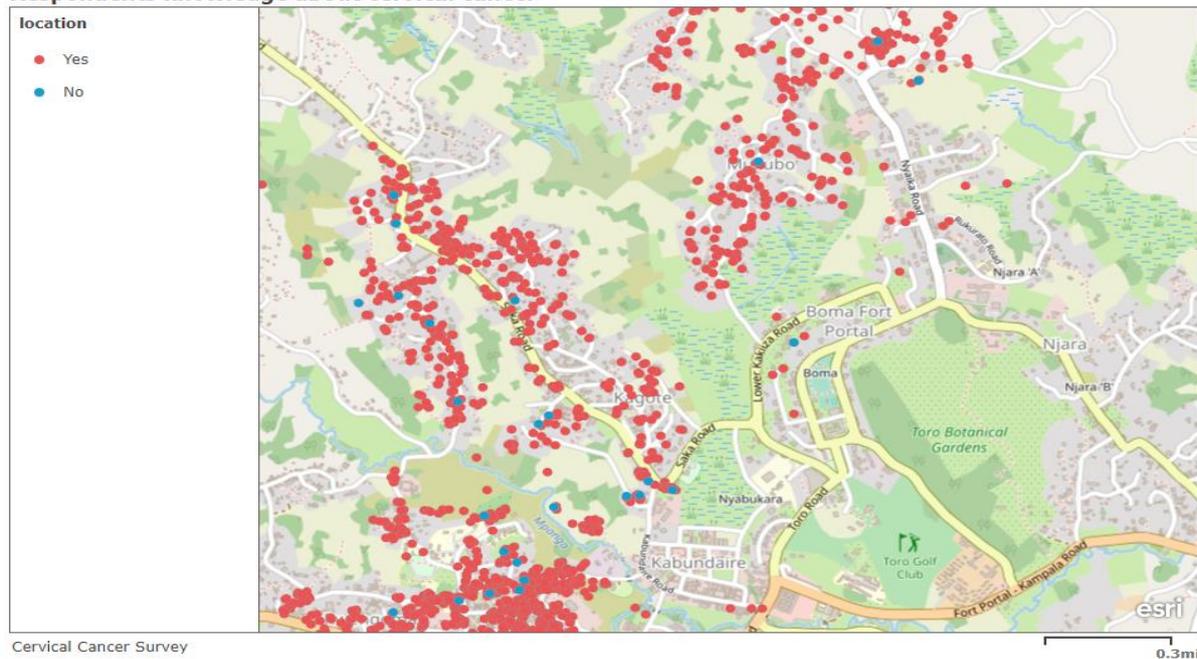

Survey
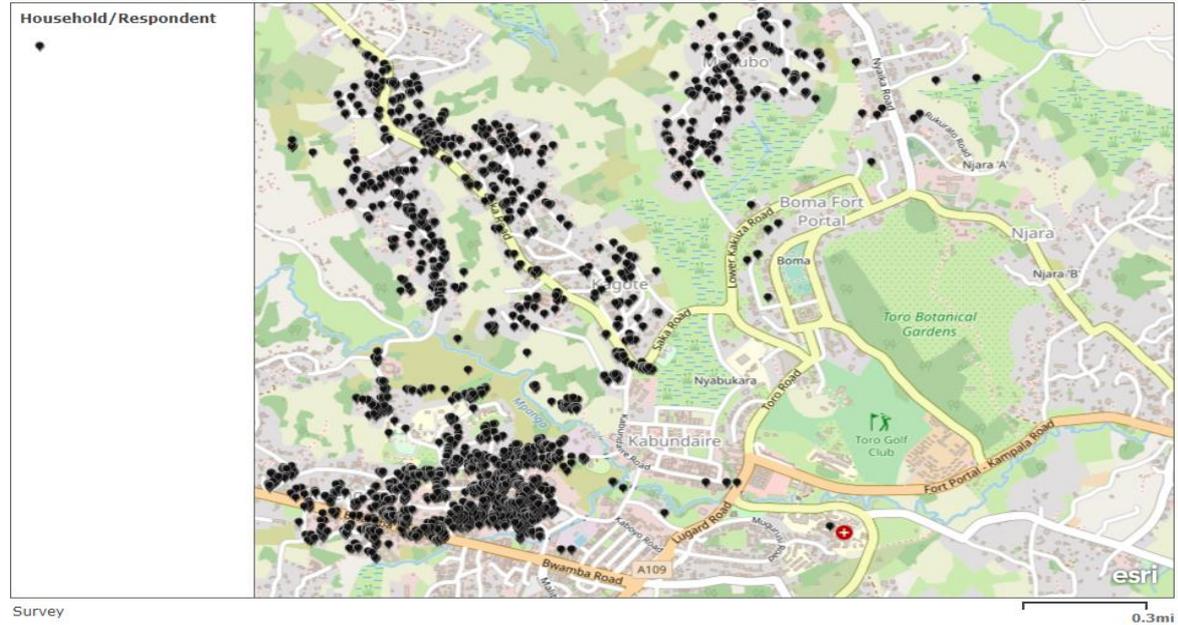
Map 2. Below is showing the spatial distribution pattern of women who were informed and not informed about cervical cancer disease and its related services in the community. According to the map, women who were aware of the disease were uniformly distributed in the area as compared to those who were not aware of the diseases who were scattered all over the area.
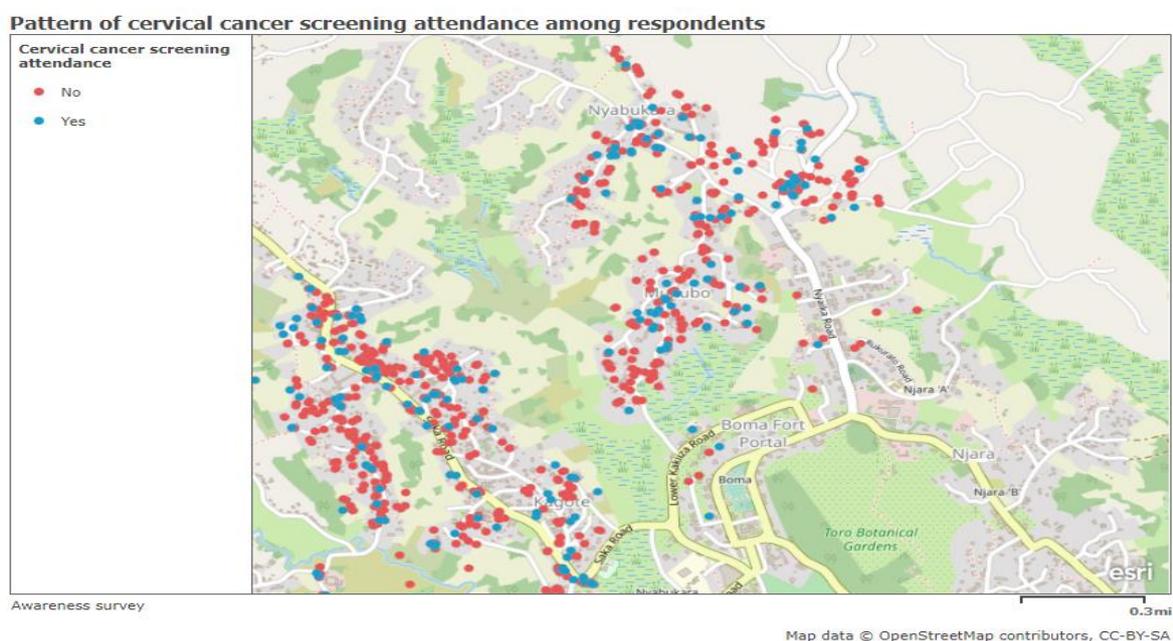
Map 2.

