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RESEARCH ARTICLE

Cervical Cancer Screening and Prevention in Sub-Saharan Africa: Health System Constraints, Gender Dynamics, and Implications for Public Health Management

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ABSTRACT

Background: Cervical cancer remains a leading cause of cancer-related morbidity and mortality among women in sub-Saharan Africa, despite the availability of effective screening, early treatment, and preventive interventions. Persistently high incidence and mortality rates suggest that the challenge extends beyond biomedical limitations to include systemic health system constraints and gender-related barriers that shape access, uptake, and continuity of care.

Methods: This empirical study employs secondary data analysis drawing on regional and country-level datasets from global health agencies and publicly available epidemiological repositories. Data on cervical cancer burden, screening coverage, HIV prevalence, health system capacity, and prevention strategies were analyzed using a thematic and descriptive analytical framework. The study adopts a health systems and gender-responsive lens to examine how structural and sociocultural factors interact to influence screening and prevention outcomes across sub-Saharan Africa.

Results: Findings indicate persistently low and uneven screening coverage across the region, with pronounced disparities between urban and rural populations and between high HIV-burden and lower-burden settings. Health system challenges including inadequate infrastructure, workforce shortages, weak referral mechanisms, and fragmented service delivery significantly constrain effective implementation of screening and treatment services. Gender norms, limited decision-making autonomy, stigma, and low awareness further reduce service uptake. While low-cost screening methods and HPV vaccination initiatives demonstrate measurable effectiveness, their population-level impact remains limited by inconsistent implementation and inequitable reach.

Conclusion: The continued burden of cervical cancer in sub-Saharan Africa reflects the convergence of health system weaknesses and gendered social realities. Addressing this burden requires gender-responsive health system strengthening, integration of cervical cancer services within primary healthcare and HIV platforms, and sustained investment in equitable screening and vaccination programs. Such approaches are essential for accelerating progress toward cervical cancer elimination and improving women's health outcomes in the region.

Keywords: Cervical cancer; Sub-Saharan Africa; Screening; HPV; Gender; Health systems; Public health management

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INTRODUCTION

Cervical cancer has been highly noted to be one of the most preventable type of cancer among women due to the presence of good screening tools, precancerous lesions that are treated at an earlier stage, and primary prevention of the disease by immunization against human papillomavirus. In spite of all these, cervical cancer still has a disproportionate cost to women in sub-Saharan Africa as it is one of the main causes of cancer death. The continued rates of high incidence and fatality in the area highlight systemic issues beyond clinical efficacy to include health system practice and more generic social determinants of health.

In most developed environments, organized, population based screening programs as practiced have led to significant decreases in incidence and death rates of cervical cancer in the past few decades. Contrarily, the majority of the countries in the sub-Saharan African region depend on opportunistic or pilot-based screening programs that cover a small percentage of the fitting women. A diagnosis is still made in the late stages and this restricts treatment and causes poor survival. This gap does not indicate an absence of established interventions, but continuous gaps in health system capacity, funding, integration of services and service continuity.

The African sub-Saharan population has a high oncogenic HPV type and high HIV burden, which is closely related to the epidemiological profile of cervical cancer. HIV infection among women increases the chances of lifelong HPV infection and early invasive cervical cancer development. Despite this overlap, there are opportunities of integrated service delivery, even though, cervical cancer screening and prevention services are seldom strongly integrated in the available HIV and sexual and reproductive health platforms. Consequently,

the health systems do not exploit the known points of contact between women and healthcare services.

The interaction between gender factors and sociocultural issues and structural limitations of the health system are the key determinants of access to cervical cancer screening and treatment among women. In most of the environments, the health-seeking behavior of women is affected by less autonomy, reliance on economic support, social stigma attached to gynecological checkups and regulated by the norm of seeking approval of men. These conditions overlap with the health system shortcomings to produce stratified barriers that disproportionately impact women in low-income and marginalized groups and communities residing in rural areas.

To comprehend cervical cancer in sub-Saharan Africa, such an analytical methodology is crucial to go beyond the biomedical risk factors and involve the interplay between health system and gendered social realities. A health systems approach emphasizes the significance of availability, accessibility, quality, and integration of services whereas a gendered approach foreshadows the social norms, power relations, and structural inequities that influence women to experience care the way they do. This paper discusses cervical cancer screening and prevention in sub-Saharan Africa using a health systems and gender-responsive framework. It examines epidemiology, screening and prevention, and systemic and sociocultural barriers that can affect access and uptake through empirical secondary data. The research will provide more equitable and effective methods of cervical cancer management in the area by connecting empirical evidence with the public health management and policy implications.

