

# User-Centered Design of Strategies for Improving Cervical Cancer Screening Literacy Among Rural Women Living with HIV in Eastern Uganda

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**Background:** The uptake of cervical cancer screening services among rural Women Living with HIV (WLHIV) attending several rural public facilities in Eastern Uganda is low at less than 50% of the target. This gap is largely influenced by low screening literacy among these women, difficulties in accessing, understanding and applying cervical cancer screening information due to multiple barriers, including limited education, low socioeconomic status, misconceptions, and fear. Therefore, context-specific and culturally appropriate strategies are needed to overcome these barriers. This study engaged rural WLHIV in Eastern Uganda to co-design three strategies to improve their cervical cancer screening literacy.

**Methods:** This participatory research combined the User-Centered Design (UCD) approach with co-design workshops to design the three strategies. Participants included 16 rural WLHIV from four rural public health facilities in Mayuge and Namayingo districts who had participated in prior studies that identified and selected these strategies. This process involved the ideation and implementation phases of the UCD approach. It was led by a medical illustrator and a Sexual and a Behavioral Change Communication specialist, supported by two healthcare providers.

**Results:** Two IEC charts, one on the importance of cervical cancer screening and the other addressing key misconceptions regarding cervical cancer screening. Both IEC charts had colorful pictures, and few texts in local language, Luganda, explaining the pictures. Two peer educators were trained to provide cervical cancer screening education, address misconceptions about cervical cancer screening, and encourage women to undergo cervical cancer screening. A ten-minute cervical cancer screening education video was designed, comprising a midwife providing cervical cancer screening education and a trained peer educator interacting with a client.

**Conclusion:** Integrating co-design and UCD approaches facilitated the design of context-specific strategies that incorporated preferences for rural WLHIV and targeted barriers to cervical cancer-screening literacy among these women.

**Keywords:** user-centered design, strategies, improving cervical cancer screening literacy, rural women living with HIV, Eastern Uganda

## Background

Cervical cancer is a long-term outcome of persistent human papillomavirus (HPV) infection of the lower genital tract, with one of the 15 high-risk HPV types being “necessary” for cervical cancer.<sup>1,2</sup> Globally, 661,021 cases of cervical cancer and 348,189 deaths are reported annually, making 4<sup>th</sup> most common cancer among women, with majority of cases coming from low- and middle-income countries, mostly Sub-Saharan Africa.<sup>3</sup> It is the most common cancer in Ugandan women, with an incidence rate of 54.8 per 100,000 women per year.<sup>4</sup> Women Living with Human Immune Virus (HIV) have a shorter period from HPV acquisition to invasive cervical lesions and therefore have a higher risk of cervical cancer than HIV negative women.<sup>5</sup> The World Health Organization, (WHO), targets having 90% of girls fully

vaccinated with HPV vaccine by age 15 years, screening 70% of women by 35 years of age and again by 45 years of age using high performance tests where feasible or Visual inspection with acetic acid (VIA) in resource-constrained settings and identifying and treating 90% of women with cervical cancer to eliminate cervical cancer by 2030.<sup>6</sup> VIA is the most commonly used test for screening for cervical cancer in Uganda<sup>7</sup> and treatment of precancerous lesions is performed using thermo-ablation.<sup>8</sup> However, only 4.8% to 30% of Ugandan women have ever screened for cervical cancer.<sup>9,10</sup> This has been attributed to barriers at the individual, interpersonal, community, and health-system levels.<sup>11</sup> Consequently, most Ugandan women with cervical cancer (> 80%) present late and are diagnosed with advanced disease<sup>12</sup> resulting in poor treatment outcomes and high mortality rates.<sup>13</sup>

Integration of cervical cancer screening services into HIV care<sup>14</sup> is the major strategy for improving uptake of cervical cancer screening services among WLHIV. However, despite this integration, the uptake of cervical cancer screening services among Ugandan WLHIV remains low (30.3%).<sup>15</sup> The Makerere University Joint AIDS Program (MJAP) USAID Local Partner Health Services – East Central Region (LPHS-EC) has supported the integration of cervical cancer screening services into HIV care in 12 districts in Eastern Uganda since October 2021 by training health workers and providing equipment and supplies. However, despite integration and support, several rural public health facilities still had suboptimal levels of uptake of cervical cancer screening services between October 2021 and September 2022, between 49% and 25%; however, 5% of the women screened during this period had precancerous lesions.<sup>16</sup> This implies that there are missed opportunities for cervical cancer screening, whereby rural WLHIV who interface with health facilities and have an opportunity to screen for cervical cancer do not. This leads to late presentation and disparities in cervical cancer burden.

Research evidence suggests that lack of knowledge of cervical cancer screening is a major barrier to the uptake of cervical cancer screening services among Ugandan WLHIV.<sup>17</sup> Health literacy, the knowledge, motivation and competence to access, understand, appraise and apply health information<sup>18</sup> predicts knowledge of cervical cancer screening.<sup>19</sup> One's ability to access, understand and use health information is influenced by individual, interpersonal, community and health facility factors<sup>18</sup> as well as the complexity of health services, and the demands they place on the individual.<sup>20,21</sup> "Cervical cancer screening literacy" among rural WLHIV is affected by their low or no educational attainment, low socioeconomic status, poor risk perception, fear, misconceptions, and beliefs influenced by interpersonal relationships and their communities, as well as the challenges they face while engaging with cervical cancer screening services.<sup>10</sup> Therefore, there is a need for strategies targeting these multilevel barriers to cervical cancer screening literacy among these women.