Respondents knowledge about cervical cancer

Cervical Cancer Survey

Map data © OpenStreetMap contributors, CC-BY-SA

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Map 3 **Spatial pattern of cervical cancer screening among respondents**

In conclusion, community awareness surveys present a great potential for transferring cervical cancer information directly to the risky population, assessing barriers for low uptake for cervical cancer screening and understanding the community perspective on cervical cancer disease. In addition, collecting georeferenced data from the community that provides realistic results visualized on the maps which can be adjusted to any spatial scale and can allow comprehensive data analysis and display of several parameters.

This model could thus lead to improved rationales and approaches for public health interventions and strengthening policies basing on evidence relevant in determining specific strategies for improving the quality of health care in the community.

However, one of the challenges faced during the survey included getting representative data due to inaccessible households attributed to security, closed perimeter walls, unavailable people to complete questions as they leave too early and return late from work. In addition, this made it impossible to collect geographic coordinates of all residents in community.

Activity 2: Integrating Cervical Screening into the HIV clinic

From June 2017 to end of August 2019, despite the screening occurring on the same days with HIV care services in Kagote health center, only 19% (161/515) of the eligible women registered in the HIV clinic had been screened. Additionally, about 8% (30/161) of the screened women returned for their annual subsequent screening appointments, but after an

average delay of 7-9 months from their scheduled appointment dates. It's important to note that about 57% (17/30) of the women who attended their subsequent screening visits, it was challenging to determine if the subsequent visits were on the exact scheduled appointment dates given from the other facilities (where initial screening was conducted) as no evidence was given. As such, the missed opportunities and a less aggressive screening schedule exposes these women to a higher risk of late presentation with the advanced cervical malignancy and a poor outcome. Therefore, there was need to develop a sustainable intervention that would promote implementation of cervical screening into the HIV clinic. This was supported by the Royal Society of Tropical Medicine and Hygiene (RSTMH) small grant 2019. Another research project was then embarked, exploring the perceptions of the health workers towards integration of cervical screening into the HIV care services. Using an inductive qualitative methodological approach, data was obtained from ten health care providers working in the HIV and/or the cervical screening clinics. The study findings revealed that health care providers are optimistic about integrating cervical screening into HIV care services. Additionally, practical and sustainable methods were identified to effectively integrate the two clinics. These were categorized under 5 main themes emerging from the interviews, i.e. follow up mechanisms, human resource management, awareness-raising, professional development and public private partnerships (the themes are expounded elsewhere.[1]). A series of interventions (based on the findings) were then developed to improve the integrated service delivery.

The interventions consisted of developing a system of call and recall with the help of appointments books, newly designed cervical screening cards (see figure 1 below) in each of the women's files. The village health technicians (VHTs) and other health professionals in the HIV clinic were mentored to sensitize and refer eligible HIV positive women for screening. As such, the number of enrolled HIV positive women screened has successfully increased to about 298 women in 7 months and 59 more women have had had their routine follow up.

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[1] Integrating Cervical Screening into HIV Care: Health Workers' Perspectives on Effective Implementation of the integrated clinics in a Ugandan Community Health Facility.

