Availability of Essential Supplies for VIA Testing in Primary Healthcare Facilities in Khargone District, Madhya Pradesh: A Cross-Sectional Study

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Abstract

Background: *Cervical cancer is one of the leading causes of morbidity and mortality among women in low- and middle-income countries. Early detection through screening is a proven strategy to reduce its burden. Visual Inspection with Acetic Acid (VIA) is widely recommended by the World Health Organization as a simple, cost-effective, and feasible approach for resource-constrained health systems. However, its effectiveness relies not only on trained providers but also on the uninterrupted availability of basic supplies such as acetic acid, sterile gloves, instruments, and disinfectants. Inadequate readiness of health facilities may compromise screening quality, hinder infection control, and ultimately reduce community trust in the program.*

Objective: *The present study aimed to assess the readiness of healthcare facilities to provide VIA services by evaluating the availability of essential supplies, including acetic acid (3–5%), sterile gloves, disposable or sterilized instruments, and disinfectants, in Khargone district, Madhya Pradesh.*

Methods: *It was conducted A cross-sectional, facility-based survey was conducted in 169 healthcare centers across various blocks in Khargone district, Madhya Pradesh. Data were collected using a structured checklist focusing on key VIA inputs. Availability of supplies was documented and analyzed descriptively, with results expressed as frequencies and percentages.*

Results: *The findings revealed striking shortages across facilities. Acetic acid, the critical reagent for VIA testing, was available in only one facility (0.6%), while 99.4% lacked it altogether. Sterile gloves were adequately stocked in just 14 facilities (8.3%). Similarly,*

Disposable or sterilized instruments such as forceps and cotton swabs were present in 12 facilities (7.1%). Although disinfectants and sterilization materials were reported in 90 facilities (53.3%), nearly half still lacked the resources necessary for maintaining safe practices.

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Conclusion: *The study underscores profound gaps in health system preparedness for cervical cancer screening through VIA. The near-absence of acetic acid, coupled with inadequate infection control supplies, renders most facilities unable to provide safe and effective screening. These deficiencies threaten the sustainability of cervical cancer prevention programs and may delay progress toward global elimination targets. Strengthening procurement and supply chains, investing in infection prevention resources, and ensuring regular monitoring of facility readiness are urgent priorities. Without such measures, the promise of VIA as a low-cost, life-saving intervention will remain unfulfilled in many underserved communities.*

Keywords

Cervical cancer, Visual Inspection with Acetic Acid, Facility readiness, Screening supplies, Acetic acid, Infection prevention, Low-resource settings

Introduction

Cervical cancer represents a persistent inequity in global health, disproportionately affecting women in low- and middle-income countries (LMICs). It is the second most common malignancy among women in these regions, where organized screening and preventive programs remain underdeveloped. According to the World Health Organization (WHO), over 600,000 new cases and approximately 340,000 deaths occur annually, with nearly 90% of this burden concentrated in LMICs (WHO, 2020). The mortality-to-incidence ratio in these contexts is markedly higher than in high-income countries, reflecting systemic challenges in prevention, early detection, and access to timely treatment (Arbyn et al., 2020).

Screening remains the cornerstone of cervical cancer control, and its expansion is central to the WHO's global strategy to eliminate cervical cancer as a public health problem. Visual Inspection with Acetic Acid (VIA) has been advocated as a pragmatic alternative to cytology and HPV- based testing in resource-constrained settings. Unlike cytology, VIA is inexpensive, requires minimal laboratory infrastructure, and provides immediate results, enabling a "screen-and-treat" model that reduces loss to follow-up (Sankaranarayanan et al., 2014). Evidence from demonstration projects and national programs has shown VIA to be effective in reducing cervical cancer incidence and mortality when implemented with fidelity (Denny et al., 2006).

Yet, the promise of VIA is often undermined by structural deficits within health systems. The consistent availability of basic supplies—including 3–5% acetic acid, functioning speculums, sterile gloves, disinfectants, and sterilized or disposable instruments—is a non-negotiable prerequisite for safe and effective implementation. Their absence compromises not only the technical validity of screening but also patient safety and infection control, which are critical determinants of community trust in preventive services. Supply chain vulnerabilities and weak logistics management systems further exacerbate these challenges in LMICs, rendering health facilities unable to deliver routine VIA services (Chigbu et al., 2017).