Provision of cervical cancer screening education by health workers and volunteers is the major strategy for improving the uptake of cervical cancer screening services among rural WLHIV attending rural public health facilities in Eastern Uganda. These strategies were developed based on research evidence from Ugandan women that emphasized a lack of knowledge as a major barrier to cervical cancer screening<sup>11,22–24</sup> yet Rural WLHIV face barriers and challenges that require context-specific and culturally sensitive information and interventions.<sup>25</sup> Despite the demonstrated importance of engaging low-literacy populations in designing their health education strategies,<sup>26</sup> current cervical cancer screening education strategies have been designed without the engagement of these women. This study engaged rural WLHIV in selected districts in Eastern Uganda in designing three selected strategies<sup>27</sup> based on barriers and facilitators of cervical cancer screening literacy among these women.<sup>28,29</sup>

## Methods

### Study Setting and Sites

The study setting was 12 districts in Eastern Uganda: Jinja, Buyende, Kaliro, Namayingo, Busia, Bugiri, Iganga, Bugweri, Kamuli, Luuka, Mayuge, and Namutumba. Cervical cancer screening using VIA was integrated into HIV care at 42 public health facilities in these Districts. However, the uptake of cervical cancer screening services at rural public health facilities in these Districts is low, and the overall precancerous lesion positivity rate between October 2021 and September 2022 is 5%.<sup>16</sup>

The study sites were four purposively selected rural public health facilities in the Namayingo and Mayuge districts, Banda HCIII and Mutumba HCIII in Namayingo district and Wabulungu HCIII and Malongo HCIII in Mayuge district. These health facilities had varying levels of achieving cervical cancer screening targets for the period October 2021 to September 2022. Banda HCIII and Malongo HCIII achieved low levels, 39% (173/443) and 43% (286/671) respectively, while Wabulungu HCIII and Mutumba HCIII achieved high levels, 82% (209/254) and 143% (504/352)<sup>16</sup> respectively.

## Research Method and Approach

This study was part of a large study that sought to identify barriers and facilitators of cervical cancer screening literacy among rural WLHIV in selected districts in Eastern Uganda and engage key stakeholders in selecting, designing and evaluating strategies to improve cervical cancer screening literacy among these women. Our previous research identified demand-side barriers and facilitators of cervical cancer screening literacy among rural WLHIV<sup>28</sup> and supply-side barriers and facilitators of health care providers' responsiveness to cervical cancer screening literacy needs of these women.<sup>29</sup> We applied this evidence to theory with engagement of rural WLHIV and health care providers to select three strategies for improving cervical cancer screening literacy, improved IEC charts, cervical cancer screening peer education and a cervical cancer screening education video.<sup>27</sup> In this study, we describe participatory research that engaged rural WLHIV in designing these three strategies for improving their cervical cancer screening literacy.

The process of designing the three strategies—improved IEC charts, cervical cancer screening peer education, and the cervical cancer screening education video followed the User-Centered Design (UCD) approach. UCD is an approach that considers users (individuals or entities that will interact with, use, or be affected by the product, service, or system being designed), needs, capabilities, and behavior to design products that accommodate those needs, capabilities, and behavior to ensure that the resulting design is understandable, usable, and accomplishes the desired tasks while providing a meaningful and pleasurable user experience.<sup>30</sup> Beyond products, this approach has been applied to designing services, procedures, strategies, and policies<sup>31</sup> and to improve health care.<sup>32</sup> The UCD approach was used to ensure that the designed strategies addressed barriers to cervical cancer screening literacy, while incorporating the needs and preferences of rural WLHIV.

This study followed the IDEO (from the Greek word for idea) UCD process (Design Kit, 2016) design process which comprises inspiration, ideation, and implementation phases. The inspiration phase involves identifying the problem for which a solution is desired and building empathy and inspiration from users to understand their barriers and preferred solutions (Design Kit, 2016). In the ideation phase, the co-creators of the solution generate ideas from the users regarding what to incorporate in the design of the solution based on their thoughts, feelings, and experiences. In the implementation phase, the co-creators prototype different ideas with users and solicit feedback from them, which is used to refine the solution that is then tested among users (Design Kit, 2016).

The inspiration phase was undertaken in prior studies that involved identifying barriers and facilitators of cervical cancer screening literacy among rural WLHIV<sup>28,29</sup> and applying this evidence to the engagement of rural WLHIV and healthcare providers to select the three strategies.<sup>27</sup> Therefore, the UCD process in this study focused on ideation and implementation phases.

## User-Engagement

Rural WLHIV were the intended users of the three strategies. They were engaged in the design processes of the three strategies through co-design workshops. Pavelin et al<sup>33</sup> defined co-design workshops as a structured set of facilitated activities for groups of participants who work together to explore a problem and its solutions over a specific period in one location. Co-design workshops were used because they were appropriate for facilitating interactions among participants and aiding consensus during the design processes. The co-design workshops were facilitated by two co-creators: a medical illustrator, a Sexual and a Behavior Change Communication (SBCC) specialist supported by a midwife, the PI, and two research assistants. They were conducted in the local language Lusoga and comprised sessions that lasted approximately two hours. The workshops were conducted at a central hotel between July and October 2024.

# Participants

Participants included sixteen<sup>16</sup> rural WLHIV, four from each study site and two<sup>2</sup> health care providers, an ART clinic in-charge and a midwife. They were purposefully selected because they participated in the process of identifying and selecting these strategies. Two healthcare providers were present to ensure that the agreed suggestions were feasible in the study context.