Figure 1: **A template of the cervical screening follow-up card being used in the HIV clinic**

INTEGRATED CERVICAL CANCER PREVENTION FOLLOW UP CARD IN THE HIV CARE/ART CLINIC

Name: ………………………………………………… ART No. ………… Current Address: ………………………………………

| *Date* Tick small box if scheduled	AGE IN YEARS	Next Appointment *Date*	Duration in months since last screen	Results of the cervical Screening
☐				
☐				
☐				
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Table 1: **Table showing the different purposes of visits to the cervical screening unit by the HIV+ women enrolled in the Kagote HIV/ART clinic over the years**

Purpose of visit	2017	2018	2019	2020 (Jan-Apr)
Initial screens	20	41	122	37
Subsequent visits	0	16	39	34
Treatment	0	1	1	1
Post Treatment (coagulation) follow up	2	0	0	1
Others	0	0	1	0
Total	22	58	162	72

Table 2: **Table showing the average time interval before subsequent screening visits to the cervical screening unit by the HIV+ women enrolled in the Kagote HIV/ART clinic.**

Average Time Interval before subsequent screen	Frequency
Unknown number of months before subsequent screen	46
After an average of 4 months (3-6 months)	5
After an average of 9 months (7-10 months)	3
After an average of 12 months (11-13months)	16
After an average of 16 months (14-18 months)	13
After an average of 22months (20-24 months)	6
Total	89

Chart 1: **Bar graph showing the different age groups of the HIV+ women enrolled in the Kagote HIV/ART clinic who were screened.**

Age Groups of the HIV+ women at Kagote who were screened
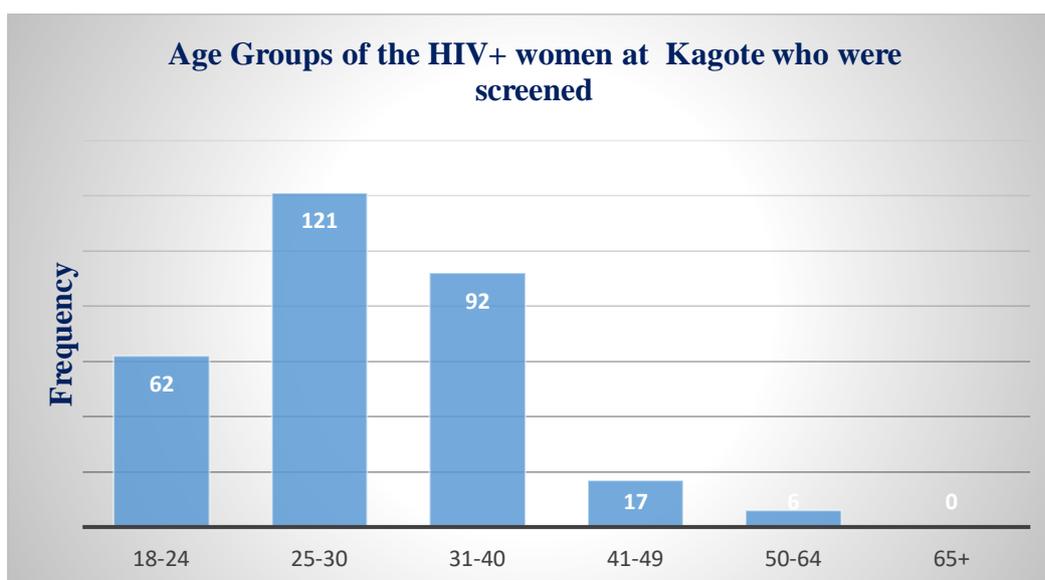
# Activity 3: Cervical screening (Clinical program coverage)

A total of 993 women, of whom 527 (53 %) were HIV+, attended the cervical screening services. 56.5% (298/527) of the HIV+ women received their HIV care from Kagote health centre.

Generally, 904 women were screened, with about 80% (717/904) undergoing first ever screening. The 89 women who were not screened [mainly due to underage, pregnancy or being in one's menses] received other reproductive health services like counselling, contraception and testing for HIV and other STIs.

