REVIEW

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Interventions to Improve the Uptake of Cervical Cancer Screening with Visual Inspection with Acetic Acid: A Scoping Review

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Abstract

Objective: Cervical cancer is a leading cause of death worldwide. Early detection and management are essential. In this case, you can use screening methods such as pap smear, visual acetic acid inspection, and HPV DNA test. Healthcare professionals recommend the Visual Inspection with Acetic Acid (VIA) test for finding precancerous lesions. This is especially useful in resource-limited settings. This scoping review explored methods to increase cervical cancer screening for women. It focused on the use of the VIA test. **Methods:** We did a systematic search in PubMed, Scopus, Science Direct, and ProQuest. We used these keywords: (uptake OR participation) AND ("visual inspection acetic acid" OR VIA) AND ("cervical cancer" OR "uterine cervical neoplasm"). We used the EndNote app to manage data. First, we screened titles and abstracts. Then, we identified potential articles and checked the full text. We looked for non-relevant outcomes, insufficient data, and duplicate publications. We followed the Prisma framework throughout the process. Two reviewers selected and extracted the data. **Result:** A total of 39 studies were found to be assessing methods to increase VIA. Research reveals 6 ways to enhance cervical cancer screening using the VIA method worldwide. The six emerging themes for these intervention types include: health education and counselling (n=53%), cancer screening programs (n=12%), technology-driven interventions (n=10%), community and peer-based approaches (n=16%), cultural and language-specific approaches (n=4%), as well as training and capacity building (n=4%). Health education and counseling increase awareness about cervical cancer screening for women. This is especially true in countries with limited resources. **Conclusion:** The main interventions obtained from this study were health education and counseling. Future screening should use digital health tools like mHealth. It should also boost community-based methods. Finally, interventions need to fit cultural and language needs. This way, we can increase participation rates.

Keywords: VIA- screening- participation- intervention

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Introduction

Cervical cancer is a top cause of illness and death in women around the world. The World Health Organization (WHO) aims to end cervical cancer as a public health concern. To reach this goal, WHO has set up three main pillars: Vaccinate 90% of girls against Human Papillomavirus (HPV), Screen 70% of women of reproductive age, Treat 90% of women with precancerous lesions or invasive cancer [1].

The World Health Organization (WHO, 2023) reports that cervical cancer is still a top cause of cancer deaths among women [2]. Cervical cancer is the fourth most common cancer among women worldwide. In 2022, there were about 660,000 new cases. That year, about 94% of the 350,000 cervical cancer deaths occurred in low- and middle-income countries. Cervical cancer rates are highest in three areas: sub-Saharan Africa, Central America, and Southeast Asia. Cervical cancer mainly impacts younger women. Because of this, 20% of children who lose their mothers to the disease may also be at risk of developing cervical cancer [2].

Cervical cancer will be eliminated in the next century-as planned by the World Health Organisation (WHO). Screening and treatment should be common worldwide. About 70% of people with a cervix should get screened at age 35 and again at 45. Also, 90% of those showing signs of cervical cancer need treatment [3]. Preventive measures include screening, HPV vaccination, health education, and a healthy lifestyle. Cervical cancer screening is key for early detection. It helps lower mortality and allows for timely treatment. A common

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screening method is Visual Inspection with Acetic Acid (VIA). It's popular in LMICs because it's cheap and easy to use. VIA has a higher sensitivity compared to Pap smear (89% vs. 52%). VIA has a high negative predictive value of 99%. This makes it effective for ruling out cervical cancer when results are negative [4]. Another study shows that VIA is more sensitive than Pap smear. VIA has a sensitivity of 86.11%, while Pap smear's is 52.78% [5], This means VIA gives results similar to Pap smear. This test is useful for screening programs. It can enhance cervical cytology in places with limited resources [6]. In November 2020, WHO started a global effort to eliminate cervical cancer as a public health issue for the 21st century. Strong surveillance and monitoring systems should be set up at the national or local level as part of the eradication strategy [7].