# Steps in Designing the Strategies

## Ideation Phase

The ideation phase involved brainstorming sessions with participants to gather suggestions on the content of each strategy based on their abilities, experiences, and preferences. Prior to these sessions, the co-creators and the PI generated a list of key design components to be considered for each strategy, as indicated in Table 1. This list highlighted the key items to consider when designing each strategy and, therefore, guided brainstorming sessions. The brainstorming session for the improved IEC charts also involved reviewing the existing IEC charts to identify the improvements that women wanted. The co-creators facilitated all the brainstorming sessions. During the brainstorming sessions, participants freely shared their suggestions on each item. All suggestions were discussed in detail, and the agreed-upon selected suggestion was based on a consensus among the participants. Additional intervention items were generated for each strategy during brainstorming sessions. Healthcare providers guided the selection of suggestions where necessary.

**Table 1** Key Design Components for Each Strategy

| Strategy                                         | Key Design Components                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cervical cancer screening peer education</b>  | <ol style="list-style-type: none"> <li>1. Characteristics of peers to be trained</li> <li>2. Number of trained cervical cancer screening peer educators at a health facility</li> <li>3. Women to be targeted by trained peer educators for cervical cancer screening education</li> <li>4. How targeted women will be identified by trained peer educators</li> <li>5. Modes of delivering cervical cancer screening education by trained peer educators</li> <li>6. How trained peer educators will contact women for cervical cancer screening education</li> <li>7. Information and support to be provided by trained peer educators</li> <li>8. Location of cervical cancer screening education</li> <li>9. Frequency of cervical cancer screening education</li> <li>10. Duration of cervical cancer screening education sessions</li> </ol> |
| <b>Improved IEC charts</b>                       | <ol style="list-style-type: none"> <li>1. Improvements to be incorporated in the improved IEC charts based on review of existing IEC charts on cervical cancer screening</li> <li>2. Preferred language to be used on the improved IEC charts</li> <li>3. Number of IEC charts to be designed</li> <li>4. Content on improved IEC charts</li> <li>5. How should the information on the improved charts be relayed?</li> <li>6. Where improved IEC charts should be placed</li> </ol>                                                                                                                                                                                                                                                                                                                                                               |
| <b>Cervical cancer screening education video</b> | <ol style="list-style-type: none"> <li>1. Person/s to provide health education in the video.</li> <li>2. Flow of the video</li> <li>3. Language to be used in the video</li> <li>4. Information to be provided in the video</li> <li>5. Length of the video</li> <li>6. Setting where the video should be recorded</li> <li>7. Where to place the TV with the video</li> <li>8. Volume of the TV while playing the video</li> <li>9. How will women access the video?</li> </ol>                                                                                                                                                                                                                                                                                                                                                                   |

## Implementation Phase

The implementation phase involved designing and testing prototypes for these strategies. Following the ideation phase, the co-creators developed prototypes of strategies based on the agreed suggestions from the brainstorming sessions over a period of two months. Soft copies of IEC materials were developed as prototypes for improved IEC materials and presented as PowerPoint presentations, whereas a video prototype was used for the cervical cancer screening education video. Prototypes were presented to the participants during separate sessions to solicit feedback to inform improvements. Suggested improvements to each prototype were documented and incorporated by the co-creators to develop the final strategies. Two participants were selected based on the agreed characteristics of a trained peer educator and trained as cervical cancer screening peer educators by the midwife and SBCC specialist using the agreed suggested content. Role plays were conducted, whereby each trained peer educator gave a one-on-one group session of cervical cancer screening education during a co-design session. The participants then suggested areas of improvement that were incorporated by the SBCC specialist and midwife to improve the peer education strategy. Trained peers presented the final role plays to come up with the final package for the peer education strategy.

## Ethical Considerations

This study complied with the declaration of Helsinki.

## Results

### Characteristics of Participants

Sixteen rural WLHIV, four from each selected health facility, participated in co-design workshops. Most participants were in the 25–29 and 40–44 age categories, had been in HIV care between 11 and 15 years, attained lower secondary education, were married, had 1–3 children, were unemployed, and had ever screened for cervical cancer. More than half of the women who had ever screened for cervical cancer had screened for cervical cancer once. Table 2 shows the participants' characteristics.

**Table 2** Characteristics of Participants

| Variable                                      | Frequency (n) (N=16) | Variable                                 | Frequency (n) (N=16) |
|-----------------------------------------------|----------------------|------------------------------------------|----------------------|
| <b>Age category (completed years)</b>         |                      | <b>Number of children</b>                |                      |
| 25-29                                         | 4                    | 0                                        | 1                    |
| 30-34                                         | 3                    | 1-3                                      | 8                    |
| 35-39                                         | 2                    | 4-6                                      | 6                    |
| 40-44                                         | 4                    | 7-10                                     | 1                    |
| 45-49                                         | 3                    |                                          |                      |
| <b>Duration in HIV care (completed years)</b> |                      | <b>Occupation</b>                        |                      |
| 1-5                                           | 3                    | Employed                                 | 5                    |
| 6-10                                          | 4                    | Unemployed                               | 11                   |
| 11-15                                         | 6                    |                                          |                      |
| 16 and above                                  | 3                    |                                          |                      |
| <b>Highest Education level attained</b>       |                      | <b>Ever screened for cervical cancer</b> |                      |
| No education                                  | 2                    | Yes                                      | 10                   |
| Lower Primary                                 | 3                    | No                                       | 6                    |
| Upper Primary                                 | 4                    |                                          |                      |
| Lower Secondary                               | 7                    |                                          |                      |

(Continued)

**Table 2** (Continued).

| Variable              | Frequency (n) (N=16) | Variable                               | Frequency (n) (N=16) |
|-----------------------|----------------------|----------------------------------------|----------------------|
| <b>Marital status</b> |                      | <b>Number of times screened (N=10)</b> |                      |
| Married               | 12                   | One time                               | 6                    |
| Widowed               | 1                    | Two times                              | 1                    |
| Separated             | 3                    | Three times                            | 3                    |

## Designed Strategies

Three strategies, namely improved IEC charts, cervical cancer screening peer education, and the cervical cancer screening education video were designed following the steps of the UCD approach with in-put from rural WLHIV.