Chart 2: **Total screening attendance over the months (October 2018 to April 2020)**
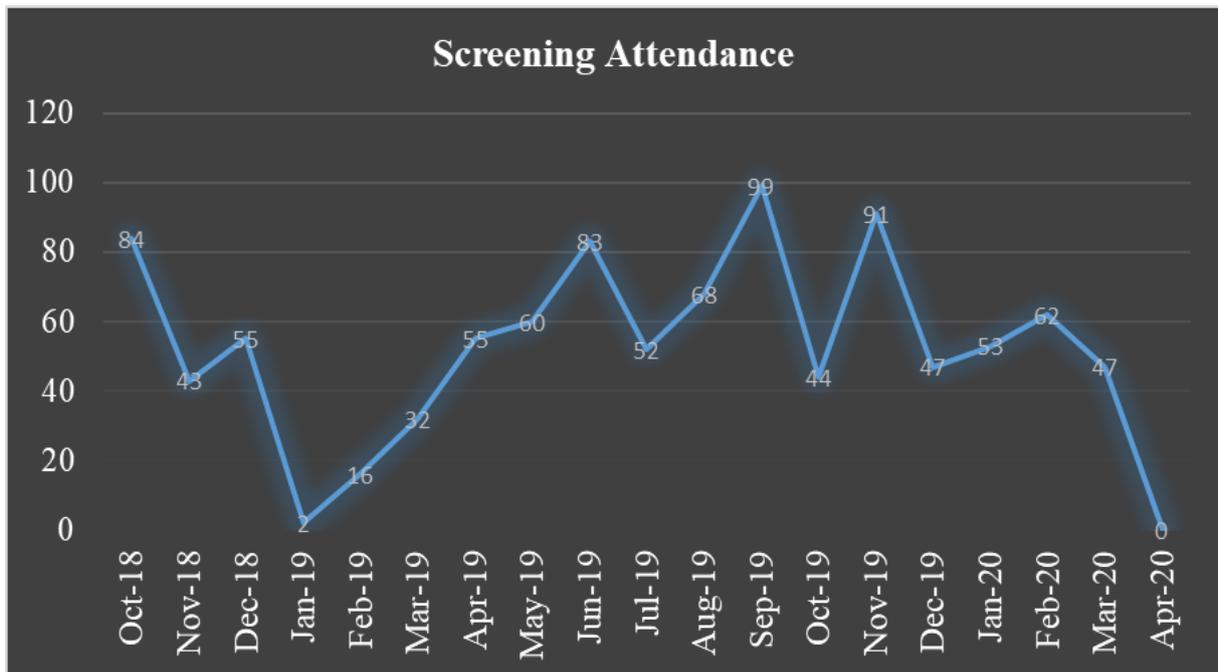
Charts 3 and 4: **Screening attendance over the months in 2 health centers (Kagote and Bukuuku respectively)**
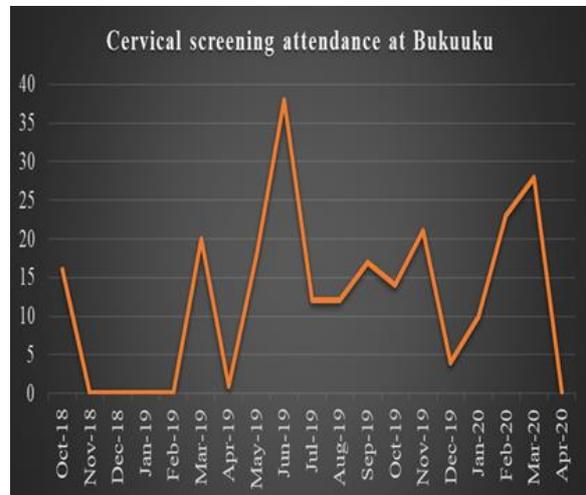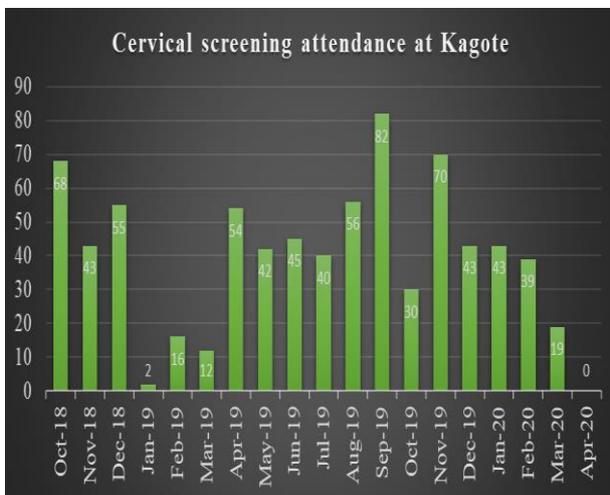
HIV negative women between the ages of 25-60 and HIV positive women (18 years and above) who were sexually active were targeted for cervical screening, with a routine follow up VIA screening interval of 3 years for HIV-negative women and yearly for HIV-positive women.