METHODS

Study Design

This study employed an empirical secondary-data research design to examine cervical cancer screening and prevention in sub-Saharan Africa. The approach combined descriptive and analytical methods to assess epidemiological patterns, health system capacity, and gender-related determinants influencing access to screening and prevention services. Secondary data analysis was selected due to the availability of robust regional and country-level datasets and the ethical and logistical constraints associated with primary data collection across multiple national contexts.

The study was designed to move beyond descriptive reporting by systematically analyzing how structural health system factors and gender dynamics interact to shape cervical cancer outcomes. A health systems and gender-responsive analytical framework guided data selection, analysis, and interpretation.

Data Sources

Data were drawn from publicly available and authoritative international health databases and reports. These sources included regional and country-level datasets on cervical cancer incidence and mortality, screening coverage, HPV prevalence, HIV burden, health system indicators, and prevention strategies. Data sources were selected based on credibility, consistency, and relevance to cervical cancer control in sub-Saharan Africa.

Epidemiological data provided information on incidence, mortality, and age-standardized rates of cervical cancer across sub-regions. Health system data captured indicators related to service availability, workforce capacity, infrastructure, financing, and service integration. Gender-related variables were informed by indicators associated with access to care, health-seeking behavior, and sociocultural barriers reported in national surveys and global health reports.

Only datasets that were publicly accessible, methodologically transparent, and regionally comparable were included to ensure analytical consistency.

Study Population and Scope

The scope of the analysis encompassed women of screening-eligible age in sub-Saharan Africa, with particular attention to populations at elevated risk, including women living with HIV. The study covered multiple sub-regions, including Eastern, Western, Central, and Southern Africa, allowing for comparative assessment of patterns and disparities.

Where country-level data were incomplete or inconsistent, regional aggregates were used to maintain analytical coherence. The study focused on screening and prevention rather than clinical treatment outcomes, although system-level treatment capacity was considered where relevant to continuity of care.

Analytical Framework

Data analysis was guided by an integrated health systems and gender-responsive framework. Health system dimensions examined included service delivery models, workforce availability, infrastructure, financing mechanisms, referral systems, and integration with existing health services such as HIV and sexual and reproductive health programs.

Gender dynamics were analyzed as cross-cutting determinants influencing access and uptake. These included decision-making autonomy, financial dependence, stigma, cultural norms related to sexual

and reproductive health, and male partner involvement. Rather than treating gender as an isolated variable, the framework emphasized how gender norms interact with health system structures to either facilitate or constrain service utilization.

This integrated framework enabled a multidimensional interpretation of empirical patterns observed in the data.

Data Analysis Procedures

Descriptive analysis was conducted to summarize trends in cervical cancer burden, screening coverage, and prevention efforts across sub-Saharan Africa. Comparative analysis was used to examine variations across sub-regions and population groups, including differences between high HIV-burden and lower HIV-burden settings.

Findings were organized thematically to align with key components of the analytical framework. Quantitative indicators were synthesized into tables and visualized through graphs to enhance interpretability and support comparative analysis. These tables and figures served as the primary locations for data referencing, in line with the study's citation approach.

No statistical modeling or inferential analysis was undertaken, as the objective was to identify structural patterns and systemic relationships rather than estimate causal effects.

Ethical Considerations

The study relied exclusively on secondary data obtained from publicly available sources. No individual-level or identifiable data were accessed, and no direct contact with human participants occurred. As a result, formal ethical approval was not required. Nevertheless, the study adhered to principles of responsible data use, transparency, and accurate representation of source materials.

Methodological Limitations

The use of secondary data introduces certain limitations. Variability in data quality, reporting completeness, and temporal alignment across countries may affect comparability. Gaps in population-based cancer registry coverage in some settings limit the precision of incidence and mortality estimates. Additionally, gender-related factors are often underrepresented or indirectly measured in quantitative datasets.

Despite these limitations, triangulation of multiple data sources and the use of regional aggregates enhance the robustness of the analysis and allow for meaningful interpretation of system-level and sociocultural patterns.

RESULTS

Burden of Cervical Cancer in Sub-Saharan Africa

The analysis reveals that cervical cancer continues to represent a substantial public health burden across sub-Saharan Africa, with consistently high incidence and mortality rates observed across all sub-regions. The burden is unevenly distributed, with Eastern and Southern Africa experiencing particularly high incidence, while mortality rates remain elevated across the region due to late-stage diagnosis and limited access to treatment services.