### Improved Cervical Cancer Screening IEC Charts

Three additional intervention items for the improved IEC charts were generated during the brainstorming session, increasing the number of intervention items from 6 to 9. The additional intervention items included 1) colors to be used on improved IEC charts, 2) pictures on improved IEC charts, and 3) font on improved IEC charts.

Based on the agreed content of the improved IEC charts, we designed two IEC charts, in local language, Luganda, one on the importance of cervical cancer screening, and the second addressing misconceptions. Both charts were clear, simple, and attractive, with colored human-like pictures and a few texts in big font explaining them. Details of agreed-upon suggestions for the content of the nine intervention items for the improved IEC charts are presented in [Table 3](#).

### Trained Cervical Cancer Screening Peer Educators

Five additional intervention items for the cervical cancer screening peer education strategy were generated during the brainstorming session, increasing the number of intervention items from ten to fifteen. The added intervention items included 1) how women will contact trained peer educators, 2) modes of interaction during cervical cancer screening education, 3) starting time for group sessions on art clinic days, 4) how trained peer educators will be easily identified by women, and 5) facilitation and support to be provided to trained peer educators. The agreed-upon suggestions for the content of the 15 intervention functions for the cervical cancer screening peer education strategy are presented in [Table 4](#).

**Table 3** Content of Improved IEC Charts

| Intervention Item                                                                                                                        | Agreed Suggestions                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Improvements to be incorporated in the improved IEC charts based on review of existing IEC charts on cervical cancer screening</b> | <ul style="list-style-type: none"> <li>• Use simple pictures</li> <li>• Use attractive pictures</li> <li>• Use few words</li> <li>• Use text that is easily understood</li> <li>• Use easy local language</li> <li>• Make big charts</li> <li>• Make the charts accessible</li> </ul> |
| <b>2. Preferred language to be used on the improved IEC charts</b>                                                                       | <ul style="list-style-type: none"> <li>• Luganda, most spoken native language in Uganda</li> </ul>                                                                                                                                                                                    |
| <b>3. Number of IEC charts to be designed</b>                                                                                            | <ul style="list-style-type: none"> <li>• To design two charts</li> </ul>                                                                                                                                                                                                              |
| <b>4. How the information on the improved charts should be relayed</b>                                                                   | <ul style="list-style-type: none"> <li>• Information to be relayed using pictures explained by words</li> </ul>                                                                                                                                                                       |

(Continued)

**Table 3** (Continued).

| Intervention Item                                           | Agreed Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>5. Content on improved IEC charts</b>                    | <p><b>CHART ONE</b></p> <p>To explain the importance of cervical cancer screening</p> <p><b>Pictures</b></p> <p>Show stages of cervical cancer</p> <ul style="list-style-type: none"> <li>• A normal cervix</li> <li>• Stages of cervical cancer</li> <li>• Stages that can be treated after screening</li> <li>• Stages that cannot be treated even after screening</li> <li>• What happens after treatment</li> <li>• Show when the person starts feeling pain</li> </ul> <p><b>Words</b></p> <ul style="list-style-type: none"> <li>• Should explain the importance of cervical cancer screening</li> <li>• Explain dangers of not screening</li> </ul> <p><b>CHART TWO</b></p> <p>To address fear, myths and misconceptions about cervical cancer screening</p> <p><b>Words</b></p> <p>Indicate what is true and what is false about cervical cancer screening</p> <ul style="list-style-type: none"> <li>• You do not feel pain during cervical cancer screening vs you feel pain during cervical cancer screening</li> <li>• The uterus is not removed during cervical cancer screening vs the uterus is removed during cervical cancer screening</li> <li>• Instruments used for cervical cancer screening are scary vs instruments used for cervical cancer screening are not scary</li> <li>• Instruments used for cervical cancer screening can spread infections vs instruments used for cervical cancer screening are sterilized and do not spread infections</li> <li>• A women can give birth after screening for cervical cancer vs a woman cannot give birth after screening for cervical cancer.</li> <li>• Cervical cancer screening takes a long-time vs cervical cancer screening takes a short time</li> </ul> <p><b>Pictures</b></p> <ul style="list-style-type: none"> <li>• Illustrate true vs false using pictures</li> </ul> |
| <b>6. Colours to be used on improved IEC charts</b>         | <ul style="list-style-type: none"> <li>• Use attractive colours in the charts</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>7. Pictures on improved IEC charts</b>                   | <ul style="list-style-type: none"> <li>• Not to use cartoons</li> <li>• Pictures of human beings should look as close to human beings as possible</li> <li>• Pictures should be clear</li> <li>• Pictures should be easily understood</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>8. Font of words on improved IEC charts</b>              | <ul style="list-style-type: none"> <li>• Use large fonts that can be easily read</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>9. Where should improved IEC charts should be placed</b> | <ul style="list-style-type: none"> <li>• Designed charts to be placed in areas at the health facility where they can easily be accessed by WLHIV <ul style="list-style-type: none"> <li>○ Within the ART clinic</li> <li>○ Outpatient department</li> <li>○ Maternity ward</li> <li>○ Any other accessible spaces</li> </ul> </li> <li>• Provide many charts</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