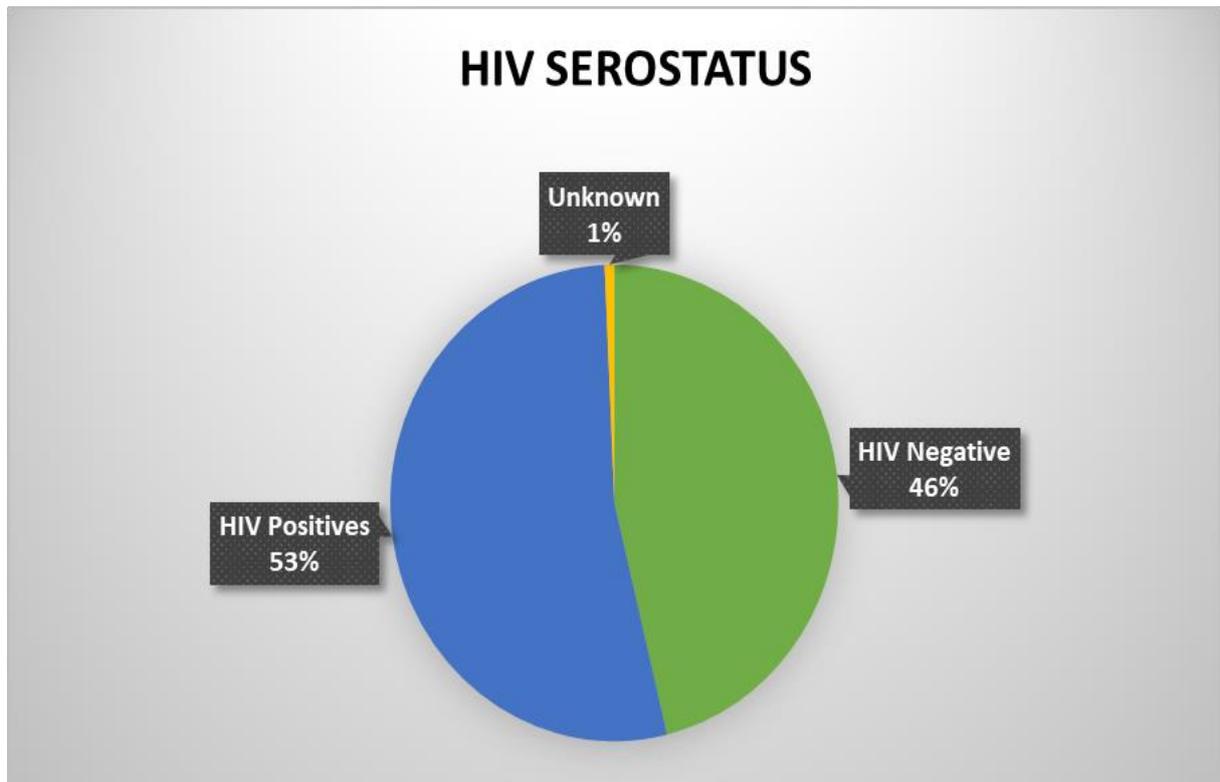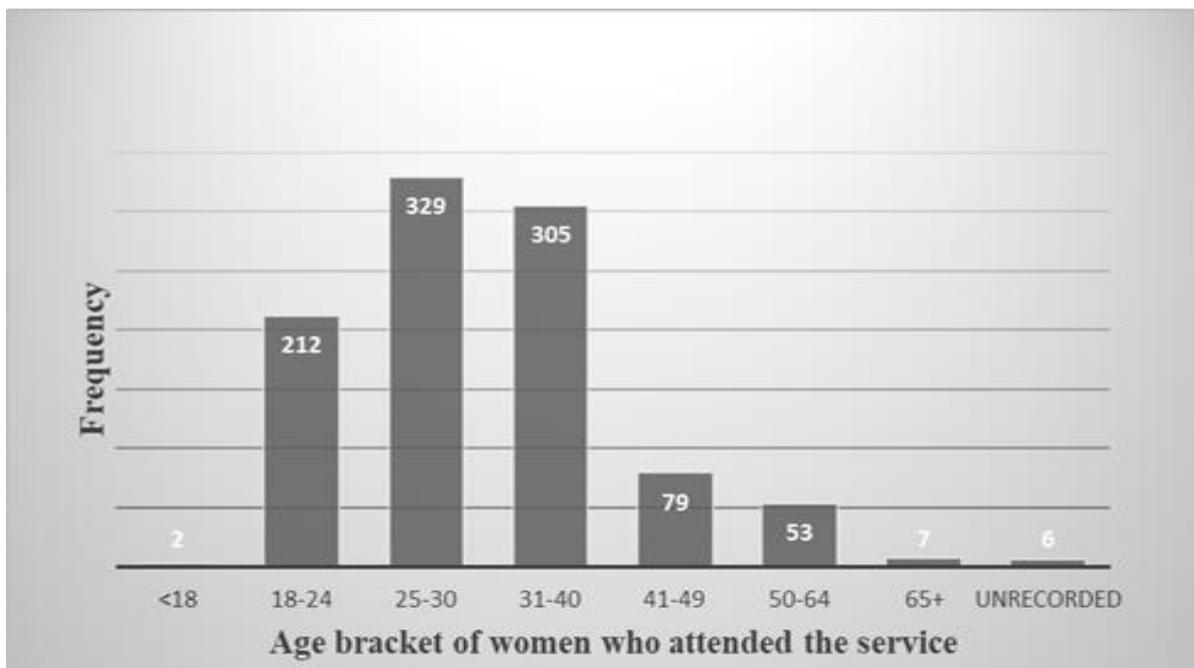Chart 5: **HIV serostatus of the women who attended the screening services**

Chart 6: **Age ranges of the women who attended the screening services**

Screening Results

Of the 904 clients who were screened, 832 (92%) were VIA negative, 53 (5.86%) VIA Positive, 5 (0.55%) had Invasive cervical cancer, 8 (0.88%) had no definite results due to unsatisfactory colposcopy, and results of 6 (0.66%) were not recorded – so unknown.