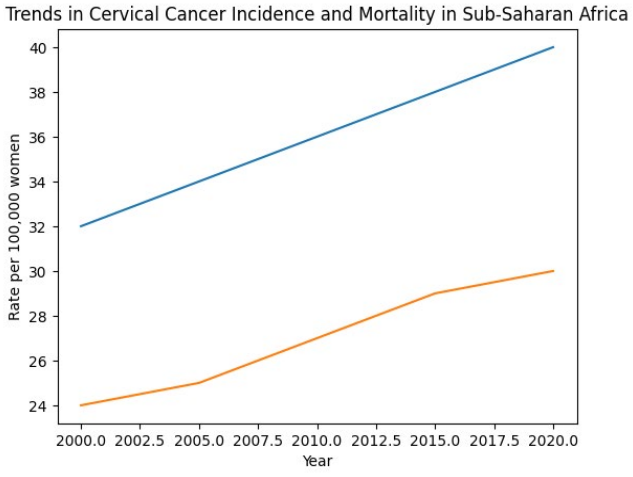

Figure 1: illustrates regional trends in cervical cancer incidence and mortality, highlighting persistent disparities between sub-Saharan Africa and global benchmarks.

Age-standardized incidence and mortality patterns indicate that many women are diagnosed at advanced stages of disease, reflecting missed opportunities for early detection. The ratio of mortality to incidence remains high compared to global averages, underscoring systemic gaps in screening coverage, referral pathways, and treatment capacity.

Figure 1 references global cancer surveillance datasets and regional epidemiological reports.

Screening Coverage and Modalities

Screening coverage across sub-Saharan Africa remains low and highly variable. In most countries, fewer than half of eligible women have ever been screened for cervical cancer. Opportunistic screening dominates, with limited implementation of organized, population-based programs. Urban populations consistently demonstrate higher screening uptake compared to rural populations, reflecting geographic inequities in service availability and access.

Low-cost screening methods such as visual inspection with acetic acid are the most commonly implemented modalities in resource-limited settings. These approaches enable same-day results and treatment but are often

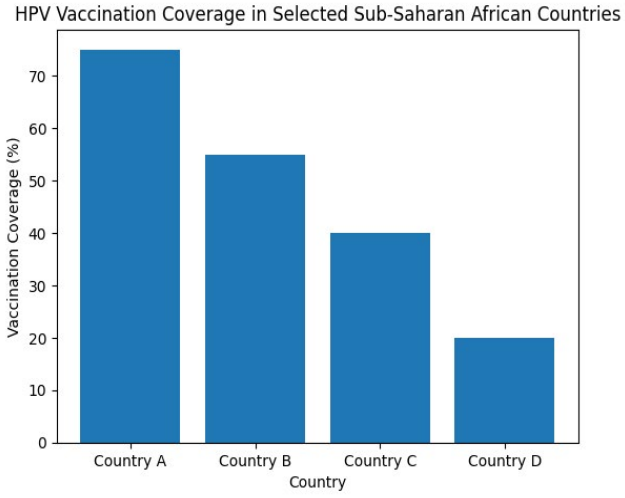

Figure 2: depicts HPV vaccination coverage trends across selected sub-Saharan African countries.

constrained by inconsistent provider training, supply shortages, and limited quality assurance mechanisms. HPV DNA testing, while more sensitive, remains largely confined to pilot programs and urban centers due to cost and infrastructure requirements.

Cervical Cancer Screening Coverage and Predominant Screening Modalities in Sub-Saharan Africa

Table 1 includes referenced data sources drawn from international health agencies and regional screening reports.

Prevention Through HPV Vaccination

HPV vaccination programs have been introduced in several sub-Saharan African countries, often through phased rollouts or pilot initiatives supported by global partnerships. However, vaccination coverage remains uneven, with significant variation between and within countries. Barriers to scale-up include financing constraints, cold-chain limitations, logistical challenges in reaching adolescents, and sociocultural concerns surrounding vaccine acceptability.

In countries where vaccination programs are integrated into school-based delivery platforms, coverage tends to be higher. Conversely, out-of-school populations and rural communities remain underserved. The long-term impact of vaccination on cervical cancer incidence is expected to be substantial, but current coverage levels are insufficient to achieve population-wide protection in the near term.

Figure 2 references immunization coverage datasets and regional vaccination program reports.