Empirical evidence underscores this tension between policy endorsement and practical feasibility. In Zambia, Mwanahamuntu et al. (2011) demonstrated that integrating VIA into HIV care programs was successful largely because critical resources were reliably supplied, alongside provider training and supervision. Conversely, studies from India and several Sub-Saharan African countries have revealed that frequent stock-outs of acetic acid and the absence of sterilized instruments are among the most common barriers to VIA scale-up (Sankaranarayanan et al., 2014; Muwonge et al., 2020). These findings highlight that while VIA is often framed as a "low-cost" technology, its sustainability depends on a minimum threshold of material inputs and systemic readiness.

Against this backdrop, the present study seeks to evaluate the availability of essential supplies required for VIA testing across healthcare facilities across various blocks in Khargone district, Madhya Pradesh. By systematically documenting gaps in acetic acid, sterile gloves, instruments, and disinfectants, this research provides an empirical foundation for strengthening service readiness. In doing so, it contributes to the broader discourse on health system preparedness, equity in cancer prevention, and the operational realities of achieving the global cervical cancer elimination targets.

Methods

A descriptive, cross-sectional facility-based survey was undertaken across 169 healthcare facilities in Khargone district, Madhya Pradesh to assess readiness for cervical cancer screening using Visual Inspection with Acetic Acid (VIA). The study design was chosen to provide a snapshot of essential supply availability, a critical determinant of service delivery capacity in resource-limited contexts.

Data Collection Instrument

A structured facility assessment checklist was developed, drawing on the WHO service availability and readiness assessment (SARA) frameworks and prior cervical cancer screening evaluation tools. The checklist captured information on the presence or absence of core supplies required for VIA, specifically:

- Acetic acid (3–5%), the essential reagent for VIA testing,
- Sterile gloves, to ensure provider and patient safety during examinations,
- Disposable or sterilized instruments (e.g., forceps, cotton swabs) for conducting the procedure, and
- Disinfectants and sterilization materials, necessary for infection prevention and safe reuse of instruments where applicable.

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Data Collection Procedure

Data were collected by trained field investigators through direct observation and verification of supply availability within each facility. Where applicable, confirmation was obtained from facility records and supply registers to reduce reporting bias.

Data Analysis

Collected data were coded and entered into a statistical database. Descriptive analyses were conducted, with results summarized as frequencies and percentages to illustrate the proportion of facilities reporting availability of each supply. The choice of descriptive statistics aligns with the study's objective of documenting facility readiness rather than testing hypotheses.

Results:

Availability of Acetic Acid (3–5%) for VIA Test

Does the facility have an adequate supply of acetic acid (3-5%) for The VIA test?	Frequency	Percent
Yes	1	.6
No	168	99.4
Total	169	100.0

The majority of 169 facilities surveyed had an inadequate supply of acetic acid (3-5%), a crucial reagent for conducting VIA tests. This shortage, which affects 99.4% of facilities, is a significant issue in service readiness, as acetic acid is the cornerstone of VIA screening, which is crucial for primary care cervical cancer screening efforts.

Availability of Sterile Gloves for VIA Testing

Is there a sufficient supply of sterile Gloves for the healthcare provider performing the VIA?	Frequency	Percent
Yes	14	8.3
No	155	91.7
Total	169	100.0

Out of 169 facilities surveyed, only 8.3% had sufficient sterile gloves for VIA testing, while 91.7% had inadequate supplies. This shortfall poses a significant challenge to infection control standards and patient safety during

cervical cancer screening. The lack of basic protective equipment could hinder service delivery and discourage providers from offering VIA testing.

Availability of Disposable or Sterilized Instruments for the VIA Procedure

Are disposable or sterilized instruments (e.g., forceps, cotton swabs) available for the procedure?	Frequency	Percent
Yes	12	7.1
No	157	92.9
Total	169	100.0

The majority of 169 facilities, including 157 with 92.9% lacking disposable or sterilized instruments like forceps and cotton swabs, have no such tools for conducting the Viral In Vitro Aortic Aneurysm (VIA) procedure, a significant issue that raises concerns about hygiene, patient safety, and the quality of cervical cancer screening services.