VIA screening coverage is still low in many countries. This is especially true in Asia, Africa, and Latin America. It falls short of the target levels [1]. The coverage of VIA screening in low- and middle-income countries (LMICs) is quite low. In Sub-Saharan Africa, it averages only 4%. In other regions, such as Asia and Latin America, screening coverage is less than 50% [8]. A main challenge in effective cervical cancer screening (CCS) is that many women do not use the services. Researchers designed various interventions to increase uptake of CCS services. Phone call reminders, SMS, community HPV test sampling, and free services can help increase CCS uptake. Combining health education with SMS and e-vouchers could be more effective than using only one method. Due to the low certainty of the evidence, these findings should be applied with caution [9–12].

Delays in detecting cervical cancer can have serious effects. So, we need to find ways to boost the use of cervical cancer screening with the VIA method. We need to find effective ways to help those who aren't interested in cervical cancer screening. Gathering evidence on these interventions is key. Many studies look into ways to boost cervical cancer screening worldwide. There isn't much research on how to improve cervical cancer screening using the VIA method. This study looks at ways to boost cervical cancer screening using the VIA method. This study will evaluate research gaps and suggest ideas for future research. We did a scoping review of interventions that promote cervical cancer screening using the VIA test around the world. This scoping review aimed to gather global evidence on interventions that promote cervical cancer screening with the VIA test. We think no past review has fully addressed cervical cancer screening like ours. This makes our study unique and new.

Materials and Methods

Search strategy

We created a search strategy to enhance clarity and the quality of results. A thorough search was performed across four databases: PubMed, Scopus, ScienceDirect, and ProQuest. The systematic review follows the PRISMA Scr Checklist guidelines. The review objectives use the PCC framework: Population, Concept, and Context. The search used modified MeSH Terms in each database. Search terms were combined using boolean operators 'AND' and 'OR'. Keywords: (uptake OR participation) AND ("visual inspection acetic acid" OR VIA) AND ("cervical cancer" OR "uterine cervical neoplasm"). The language used is English and is not time-limited. Two reviewers rechecked the data. After we received the eligible data, we consulted the experts.

The articles included in this review must meet these criteria: (1). Use empirical studies with any design, such as qualitative, quantitative, or mixed methods, (2) They should focus on ways to improve cervical cancer screening with the VIA method, (3) They should be conducted anywhere in the world. The excluded articles did not meet these criteria: (1) Irrelevant topic (not about cervical cancer screening), (2) Irrelevant population (not focused on women), (3) Non-research articles (like editorials and opinion pieces), (4) Irrelevant study designs (like animal or lab-based studies), (5) Irrelevant output (no data on screening uptake), (6) Protocol (only study protocols without results), (7) Duplicate publications from the same data set.

Two researchers extracted all articles using EndNote. One researcher removed duplicate articles. Then, they checked the titles and abstracts. They also evaluated the full articles based on the inclusion and exclusion criteria. We hand-searched articles from Google Scholar and other relevant sources to check for study eligibility. Other researchers helped validate the extractions to ensure accuracy. Team discussions addressed disagreements and led to a resolution.

Data Synthesis

The tables displayed data from the literature. They organized the items by area and review purpose. Two researchers conducted separate screenings, extractions, syntheses, and data analyses. The team added a third researcher to settle any differences they found. The results table presents the summary analysis of the review.

Results of Search

The four databases yielded a total of 39 articles, with 115 duplicates. The researchers reviewed 695 articles after removing duplicates. They based their review on the title and abstract. After this process, we excluded 673 articles. Then, we reviewed 22 articles for eligibility. We also searched Google Scholar and related articles to help meet our research goals. The final result of this process was 39 articles. The total number of participants included across all reviewed studies is 362.745. Figure 1 shows the extraction process.