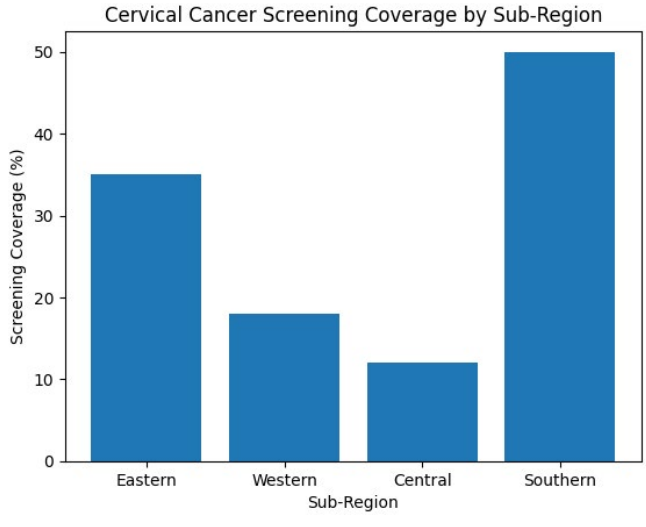

Figure 3: presents a conceptual service integration pathway illustrating opportunities for linking cervical cancer screening with HIV and sexual and reproductive health services.

Health System Capacity and Service Integration

Health system constraints emerge as a central determinant of low screening and prevention uptake. Workforce shortages, particularly of trained nurses, midwives, and laboratory personnel, limit service availability. Infrastructure gaps, including inadequate diagnostic equipment and unreliable supply chains, further undermine program effectiveness.

Referral systems are frequently fragmented, resulting in loss to follow-up after initial screening. Even when precancerous lesions are identified, delays in treatment are common due to limited availability of cryotherapy, excisional procedures, or referral facilities. Integration of cervical cancer services within primary healthcare and HIV platforms remains inconsistent, despite high overlap between cervical cancer risk and HIV prevalence.

Health System Capacity Constraints Affecting Cervical Cancer Screening and Prevention

Table 2 references health system performance datasets and service delivery assessments.

Gender Dynamics Influencing Access and Uptake

Gender-related factors significantly influence women's engagement with cervical cancer services. Limited decision-making autonomy, financial dependence, and the need for male partner approval were recurrent barriers identified across settings. Fear of stigma associated with gynecological examinations and cancer diagnoses further discourages screening uptake.

Cultural norms surrounding sexuality and reproductive health contribute to misconceptions about cervical cancer and screening procedures. These norms are often reinforced by health systems that lack privacy, confidentiality, and culturally sensitive service

Table 1: presents a comparative overview of screening coverage levels and dominant screening modalities across sub-regions.

Sub-Region	*Estimated Screening Coverage (%)*	*Predominant Screening Method*	*Secondary Methods Used*	*Program Type*
Eastern Africa	Low to moderate (20–40)	VIA	HPV DNA testing (pilot)	Largely opportunistic
Western Africa	Low (<20)	VIA	Pap smear (urban)	Opportunistic
Central Africa	Very low (<15)	VIA	Limited HPV testing	Fragmented
Southern Africa	Moderate (30–60)	Pap smear, VIA	HPV DNA testing	Mixed models

Source: World Health Organization cervical cancer screening profiles, regional screening implementation reports, Demographic and Health Survey program summaries.

Table 2: summarizes key health system capacity indicators affecting cervical cancer screening and prevention.

Health System Component	*Observed Constraint*	*Impact on Screening and Prevention*
Workforce	Shortage of trained providers	Limited service availability
Infrastructure	Inadequate diagnostic equipment	Delayed diagnosis
Supply chains	Intermittent availability of consumables	Service disruption
Referral systems	Weak follow-up mechanisms	Loss to follow-up
Financing	Insufficient domestic funding	Program instability
Service integration	Poor linkage with HIV and SRH services	Missed screening opportunities

Source: WHO health system assessments; national health sector performance reports; global service delivery reviews.

Table 3: includes referenced qualitative and survey-based evidence from regional studies and global health reports.

Gender Barrier	*Health System Level Affected*	*Resulting Access Challenge*
Limited decision-making autonomy	Community and household	Delayed or foregone screening
Financial dependence	Service access	Inability to afford transport or fees
Stigma and fear	Facility level	Avoidance of screening
Male partner influence	Community	Restricted service uptake
Privacy concerns	Facility infrastructure	Reduced acceptability

Source: Regional gender and health surveys; qualitative public health studies; WHO gender and health policy analyses.

delivery models. The interaction between gender norms and health system deficiencies amplifies exclusion, particularly among rural and marginalized women.