**Note:** Italicized intervention items were generated during the brainstorming session.

**Table 4** Content of the Cervical Cancer Screening Peer Education Strategy

| Intervention Item                                                                                | Agreed Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Characteristics of peers to be trained</b>                                                 | <ul style="list-style-type: none"> <li>• Must have attended the co-design workshops</li> <li>• Must have screened for cervical cancer</li> <li>• Should have confidentiality</li> <li>• Should be calm</li> <li>• Should be from the same health facility</li> <li>• Should be trained</li> <li>• Should be easy to engage</li> <li>• Should have been in HIV care for a long time, at least five years</li> <li>• Should be available and accessible</li> <li>• Must own a mobile telephone</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>2. Number of trained cervical cancer screening peer educators at a health facility</b>        | Two peers to be trained at each health facility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>3. Women to be targeted by trained peer educators for cervical cancer screening education</b> | <ul style="list-style-type: none"> <li>• WLHIV aged 25–49 years</li> </ul> <b>Key categories</b> <ul style="list-style-type: none"> <li>• Women newly diagnosed with HIV</li> <li>• WLHIV who have never screened for cc</li> <li>• WLHIV who do not consistently screen for cervical cancer</li> <li>• WLHIV previously diagnosed with precancerous lesions or cc</li> <li>• Women who discourage others from screening for cervical cancer</li> <li>• Women who spread myths and misconceptions about cervical cancer screening</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>4. How targeted women will be identified by trained peer educators</b>                        | <ul style="list-style-type: none"> <li>• From health facility records</li> <li>• From other clients</li> <li>• From appointment lists</li> <li>• On phone</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>5. Modes of delivering cervical cancer screening education by trained peer educators</b>      | <ul style="list-style-type: none"> <li>• One-on-one sessions</li> <li>• Groups sessions</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>6. How peer educators will contact women for cervical cancer screening education</b>          | <b>Group sessions</b> <ul style="list-style-type: none"> <li>• On ART clinic days</li> </ul> <b>One-on-one sessions</b> <ul style="list-style-type: none"> <li>• ART clinic days</li> <li>• On clinic days</li> <li>• On appointment</li> <li>• Phone calls</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>7. How women will contact trained peer educators</b>                                          | <ul style="list-style-type: none"> <li>• Anytime they see them</li> <li>• On appointment</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>8. Information and support to be provided by trained peer educators</b>                       | <b>Information about cervical cancer</b> <ul style="list-style-type: none"> <li>• How cervical cancer is spread</li> <li>• Risk of cervical cancer</li> <li>• How to prevent cervical cancer</li> <li>• Importance of cervical cancer screening</li> </ul> <b>Information about benefits of cervical cancer screening</b> <ul style="list-style-type: none"> <li>• Explain advantages of cc screening</li> </ul> <b>Information and support in accessing cervical cancer screening services</b> <ul style="list-style-type: none"> <li>• How one can access cervical cancer screening services</li> <li>• Information about treatment of precancerous lesions</li> <li>• Support women to access cervical cancer screening and treatment services</li> <li>• Offer guidance and follow up on those who need or have undergone cervical cancer treatment</li> </ul> <b>Information about the cervical cancer screening procedure</b> <ul style="list-style-type: none"> <li>• Explain the cervical cancer screening procedure</li> </ul> <b>Motivate others to screen for cervical cancer</b> <ul style="list-style-type: none"> <li>• Share their experiences with cervical cancer screening procedures</li> <li>• Motivate others to screen for cervical cancer</li> </ul> <b>Address, fear myths and misconceptions</b> <ul style="list-style-type: none"> <li>• Provide the correct information to address fear, myths and misconceptions women have about cervical cancer and cervical cancer screening</li> </ul> |

(Continued)

**Table 4** (Continued).

| Intervention Item                                                            | Agreed Suggestions                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>9. Modes of interaction during cervical cancer screening education</b>    | <ul style="list-style-type: none"> <li>• Use IEC charts with pictures</li> <li>• Women (clients) to ask questions</li> <li>• Peer educator to respond to questions from women</li> </ul>                                                                                                                                                                                               |
| <b>10. Location of cervical cancer screening education</b>                   | <p><b>At the health facility</b></p> <ul style="list-style-type: none"> <li>• In a shade or outside the health facility</li> <li>• In a room (if available)</li> <li>• In a tent, outside shed or other available private spaces within the health facility</li> </ul> <p><b>Any other place convenient for both the trained peer and the client(s). Both parties should agree</b></p> |
| <b>11. Frequency of cervical cancer screening education</b>                  | <p><b>Group sessions</b></p> <ul style="list-style-type: none"> <li>• On the clinic day – once a week</li> </ul> <p><b>One-on-one session</b></p> <ul style="list-style-type: none"> <li>• On appointment or anytime of convenience</li> </ul>                                                                                                                                         |
| <b>12. Duration of cervical cancer screening education sessions</b>          | <ul style="list-style-type: none"> <li>• Group or one-one cervical cancer screening education session to last 30 minutes (one-on-one sessions) – 2 hrs (group sessions)</li> <li>• Depending on agreed time by both parties</li> </ul>                                                                                                                                                 |
| <b>13. Start time for group session on ART clinic days</b>                   | <ul style="list-style-type: none"> <li>• Group sessions on ART clinic days to start at 8:00am</li> </ul>                                                                                                                                                                                                                                                                               |
| <b>14. How trained peer educators will be easily identified by women</b>     | <ul style="list-style-type: none"> <li>• Trained peers should have a uniform</li> <li>• An orange apron with a cancer symbol in front and words at the back “ask me about cervical cancer screening”, in native language, Luganda</li> </ul>                                                                                                                                           |
| <b>15. Facilitation and support to be provided to trained peer educators</b> | <ul style="list-style-type: none"> <li>• Training</li> <li>• Trained peers to be given a monthly allowance and airtime for communication.</li> </ul>                                                                                                                                                                                                                                   |