Results

Description of included studies

The first study on improving cervical cancer screening using the VIA test began in 2011. The most recent findings were published in 2024. Of the studies reviewed, 24 used a quantitative design. That's 49% and includes quasi-experimental methods. Six studies (12%) employed randomized controlled trial (RCT) methods. Seven studies (14%) followed pre-experimental designs. The rest used

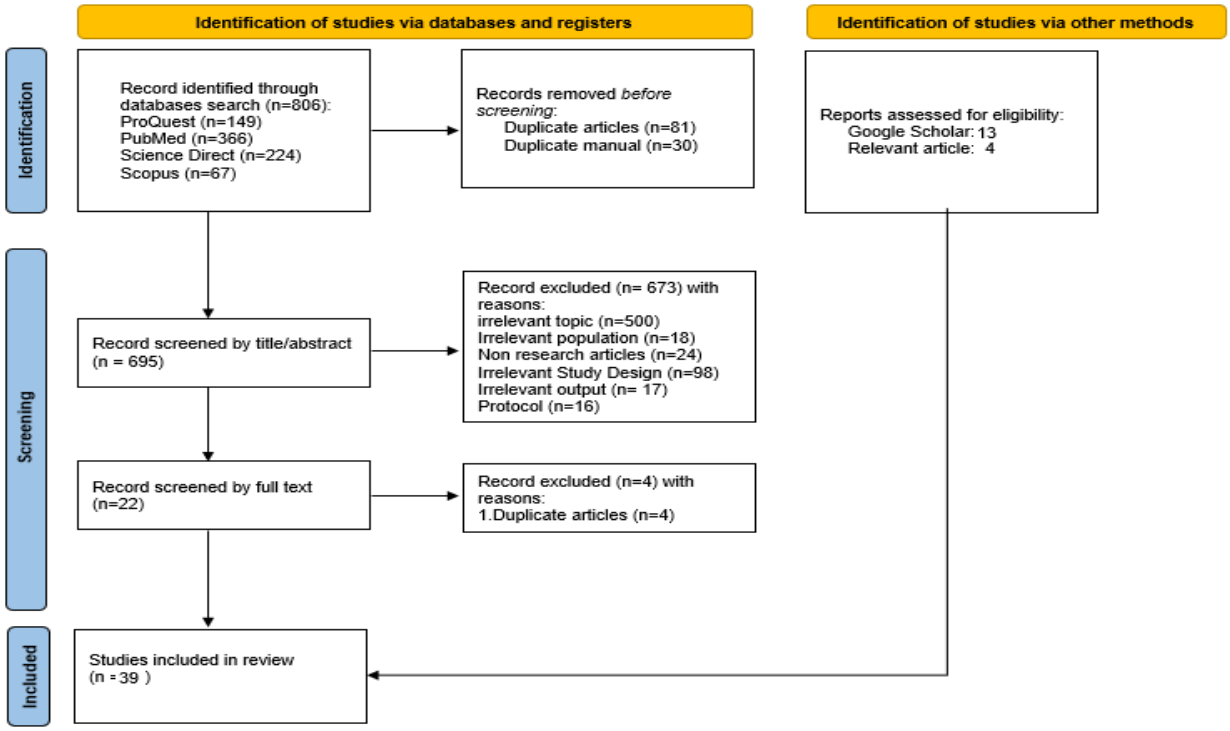

Figure 1. PRISMA Flow Chart Diagram for Determining the Research Concerning Interventions to Improve the Uptake of Cervical Cancer Screening with Visual Inspection with Acetic Acid [31]

cross-sectional and mixed methods. Most studies took place in Low-and Middle-Income Countries (LMICs), mainly in African and Asian countries. They focused on people aged 30 to 55 years on average.

This review found that 53% of studies focused on health education and counseling. See Figure 2 and Table 1 for details.

We identified six key themes for intervention types: health education and counseling (53%), cancer screening programs (12%), technology-driven interventions (10%), community and peer-based approaches (16%), cultural and language-specific approaches (4%), Training and capacity building (4%).

Health education and counselling

Health education teaches people about screening services and their benefits. It also shows them where to access these services. In many developing countries, few people use cervical cancer screening. This is mainly due to a lack of knowledge about cervical cancer and how to prevent it [13–15]. The main types of interventions included: health education and counseling use traditional methods like brochures, pamphlets, and booklets., audiovisual and digital tools for health education., education through social media and SMS. Health education is the main way to boost cervical cancer screening. It raises public awareness about the importance of early detection [13,16–20].