Availability of Disinfectants and Sterilization Materials

Does the facility have disinfectants and materials for sterilizing instruments?	Frequency	Percent
Yes	90	53.3
No	79	46.7
Total	169	100.0

Out of 169 facilities surveyed, only 53.3% had disinfectants and sterilization materials, while 46.7% did not. This lack of resources raises concerns about infection control and safe instrument reuse during VIA procedures. Strengthening service readiness is crucial to ensure hygienic conditions and prevent cross-contamination, as nearly half of the centers lack these materials.

Discussion

This study revealed critical deficiencies in the readiness of healthcare facilities to provide VIA-based cervical cancer screening. The near-complete absence of acetic acid (available in only 0.6% of facilities) highlights a fundamental barrier to implementing this low-cost screening approach. Without acetic acid, VIA cannot be conducted, rendering training, infrastructure, and policy directives ineffective. Similar findings were reported by Sankaranarayanan et al. (2014), who observed

that interruptions in acetic acid supply chains were among the leading causes of low VIA coverage in India. In Sub-Saharan Africa, Chigbu et al. (2017) documented comparable shortages, noting that despite policy endorsement, logistical bottlenecks often prevented facilities from maintaining even basic screening supplies. These consistent observations across regions underscore the reality that cervical cancer prevention in LMICs is less constrained by clinical feasibility than by health system functionality.

The graphical representation (Figure 1) starkly illustrates the profound gaps in service readiness. The availability of acetic acid (0.6%), sterile gloves (8.3%), and disposable instruments (7.1%) is nearly negligible compared to disinfectants (53.3%). This pattern suggests that while some infection control measures receive partial attention, the essential inputs required for VIA screening are almost universally absent.

Comparisons with previous studies. Similar findings have been reported in multiple LMICs. For example, Sankaranarayanan et al. (2014) emphasized that in India, the shortage of acetic acid was a recurrent bottleneck, leading to interruptions in VIA coverage. Chigbu et al. (2017) observed that in Nigeria, weak logistics and procurement systems resulted in high rates of stock-outs for gloves and screening consumables. These parallels reinforce that the shortages documented here are not isolated but symptomatic of systemic weaknesses in supply chain governance across low-resource settings.

Implications for infection control. The lack of sterile gloves in 91.7% of facilities is particularly concerning. As Denny et al. (2006) demonstrated in South Africa, consistent availability of gloves and disinfectants increased provider adherence to infection control protocols and improved patient acceptance of VIA. Conversely, in facilities without adequate infection prevention supplies, both providers and patients were reluctant to participate, undermining program effectiveness. Thus, infection control readiness is not peripheral but central to the success of screening initiatives.

Holistic readiness vs partial preparedness. The relatively higher availability of disinfectants (53.3%) may reflect generalized procurement for broader health services. However, without the simultaneous availability of acetic acid, speculums, and instruments, this preparedness cannot translate into meaningful cervical cancer prevention. As Nakisige et al. (2017) noted in Uganda, partial readiness often leads to missed opportunities: facilities may advertise screening but be unable to deliver services consistently, eroding public trust.

Policy and system-level implications. These findings echo Arbyn et al. (2020) and the WHO's global elimination strategy (2020), both of which stress that cervical cancer elimination requires more than technical know-how—it requires reliable health system inputs. Viner et al. (2012) further highlighted that inequities in health outcomes persist not because interventions are unknown, but because resource allocation and service delivery remain uneven. Addressing these bottlenecks requires investments in supply chain management, decentralized procurement authority, and continuous monitoring systems that can identify and resolve stock-outs in real time.