**Note:** Italicized intervention items were generated during the brainstorming session.

## Cervical Cancer Screening Education Video

Three additional intervention items for the cervical cancer screening video were generated during brainstorming sessions. These included 1) the number of people appearing in the video, 2) the characteristics of the people in the video, and 3) the appearance of people in the video, increasing the number of intervention items from 9 to 12. The final video was a ten-minute cervical cancer screening education video in the local language, Lusoga, with a health worker providing cervical cancer screening education and a trained peer educator interacting with a client about cervical cancer screening. Details of agreed-upon suggestions for the content of the 12 intervention functions for the cervical cancer screening education video are presented in [Table 5](#).

## Discussion

This study engaged rural WLHIV in designing three user-centered, context-specific strategies, improved IEC charts, cervical cancer screening peer education, and the cervical cancer screening education video to improve their cervical cancer screening literacy.

## Improved IEC Charts

Women suggested two different charts: one on the importance of cervical cancer screening, and the other addressing misconceptions about cervical cancer screening. This is because they felt that it would be important to explain the importance of cervical cancer screening and address misconceptions about cervical cancer screening among rural WLHIV. Most women had not been screened for cervical cancer because they did not appreciate the importance of cervical cancer screening and/or had misconceptions about cervical cancer screening. Moreover, rural WLHIV who did not appreciate the importance of cervical cancer screening were more likely to believe in misconceptions. The contents of the two charts were selected based on what women considered the most important information about the importance of

**Table 5** Content of the Cervical Cancer Screening Education Video

| Intervention Item                                           | Agreed Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Person/s to provide health education in the video</b> | <ul style="list-style-type: none"> <li>• Health workers</li> <li>• Trained peer educators</li> <li>• Clients</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>2. Number of people to appear in the video</b>           | <ul style="list-style-type: none"> <li>• Three people should appear in the video <ul style="list-style-type: none"> <li>○ A health worker</li> <li>○ A trained peer educator</li> <li>○ A client</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>3. Characteristics of people in the video</b>            | <ul style="list-style-type: none"> <li>• They should be knowledgeable</li> <li>• They should be able to express themselves</li> <li>• They should be trained on how to deliver the information in the video</li> <li>• The peer should have experience of cc screening</li> <li>• They should be fluent in local language, Lusoga</li> <li>• They should be confident</li> <li>• They should have a smile</li> <li>• They should have good character</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>4. Flow of the video</b>                                 | <ul style="list-style-type: none"> <li>• Trained peer educator interacting with a client - health worker- trained peer educator interacting with a client</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>5. Language to be used in the video</b>                  | <ul style="list-style-type: none"> <li>• Lusoga, most common language in the study setting</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>6. Information to be provided in the video (content)</b> | <p><b>Peer and client interaction</b></p> <ul style="list-style-type: none"> <li>• Client should ask questions about <ul style="list-style-type: none"> <li>○ Who should screen for cervical cancer</li> <li>○ How to access cc screening services</li> <li>○ The importance of cc screening</li> <li>○ Fear, myths and misconceptions about cc screening <ul style="list-style-type: none"> <li>▪ No pain</li> <li>▪ They do not remove the uterus</li> </ul> </li> <li>○ Dangers of not screening for cervical cancer</li> </ul> </li> <li>• Peer should share experiences</li> </ul> <p><b>Health worker</b></p> <ul style="list-style-type: none"> <li>• Information about cervical cancer</li> <li>• Information about cervical cancer screening</li> <li>• How to access cervical cancer screening services</li> <li>• Information about the cc screening procedure</li> <li>• Address fear and misconceptions about the cc screening procedure like <ul style="list-style-type: none"> <li>○ Machines used cannot spread infections</li> <li>○ Machines do not spread cervical cancer</li> </ul> </li> <li>• What happens when you are found with cc at early stages or late stages</li> </ul> |
| <b>7. Length of the video</b>                               | <p><b>Overall – 10 Minutes</b></p> <ul style="list-style-type: none"> <li>• Peer and client – 5 Minutes</li> <li>• Health worker – 5 Minutes</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>8. Setting where the video should be recorded</b>        | <p><b>Peer and client</b></p> <ul style="list-style-type: none"> <li>• In an ordinary place, not necessary at the health facility</li> </ul> <p><b>Health worker</b></p> <ul style="list-style-type: none"> <li>• At workstation</li> <li>• Or Health facility in the background</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

(Continued)

**Table 5** (Continued).

| Intervention Item                                   | Agreed Suggestions                                                                                                                                                                                                       |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>9. Appearance of people in the video</b>         | <b>Health worker</b> <ul style="list-style-type: none"> <li>• Should be in uniform</li> </ul> <b>Trained peer educator and client</b> <ul style="list-style-type: none"> <li>• Should be in ordinary clothing</li> </ul> |
| <b>10. Where to place the TV with video</b>         | <ul style="list-style-type: none"> <li>• Within the ART clinic/maternity ward</li> </ul>                                                                                                                                 |
| <b>11. Volume of the TV while playing the video</b> | <ul style="list-style-type: none"> <li>• Television should have volume, but not too high to distract other activities</li> </ul>                                                                                         |
| <b>12. How will women access the video</b>          | <ul style="list-style-type: none"> <li>• Daily</li> <li>• On ART clinic days</li> <li>• During cervical cancer screening education sessions</li> </ul>                                                                   |