Cancer screening programs

The second type of intervention is cancer screening programs. These include VIA, or Visual Inspection with

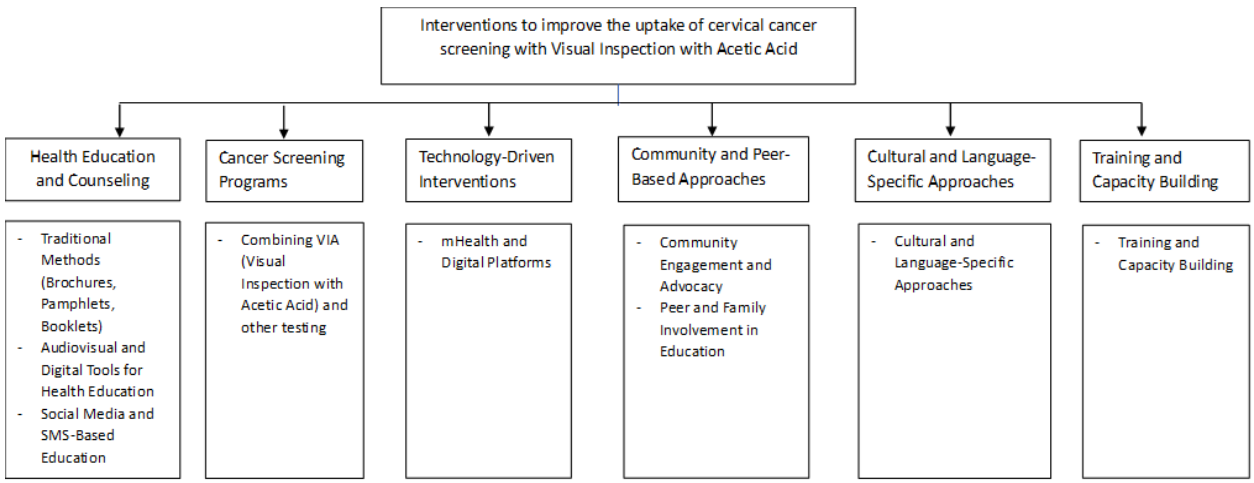

Figure 2. Intervention Group Diagram

Table 1. Theme of Interventions to Improve the Uptake of Cervical Cancer Screening with Visual Inspection with Acetic Acid