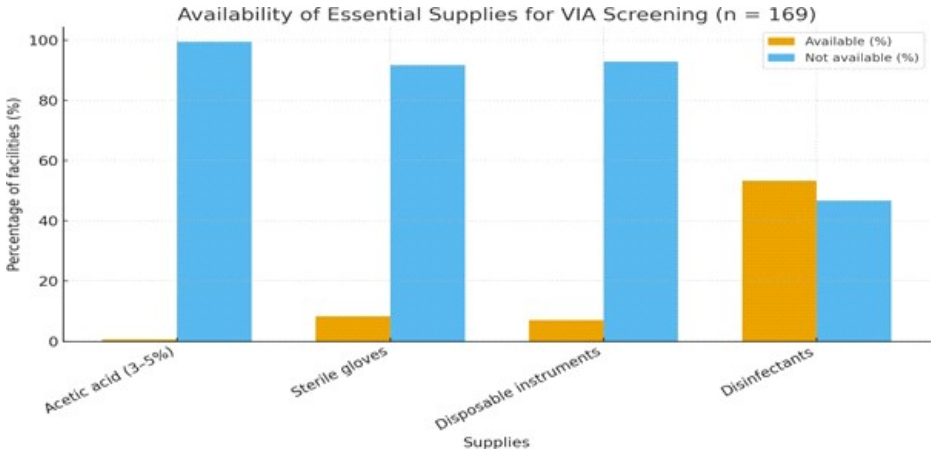

Figure 1. Availability of essential supplies for VIA screening in surveyed facilities (n = 169).

The pie chart (Figure 2) emphasizes the stark reality that virtually no facility possessed all three critical supplies—acetic acid, sterile gloves, and disposable instruments—at the same time. This finding reveals a compounded vulnerability: even if one resource is occasionally available, the absence of the others makes safe and effective VIA screening impossible.

Comparable results were reported by Mwanahamuntu et al. (2011) in Zambia, where the sustainability of VIA hinged on maintaining simultaneous availability of essential inputs. Similarly, Muwonge et al. (2020) observed that facilities with consistent multi-supply readiness were able to integrate VIA into broader reproductive health services, while those with fragmented readiness failed to deliver screening consistently. This indicates that cervical cancer prevention cannot be achieved through partial preparedness; a minimum "package" of essential supplies is indispensable.

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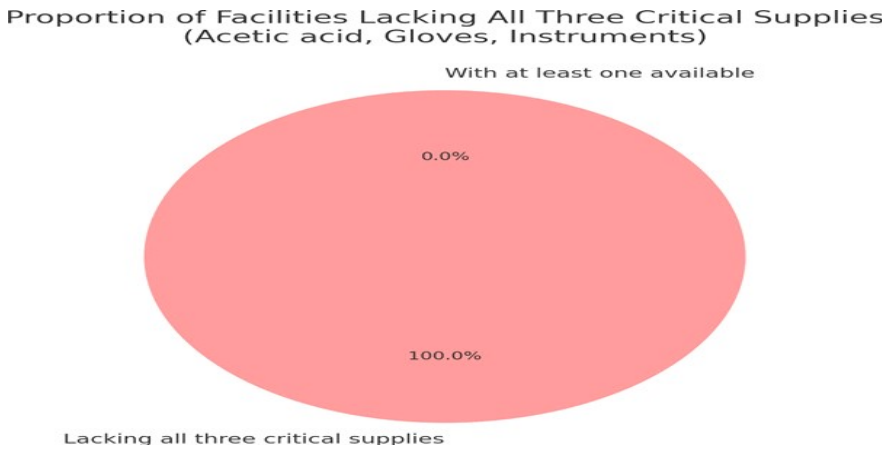

Figure 2. Proportion of facilities lacking all three critical VIA supplies (n = 169).

The broader implication of these findings is that the primary barrier to scaling up VIA screening is not lack of clinical evidence or training, but systemic weaknesses in health system preparedness. As Viner et al. (2012) and the WHO (2020) have argued, achieving health equity in cancer prevention requires both political commitment and logistical investments in supply chains. Without strengthening procurement and distribution systems, even the most cost-effective interventions cannot achieve meaningful population-level impact. This aligns with the conclusions of Arbyn et al. (2020), who emphasized that the elimination of cervical cancer in LMICs is contingent upon aligning programmatic ambitions with realistic investments in service readiness.

Conclusion

Taken together, the results of this study and those of previous authors illustrate a sobering reality: the promise of VIA as a low-cost, life-saving screening intervention cannot be realized without addressing foundational supply-side barriers. The lack of acetic acid, sterile gloves, and instruments demonstrates a systemic failure to ensure minimum standards of care. While more than half of the facilities had disinfectants, this partial readiness is insufficient for comprehensive screening. Strengthening supply chain mechanisms, ensuring sustainable financing, and embedding routine monitoring of service readiness are critical steps toward operationalizing the WHO's cervical cancer elimination strategy. Failure to address these basic gaps risks perpetuating inequities in women's health and delaying progress toward global targets.

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