**Note:** Italicized intervention items were generated during the brainstorming session.

cervical cancer screening and the most common misconceptions among rural WLHIV. The misconceptions included in chart two were selected by women because they were the major misconceptions that caused fear and deterred rural WLHIV from cervical cancer screening. A study among rural WLHIV in Kenya recommended that the content of cervical cancer screening IEC materials should demystify screening procedures and address common misconceptions.<sup>34</sup>

Surprisingly, women preferred Luganda, the most spoken local language in Uganda, to Lusoga, the most spoken local language in the study setting, for use in the text on the improved IEC charts. They chose Luganda because it was easier for them to read it than Lusoga. Moreover, the existing IEC charts for this region are in Lusoga, and most women cannot read them. Therefore, it is important to use texts in the preferred local language that can be easily read by the target population.

Simple, attractive, human-like pictures were preferred because they would be easily understood by rural WLHIV, as it was observed that most women could not interpret the pictures on existing cervical cancer screening IEC charts. They wanted colored pictures to attract them to look at charts. Women's preference for a few simple words explaining the pictures was intended to ease their understanding. According to Mayer's cognitive theory, using multi-media, a combination of pictures and words increases learning effectiveness.<sup>35</sup> Most rural WLHIV have low or no educational attainment; they do not want a lot of text that they cannot easily read or understand. Instead, they were more interested in pictures of improved IEC charts. Large fonts for words on the improved IEC charts were preferred to small fonts because they could easily be seen and read by rural WLHIV. These preferences highlight the importance of pictures in cervical cancer screening IEC charts for rural WLHIV and the need to have minimal and large texts. The use of pictures in printed educational materials improves the comprehension of complex medical information [6]. It is recommended to use minimal text in a simple language with pictures linked to text when designing print health education materials for patients with low literacy [7]. The importance of engaging users in designing illustrations on written education materials has been acknowledged because local populations are more likely to interpret and recall locally produced context-specific print material than foreign-produced materials.<sup>26</sup> A previous study among rural WLHIV in Kenya recommended revising existing print IEC materials on cervical cancer screening targeting rural WLHIV to have larger fonts and culturally accepted pictures.<sup>34</sup> Therefore, this study agrees with previous studies on the use of pictures, text on printed IEC charts, and user engagement in designing illustrations on printed IEC charts.

Women's suggestion that the IEC should be placed in areas where they would be easily accessed concurs with a previous study among rural WLHIV in Kenya that recommended that printed IEC charts should be strategically placed in high-traffic areas.<sup>34</sup>

# Cervical Cancer Screening Peer Education

Two trained peer educators per health facility were selected to ensure access to cervical cancer screening peer education. Women's preferred characteristics, personalities, and implementation of the suggested rural WLHIV have preferences of who provides peer education, which should be considered while designing cervical cancer screening peer education strategies targeting rural WLHIV. The target categories of women were considered because women felt that they needed to be encouraged to undergo screening for cervical cancer through peer education. The suggested way of identifying targeted women were to ensure that all the targeted categories would be reached and accessed for cervical cancer screening peer education. It is therefore important to identify and reach WLHIV to ensure that rural WLHIV aged 25–49 and specific categories can access cervical cancer screening education instead of assuming that women will look for information or automatically access it. It is also important to educate women who discourage others from screening for cervical cancer by mitigating fear mongering and spreading myths and misconceptions about cervical cancer screening.

Groups and one-on-one sessions were suggested to cater for women's preferences of engaging with the peer educators. Cervical cancer screening education was provided in group sessions; however, some women preferred one-on-one sessions for various reasons including privacy, shyness, and stigma. In addition, one-on-one cervical screening education sessions improve access to cervical cancer screening education by offering flexibility in terms of when and how often one can access cervical cancer screening education, and by addressing barriers to accessing cervical cancer screening information. It is therefore important to consider flexibility and convenience while providing cervical cancer screening information to address barriers to accessing cervical cancer screening information among rural WLHIV.

Suggested information to be provided during cervical cancer screening peer education included information about cervical cancer, the benefits of cervical cancer screening, information and support on access to cervical cancer screening services, and cervical cancer screening procedures. Additionally, trained cervical cancer screening peers were expected to motivate others to screen for cervical cancer by sharing their experiences and addressing fear, myths, and conceptions of cervical cancer screening. Women preferred interactive cervical cancer screening for peer education over non-interactive sessions. They suggested that interactions with trained peer educators would be facilitated using IEC charts with pictures and question-answer sessions. Women preferred to have a cervical cancer screening peer education session in convenient areas within the health facility or any place outside the health facility, provided it was convenient for both the client and peer. In terms of the duration of cervical cancer screening peer education sessions, women suggested that one-on-one sessions would last approximately 30 minutes, while group sessions would not exceed 2 hours.

The selected information to be provided by peer educators was considered because it is key in educating rural WLHIV about cervical cancer and cervical cancer screening. Women also felt that they would be motivated to screen for cervical cancer if encouraged by their peers who were like them and had the same experiences. It was also important for trained peer cervical cancer screening educators to address fear, myths, and misconceptions about cervical cancer screening. This emphasizes the importance of using peers for cervical cancer screening education; providing important information on cervical cancer and cervical cancer screening; and addressing fear, myths, and conceptions about cervical cancer screening. Interactive peer education sessions are important to improve the understanding of cervical cancer screening information. Therefore, it is important to use pictures and provide rural WLHIV with an opportunity to ask questions during cervical cancer screening education sessions. To improve access to cervical cancer screening information, it is important to ensure that peer education occurs at a convenient location within or outside the health facility. Therefore, flexibility should be considered when providing peer education. Women felt that 30 minutes and at most 2 hours were sufficient times for one-on-one and group peer education sessions, respectively. Therefore, it is important for peer education sessions to avoid taking too long depending on their mode and purpose.