Chart 7: **Results from the cervical screening procedure**
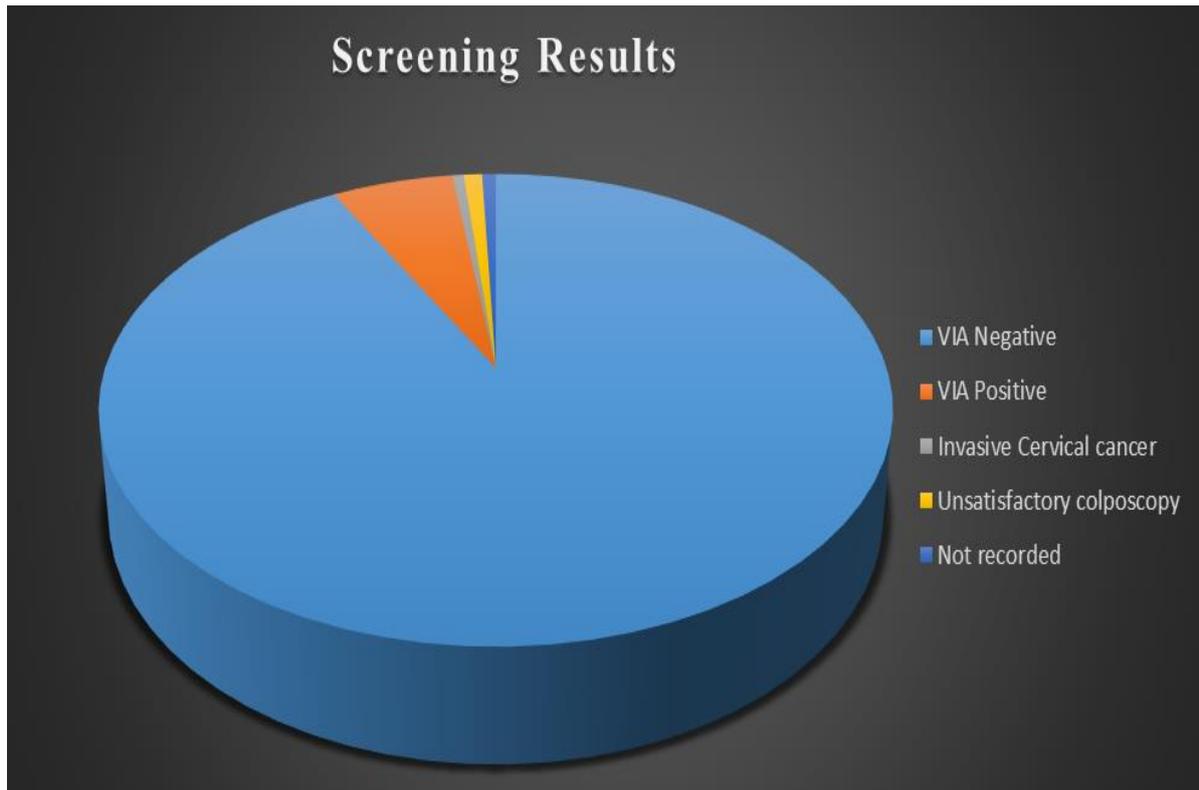
Clients with VIA positive results

A total of 53 clients were screened VIA positive during this time period, with only 14 being treated for precancerous lesions, 12 referred for biopsy, and 6 kept under surveillance of 3-6 months. 4 of the clients who had previously been screened VIA positive, were found to be VIA negative on rescreening (before treatment) hence not treated but health educated and counselled. 6 of the clients with VIA positive results have been lost to follow up as they left no contacts and 11 are awaiting their appointments for treatment.

NB: only 11% (6/53) clients received same-day treatment, all during the training sessions.
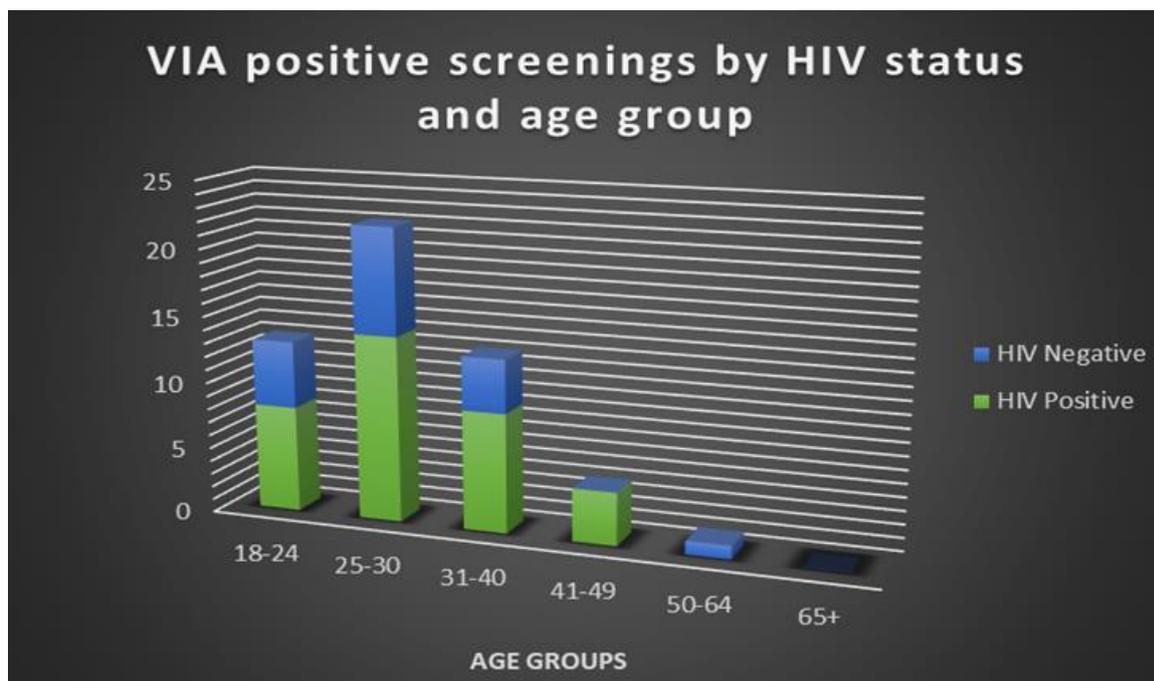
Clients with screening results suspicious of cervical cancer

4 of the clients screened had cervical lesions suspicious of invasive cancer and 1 client was already a known patient with stage 4 cervical cancer, who attended the program for possible palliative management. 2/4 of the clients who were referred for biopsy at the regional referral were able to get their biopsies taken and received further management at the referral facility.

Table 3: Classification of the cases diagnosed with cervical cancer by HIV status and age

Age (years)	HIV positive	HIV Negative
24	1	0
26	0	1
38	1	0
59	0	1
60	0	1

Activity 4: Professional Development

A total of 37 providers (32 clinical staff and 5 VHTs) were trained in cervical screening, treatment of precancerous lesions, health education and awareness-raising.