Type of interventions	Methods of interventions	Content & format	Conclusions	References
Health Education and Counselling	Traditional Methods (Brochures, Pamphlets, Booklets)	*Health education brochures. *Face-to-face interviews, pamphlets on VIA screening. *Health education using booklets and VIA cards. *Health counseling using leaflets. *VIA screening education using leaflets. *E-booklet on cervical cancer.	Health education tools like counseling, booklets, and e-booklets increase awareness, motivation, and compliance for cervical cancer screening. This benefit spans women of various age groups and settings. These interventions help overcome barriers, such as low knowledge, fear, and misunderstandings. They increase the use of screening services and promote early detection.	[20,29,32–39]
	Audiovisual and Digital Tools for Health Education	*Education through audiovisual media and counseling. *Health education using slide presentations and module books. *Education using audiovisual media and module readings. *Video-based health promotion. *Audiovisual health education. *E-booklet promotion of cervical cancer detection.	Educational interventions, like audiovisuals, leaflets, or family involvement, improve knowledge and attitudes about early cervical cancer detection. Whether through community counselling, digital media, or structured learning programs.	[17–19,37,39–42]
	Social Media and SMS-Based Education	*SMS messages about cervical cancer. *Cervical cancer education through WhatsApp groups. *Health education using social media and community resources.	Educational tools, like WhatsApp, SMS, videos, and leaflets, lead to big improvements. These methods help women of childbearing age learn more about cervical cancer. They improve awareness, attitudes, and motivation for screening and prevention. These interventions tackle barriers to screening. They raise awareness about cervical cancer risks. They also encourage people to get screened using methods like VIA.	[37,43–45]
Cancer Screening Programs	Combining VIA (Visual Inspection with Acetic Acid) and other testing.	*Providers integrate cervical cancer screening into HIV care. *VIA and cryotherapy with mobile clinics. *VIA screening by trained nurses with community outreach. *Primary and secondary care integrate cancer screening. *Combined breast and cervical cancer screenings.	Cervical cancer screening can see significant improvements. This can happen through education, community involvement, and better integration with healthcare services. This method increases screening rates. It also improves treatment follow-up when necessary.	[21–24,46–49]
Technology-Driven Interventions	mHealth and digital platforms	*mHealth data management for cervical and oral cancer screenings. *mHealth video education. *Telementoring via Zoom (Project ECHO). *VIA screening with smartphone imaging.	mHealth tech and community programs can boost cervical cancer screening in low-resource areas. We need to address tech barriers, social challenges, cultural issues, and the need for follow-up. This will help ensure that these programs work well and last.	[25,30,50–52]
Community and Peer-Based Approaches	Community Engagement and Advocacy	*Mass cervical cancer screening with community advocacy *Screening with peer educators and community leaders.	Community support helps women in low-resource areas, like rural Nigeria and India, get cervical cancer screenings. Husbands and local leaders play a big role in this. Immediate results and awareness campaigns also help to motivate participation.	[24,26]
	Peer and Family Involvement in Education	*Interpersonal education involving partners and peers. *Home visits, group counselling. *Audio-visual education involving peers. *Wish and Drive method, family-involved education. *Peer education on cervical cancer.	Educational interventions help women learn more about cervical cancer screening. These include peer sharing, counseling, and audiovisual aids. They improve women's knowledge, attitudes, and behaviors in many areas. These strategies boost awareness and participation. Community support and spousal support are key. They help encourage screening and follow-up actions.	[16,53]
Cultural and language-specific approaches	Cultural and language-specific approaches	*Educational program in native Maasai language with 3D models. *They linked breast and cervical cancer screenings with messages that fit their culture.	Educational programs designed for specific cultural contexts help increase cervical cancer screening. They focus on specific community barriers, such as language and misunderstandings.	[27,47]
Training and Capacity Building	Training and Capacity Building	*Educational program: hands-on clinical training. *Health education through cadre rejuvenation sessions.	Educational interventions greatly improve healthcare providers' skills in cervical cancer screenings. These improvements lasted over time. This shows that training effectively boosts screening skills in low-resource areas.	[28,54]

Acetic Acid, along with other tests. A past study shows that health education on VIA and clinical breast exams (CBE) can increase cervical cancer screening rates. VIA is very sensitive, making it great for early detection. CBE works well for finding breast cancer in women who haven't been screened before [21]. Integrating cervical cancer screening into current healthcare services can improve results. Community involvement also plays a key role. Education helps raise awareness and encourages participation. This strategy ensures better treatment follow-up when needed. It also helps increase screening rates [22–24].

Technology-driven interventions

The third type of intervention is technology-driven. This includes mHealth and digital platforms. A past study found that mHealth prototypes raise the social status of community health workers (CHWs) during interventions. mHealth can help health workers in poor and rural areas. It motivates them to improve prevention activities. These approaches are especially helpful in communities with low health literacy. They improve health communication, focus education efforts, and aid in data recording. mHealth's real-time features help with screening coordination. They also improve task reliability. This boosts efficiency and enhances care coordination between patients and providers [25].

Community and peer-based approaches

The four types of intervention are: community and peer-based approaches, community engagement and advocacy, peer and family Involvement in education. Community advocacy for cervical cancer screening is a great way to raise awareness. In southeast Nigeria, spouses and community leaders greatly influenced women's decisions on cervical cancer screening services. Most women participated in the screening because their husbands and community leaders encouraged them to do so. Local leaders and family involvement are crucial for increasing participation in public health programs in resource-limited areas [26].

Cultural and language-specific approaches

The fifth type of intervention is cultural and language-specific approaches. A previous study found that using simple scripted language in Maa, the Maasai's native tongue, with culturally relevant 3D models works well. The 3D pelvic model shows how a pelvic exam works. It helps lower anxiety and uncertainty. Maasai women stated that they prefer information to be conveyed visually. They found this approach more effective. It helped them grasp the complex topic of cervical cancer. The program used simple language and fitting visuals. This helped Maasai women understand and join cervical cancer screening [27].

Training and capacity building

The sixth type of intervention is training and capacity building. A past study showed that a 5-day training program improves health workers' knowledge and skills in VIA screening. Knowledge gained from the programme was shown to be retained in the long term. At the 6-month follow-up, the average test score remained higher than before the training [28].