Peers were also expected to encourage WLHIV to undergo cervical cancer screening by sharing their experiences with cervical cancer screening. This agrees with a previous study showing that peer-led cervical cancer screening education provides a safe space for rural WLHIV to share experiences, ask questions, and encourage each other to screen for cervical cancer.<sup>34</sup>

Providing the trained peer educators with a uniform was aimed at easing the identification of cervical cancer screening peer educators. Women's suggestion to facilitate trained peer educators through training, a monthly allowance,

and airtime was to motivate and enable trained peer educators to undertake their roles. This implies that it is important for the trained peer educators to be trained and facilitated to provide cervical cancer screening peer education.

Although there is limited evidence on beneficiaries' engagement in designing peer education strategies, this study demonstrates the importance of engaging beneficiaries in selecting peer educators and designing peer education strategies.

## Cervical Cancer Screening Education Video

A health worker was suggested in the cervical cancer screening education because women consider health workers to be trusted and knowledgeable about health issues. Women suggested the use of trained cervical cancer-screening peers because they could be trained and trusted as role models for rural WLHIV. Peer educator–client interaction was suggested because rural WLHIV would easily relate with their interaction since they are like them and they would be talking about things that they would easily relate with. The selected characteristics and personalities of the peer educator in the video were like those in the peer education strategy, because it was one of the trained peers in the video. Unlike the IEC charts, where women chose Luganda, women chose Lusoga for the video because it is the most spoken language in the study setting, and they would easily understand it. The contrast in language preference for the IEC charts and video illustrates that users' language preferences may differ between visual text and audiovisual materials and this should be an important consideration while designing different types of health education strategies. The use of the local language concurs with this study in India, in which a video in the local language was used for cervical cancer screening education among rural women.<sup>36</sup>

The flow of the video was to ensure that the focus was on peer educator – client interaction and that the health worker came in to provide more information and emphasize what the peer educator and client had discussed. Women proposed a short video of 10 minutes because they did not want the video to be too long. They felt that 10 minutes was sufficient to bring out the key information. The video content was based on what women considered the most important information for educating rural WLHIV about cervical cancer and cervical cancer screening. Women's suggested location and availability of the video ensured that it could be easily accessed.

Although the involvement of patients in designing health education strategies is limited,<sup>37</sup> this study emphasizes the importance of engaging rural WLHIV in designing cervical cancer screening literacy improvement strategies that are effective, acceptable and feasible.

## Study Strengths and Limitations

This study engaged rural WLHIV in designing three context-specific strategies that catered to the needs of these women and addressed barriers to cervical cancer screening literacy among these women. The limitation of this study was that it was limited to only four rural public health facilities in two districts of Eastern Uganda. Therefore, designed strategies should be adapted prior to their implementation in different contexts in Uganda.

## Conclusion

The improved IEC charts comprised two IEC charts with pictures and few texts in the local language, Luganda, one on the importance of cervical cancer screening and the other addressing misconceptions about cervical cancer screening.

The cervical cancer screening peer education strategy comprised of two peers that were selected among participating women based on women's preferences and trained and facilitated to provide cervical cancer screening education, share their experiences with cervical cancer screening, and encourage WLHIV to undergo cervical cancer screening. These would provide cervical cancer screening education in groups and one-on-one sessions for WLHIV aged 25–49 and key categories of WLHIV, including those newly diagnosed with HIV, WLHIV who missed cervical cancer screening appointments, those due to cervical cancer screening, and women who discourage or spread fear and misconceptions about cervical cancer screening.

The designed cervical cancer screening video was a ten-minute cervical cancer screening education video in the local language Lusoga, with a health worker providing cervical cancer screening education and a trained peer educator interacting with a client about cervical cancer screening. The content in the video was aimed at providing important information about cervical cancer and cervical cancer screening and to address fear and misconceptions about cervical cancer screening.

The designed strategies incorporated the preferences of rural WLHIV and addressed the barriers to cervical cancer screening literacy among these women. They should be implemented and evaluated within the study setting and adapted for implementation in similar contexts in Uganda. This study demonstrates the value of the “user-centered co-design approach” in designing health interventions in resource-limited, culturally specific settings.

## Abbreviations

ART, Antiretroviral Therapy; HC, Health Center; HIV, Human Immunodeficiency Virus; HPV, Human Papilloma Virus; IEC, Information, Education and Communication; IP, Implementing Partner; MJAP, Makerere University Joint AIDS Program; MOH, Ministry of Health; SBCC, Sexual and Behavioral Change Communication; UCD, User-Centered Design; VHT, Village Health Team; VIA, Visual Inspection with Acetic Acid; WHO, World Health Organization; WLHIV, Women Living with HIV.

## Ethics Approval and Consent to Participate

The larger study was approved by the Makerere University School of Public Health Research Ethics Committee (Protocol Number: SPH-2022-355). We also sought permission from authorities in the two districts, and the study was registered with the Uganda Council for Science and Technology (Registration Number: HS2753ES), which gave us permission to conduct the research. We obtained written informed consent from all participants and used unique identifiers to ensure that the collected information was not linked to the participants. All methods were performed in accordance with the relevant guidelines and regulations.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors report no conflicts of interest in this work.

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