Virtual learning/mentorship aided by frequent telemedicine consultations with the UK team of specialists is still ongoing. Nonetheless, decisions about offering coagulation treatment or referral for biopsy are made independently by the local providers but mostly after the consultations.

Currently, 5 nurses and midwives are undergoing further training in the UK for 3 months under the commonwealth fellowship scheme.

Other forms of professional development/learning include Team collaboration on development of local care pathways and 2-weekly screening reports that comprise of individual case-based discussions, problem solving, treatment advice and knowledge sharing.

Other results from the project

- 5.64% (51) of the women screened were sex workers.
- About 3.9% (35) of the women were managed for other infections like Trichomonas vaginalis, candidiasis, UTIs, genital warts and other STIs.
- The common benign cervical conditions seen during the screening include nabothian cysts, polyps and metaplastic lesions.
- Apart from referrals for biopsy, other referrals were not clearly documented in the registers but were mainly gynaecological (non-cervical) cases such as recto-vaginal fistula, genital warts, abnormal vulval growth and infertility.

Discussion

In the K4C project, 904 new VIA screenings were performed in 18 months, a 6-fold increase from previous screening rates with about 80% of the clients being screened for the first time. Most screenings and treatment were performed by midwives and nurses, which is consistent with global evidence that high-quality services can still be maintained with task-shifting (Martin et al., 2014; WHO 2013). Most of the women who attended the services came from the community or from the facility HIV clinic, and some were referred from other health facilities, mostly from their HIV clinics.

The screening visits had a fluctuating trend over time, with peaks tending to correlate with outreaches, trainings, booking appointments within the HIV clinic and periodic mass

screening campaigns. The lowest points correlated with poor weather conditions (heavy rain), public holidays and the movement restrictions during the pandemic (Feb - April 2020).

The project analysis is consistent with studies indicating that HIV-positive women have higher cervical dysplasia rates compared to HIV-uninfected women (Bansil et al., 2015; Pantanowitz & Michelow, 2011). However, this was not the case with the cervical cancer rates (we had more HIV negative clients with cervical lesions suspicious for the invasive cancer). Nonetheless, we cannot reliably comment on our findings as we only had very few cases for a statistical sample and histological results were not available. The VIA positive screening rate was also much lower than expected in this project.

The single-visit approach rate, defined as the proportion of eligible VIA positive women undergoing immediate cold coagulation therapy, was very poor, with only 7 people having same day treatment. This could be explained by over dependence on consultation, possibly indicative of a lack of confidence by the screeners to treat without confirmation. As such, many women have been lost to follow up (about 17 are still awaiting treatment – inclusive of women who also chose not to have same-day treatment). As such, in addition to same-day treatment being improved with reliable cold coagulation equipment and good counselling (as seen in a study by Pfaff et al., 2018 at Zomba central hospital, Malawi), cervical cancer prevention programs should also look at same-time consultation to improve on cases lost to follow up due to waiting for feedback from specialists. Furthermore, for VIA programs to be effective, it is essential that safe treatment be available for pre-cancerous lesions. Our findings with the use of cold coagulation suggest treatment is highly acceptable and safe when performed by trained nurses or midwives. This is consistent with studies on cryotherapy safety (Blumenthal et al., 2005; Sankaranarayanan et al., 2007; WHO 2013). Additionally, LEEP is an important treatment and diagnostic modality for incorporation into a cervical cancer prevention program (Martin et al., 2014). In our project for instance, several women who tested VIA positive were referred for biopsy due to lesion size or extension into the endocervix. This was very challenging as most facilities within the region do not offer such services. The women who did go to the regional referral for biopsy were required to meet the costs of histology (~100,000 Ugandan shillings) to get the histology done faster at a private laboratory. Due to being in a resource-constrained setting, many of the women are not able to afford and thus deferred the biopsy procedure. It would therefore be important to

consider LEEP services during implementation of cervical screening in resource constrained settings.

In addition to all the above, the project acknowledges the importance of concurrently addressing other essential systematic challenges. In our case, these included: overworked providers with competing priorities, malfunctioning sterilisation equipment, inefficient and ineffective referral pathways, and data-driven decision-making. These are consistent with some of the challenges faced by Martin et al., 2014 in a study evaluating single-visit approach to cervical screening and treatment in Guyana. Therefore, drawing insights from our project and that by Martin et al., 2014 above, for promotion of a sustainable high-quality screening service with recommended population coverage, the following factors are essential.

    I.   Competency-based training (plus regular refresher training) and supportive supervision.
   II.   Task-shifting service to better distribute workload
  III.   A strong monitoring and evaluation system for prompt identification and addressing of any programmatic and clinical gaps. This should also ensure that the program does not compromise the quality of care of other services offered in the facility.
  IV.   Integration of cervical cancer prevention services into existing services like HIV care, post-partum care and family planning.
   V.   Use of multiple community sensitisation modalities including house-to-house awareness-raising, radio advertisements, videos, leaflets and posters.
  VI.   An enabling environment providing programmatic support

Conclusions

Overall, our efforts to implement a sustainable and effective community-based intervention to improve the quality and utilization of the cervical screening services in Kabarole has been successful. Additionally, the project has potential for sustainability and scale-up with the proper structural and systematic support.

References

Abdullahi A, Copping J, Kessel A, Luck M, Bonell C (2009) Cervical screening: Perceptions and barriers to uptake among Somali women in Camden. Public Health 123: 680-685.