Discussion

Educational and counseling interventions are used more often (53%). They are cost-effective and can adapt to different cultures. Plus, they directly fill knowledge gaps. Their effectiveness shows in higher screening rates from several studies [13–15]. Health education and counseling are common methods. They effectively boost women's awareness and participation in cervical cancer screening. These interventions come in many formats. They include brochures, videos, and digital apps. This variety helps reach different groups of people. This finding matches earlier studies. They show that education increases awareness and encourages motivation for cervical cancer prevention [13, 29].

Community and peer-based interventions (16%) showed strong potential. This is important, especially for communities with few health facilities. Community leaders, husbands, and peer groups helped encourage women to get screened. This strategy helps overcome social barriers like stigma and family support issues. A study in Nigeria showed that help from local leaders boosted women's participation by 87.8% [26]. There's still a gap in using culture and language-based interventions. They make up only 4% of all studies. This is key for reaching communities with language barriers or low literacy. For example, an education program in Tanzania used 3D models and the local Maasai language [27].

Technology-based tools like mHealth and digital apps (10%) are promising, especially now. mHealth technologies provide real-time information. They improve data management and increase access for remote populations. The e-Duva app in Indonesia helped women of childbearing age learn about VIA screening. It also improved their attitudes toward it [30]. But there are still big challenges in technology. Limited infrastructure, technical issues, and low digital skills hold back wider use. The government, healthcare providers, and communities need to work together to solve these challenges.

Strengths and limitations

The review highlights cervical cancer, a major global issue. This disease is one of the top causes of death for women around the world. The scoping review examined several countries. It focused on regions with high cervical cancer rates, especially in Africa and Asia. It found different intervention patterns shaped by social, cultural, and economic factors. This paper offers important insights for global cervical cancer prevention efforts.

Using PRISMA guidelines and the PCC framework makes reviews clearer and improves them. The review shows how community-based, technological, and cultural methods work well. It also gives practical advice for use in places with few resources. Identifying research gaps is key. For example, there are few studies on culture-based approaches. This highlights a need for more research in this area.

This scoping review also has a number of limitations. Most of the studies analyzed came from low- and middle-income countries. This limits how well the findings relate to the world, especially in developed countries. The main research designs were quasi-experimental and observational. These designs provide weaker evidence than randomized controlled trials. VIA methods were the main focus. However, inconsistent data on intervention effectiveness limit broader conclusions. This review may be subject to potential selection bias due to the study selection process. This could mean that some interventions are not fully represented. Also, not having a meta-analysis makes it hard to measure how well each intervention works.

In conclusion, this scoping review identified six main interventions to improve cervical cancer screening using the VIA method globally: Health education and counselling, Cancer screening programs, Technology-based interventions, Community and peer-based approaches, Cultural and language-based strategies, Training and capacity building. Health education and counseling are essential for raising women's awareness about cervical cancer screening. This is especially true in resource-limited countries. The findings guide public health practitioners. They also help design more innovative and integrated interventions. To make future screening better, we need to diversify our approaches. We should also integrate technology and customize efforts to fit local cultures.

Author Contribution Statement

All three authors had contributed to this study. Triatmi Andri Yanuarini designed the original study protocol. Triatmi Andri Yanuarini and Sri Mulyani conducted literature searches and screenings. Triatmi Andri Yanuarini and Vitri Widyaningsih has assessed the quality of the included studies and performed the data analysis. Triatmi Andri Yanuarini contributed to writing the manuscript, Sri Mulyani and Vitri Widyaningsih reviewed the manuscript.

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General

The findings and conclusions in this document are those of the authors, who are responsible for its contents.

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Ethical Declaration

Ethics approval and consent to participate

This study is a scoping review did not require ethical approval or consent to participate. However, as it is a part of Ph.D thesis, it was approved by the medical ethics committee of the Universitas Sebelas Maret (No. 157/UN257.06.11/KEP/EC/2024).

Data Availability

As this study is a review of previous data, no new data were generated in support of this research.

Conflict of Interest

The authors have declared no potential conflicts of interest.

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