Bansil P, Lim J, Byamugisha J, et al. Performance of cervical cancer screening techniques in HIV-infected women in Uganda. J Low Genit Tract Dis. 2015;19:215–219.

Blumenthal PD, Lauterbach M, Sellors JW, Sankaranarayanan R. Training for cervical cancer prevention programs in low-resource settings: Focus on visual inspection with acetic acid and cryotherapy. *Int J Gynaecol Obstet* 2005; **89** (Suppl 2):by nurses in a cervical screening study in India. *Br J Cancer* 2007; **96**: 738–743.

Cervical Cancer Action (CCA), Wittet S, Goltz S, Cody A. Progress in cervical cancer prevention: The CCA report card 2015. In: Cervical cancer action. 2015.Cervical Cancer Action 2007-2014. http://www.cervicalcanceraction.org/pubs/pubs.php

Clifford GM, Franceschi S, Keiser O, et al. Immunodeficiency and the risk of cervical intraepithelial neoplasia 2/3 and cervical cancer: a nested case-control study in the Swiss HIV cohort study. Int J Cancer. 2016;138(7):1732–1740.

Clifford GM, Polesel J, Rickenbach M, Dal Maso L, Keiser O, Kofler A et al. Cancer risk in the Swiss HIV Cohort Study: associations with immunodeficiency, smoking, and highly active antiretroviral therapy. J Natl Cancer Inst. 2005; 97: 425-432. doi: 10.1093/jnci/dji072

ICO/IARC Information Centre on HPV and Cancer Uganda Human Papillomavirus and Related Cancers, Fact Sheet 2018 (2019-06-17) https://hpvcentre.net/statistics/reports/UGA_FS.pdf

Jacqueline S, Christina H. Preventing Cervical Cancer in Low – Resource Setting. Outlook18, no. 1, 2000

Kahesa C, Kjaer S, Mwaiselage J, Ngoma T, Tersbol B, et al. (2012) Determinants of acceptance of cervical cancer screening in DaresSalaam, Tanzania. BMC Public Health 12: 1093.

Kharsany AB, Karim QA. HIV Infection and AIDS in sub-Saharan Africa: Current Status, Challenges and Opportunities. Open AIDS J. 2016;10:34-48. PubMed.

Kirabira P, Nagaddya T (2012) Situational Analysis of the health status of the slum dwelling population along the railway line in Bukasa Parish, Makindye Division-Kampala.

Lyimo FS, Beran TN (2012) Demographic, knowledge, attitudinal and accessibility factors associated with uptake of cervical cancer screening among women in a rural district of Tanzania: Three public policy implications. BMC Public Health 12: 22.

Martin, Caitlin & Tergas, Ana & Wysong, Megan & Reinsel, Maureen & Estep, Deborah & Varallo, John. (2014). Evaluation of a single-visit approach to cervical cancer screening and treatment in Guyana: Feasibility, effectiveness and lessons learned. The journal of obstetrics and gynaecology research. 40. 1707-16. 10.1111/jog.12366.

Mbulawa, Z. Z., Marais, D. J., Johnson, L. F., Boulle, A., Coetzee, D., & Williamson, A.-L. (2010). Influence of human immunodeficiency virus and CD4 count on the prevalence of human papillomavirus in heterosexual couples. The Journal of General Virology, 91(12), 3023–3031. https://doi.org/10.1099/vir.0.020669-0

Ministry of Health. Strategic Plan for Cervical Cancer Prevention and Control in Uganda 2010–2014 [Internet]. 2010. [cited 17 Dec 2016]. Available from: http://www.rho.org/files/PATH_Uganda_cxca_strat_plan_2010-2014.pdf

Mwaka AD, Orach CG, Were EM, Lyratzopoulos G, Wabinga H, et al. (2015). Awareness of cervical cancer risk factors and symptoms: Cross-sectional community survey in post-conflict northern Uganda. Health Expect 23: 12382.

Ndejjo R, Mukama T, Musabyimana A, Musoke D (2016) Uptake of Cervical Cancer Screening and Associated Factors among Women in Rural Uganda: A Cross Sectional Study. PLos One 2016 Feb 19;11(2):e0149696. doi: 10.1371/journal.pone.0149696. eCollection 2016.

Pantanowitz, L., & Michelow, P. (2011). Review of human immunodeficiency virus (HIV) and squamous lesions of the uterine cervix. Diagnostic Cytopathology, 39(1), 65–72. https://doi.org/10.1002/dc.21364

Pfaff C, Singano V, Akello H, et al. Early experiences in integrating cervical cancer screening and treatment into HIV services in Zomba Central Hospital, Malawi. *Malawi Med J*. 2018;30(3):211-214. doi:10.4314/mmj.v30i3.14S30–S37.

Sankaranarayanan R, Rajkumar R, Esmy PO *et al*. Effectiveness, safety and acceptability of 'see and treat' with cryotherapy

Twinomujuni C, Nuwaha F, Babirye JN (2015) Understanding the Low level of cervical cancer screening in Masaka Uganda using the ASE model: A community-based survey. PLoS ONE 10: e0128498.
UNAIDS Global Data Book, UNAIDS, 2017. Available from: http://www.unaids.org/sites/default/files/media_asset/20170720_Data_book_2017_en.pdf.

WHO, ICO. Human Papillomavirus and Related Cancers. Summary Report Update. September 15, 2010. UGANDA.

World Health Organization. WHO guidelines 2013: Use of cryotherapy for cervical intraepithelial neoplasia. Available at: https://www.who.int/reproductivehealth/publications/cancers/9789241502856/en/