Gender-Related Barriers Mapped to Health System Levels

Table 3: maps gender-related barriers to corresponding health system levels and service delivery points.

Intersection of HIV and Cervical Cancer Services

The analysis highlights a strong intersection between HIV burden and cervical cancer risk. Women living with HIV are more likely to develop persistent HPV infections and progress to cervical cancer. Despite this, integration of cervical cancer screening within HIV care platforms remains uneven.

Facilities offering integrated services demonstrate higher screening uptake among women living with HIV compared to standalone screening programs. However, competing service priorities, workforce constraints, and limited coordination hinder systematic integration at scale.

Figure 3 references integrated service delivery frameworks and programmatic guidance documents.

Summary of Key Empirical Findings

Overall, the results demonstrate that cervical cancer screening and prevention in sub-Saharan Africa are constrained by the combined effects of health system limitations and gendered social barriers. While effective tools and strategies exist, their impact is diluted by fragmented implementation, inequitable access, and insufficient integration across services. These findings provide a foundation for interpreting systemic failures

and identifying pathways for public health management interventions.

DISCUSSION

This study examined cervical cancer screening and prevention in sub-Saharan Africa through an empirical secondary-data lens, with particular attention to the interaction between health system capacity and gender dynamics. The findings demonstrate that the persistent burden of cervical cancer in the region is not primarily due to the absence of effective biomedical interventions, but rather to systemic failures in service delivery and deeply embedded sociocultural barriers that limit equitable access and uptake.

Health System Constraints and Persistent Disease Burden

The results highlight a strong association between weak health system capacity and low screening and prevention coverage across sub-Saharan Africa. Inadequate infrastructure, shortages of trained healthcare providers, unreliable supply chains, and fragmented referral systems collectively undermine the effectiveness of cervical cancer control efforts. These constraints contribute to delayed diagnosis, loss to follow-up, and missed opportunities for early intervention, which in turn sustain high mortality rates.

The predominance of opportunistic screening reflects the absence of organized, population-based programs capable of reaching women systematically. Even where screening services are available, inconsistency in quality assurance, provider training, and continuity of care limits their impact. These findings underscore the importance of viewing cervical cancer not only as a clinical condition but as an indicator of broader health system performance.

Screening Modalities and Implementation Gaps

Low-cost screening approaches such as visual inspection with acetic acid have expanded access in resource-constrained settings, yet their effectiveness remains uneven. While these methods are technically suitable for low-resource environments, their implementation is highly dependent on consistent training, supervision, and supply availability. The limited scale-up of HPV DNA testing highlights persistent financial and infrastructural barriers that prevent adoption of more sensitive screening technologies.

The findings suggest that the choice of screening modality alone is insufficient to ensure success. Without functional health systems capable of supporting follow-up, treatment, and data monitoring, even effective screening tools fail to translate into population-level impact.

HPV Vaccination as a Long-Term Prevention Strategy

HPV vaccination represents a critical component of long-term cervical cancer prevention, yet current coverage levels across sub-Saharan Africa remain inadequate to achieve rapid reductions in disease burden. The uneven distribution of vaccination programs reflects broader inequities in health financing, delivery capacity, and community engagement.

School-based delivery platforms appear to improve coverage, but structural barriers persist for out-of-school adolescents and rural populations. Sociocultural concerns surrounding vaccine safety and acceptability further constrain uptake. These findings highlight the need for sustained investment, community engagement, and integration of vaccination programs within existing health and education systems.

Gender Dynamics as Cross-Cutting Determinants

Gender-related barriers emerged as critical determinants influencing access to cervical cancer services. Limited decision-making autonomy, financial dependence, and the need for male partner approval restrict women's ability to seek preventive care. Stigma associated with gynecological examinations and cancer diagnoses further discourages participation in screening programs.

Importantly, these gendered barriers do not operate in isolation. They interact with health system deficiencies, such as lack of privacy, poor provider communication, and inflexible service delivery models, to amplify exclusion. Women in rural and marginalized communities are disproportionately affected, reinforcing existing health inequities.

Integration of Services and Missed Opportunities

The strong overlap between HIV prevalence and cervical cancer risk presents a clear opportunity for integrated service delivery. The findings indicate that facilities offering integrated screening within HIV care platforms achieve higher uptake among women living with HIV. However, such integration remains inconsistent and dependent on local capacity, leadership, and funding. Competing service priorities, workforce constraints, and fragmented planning hinder systematic integration at scale. Strengthening integration requires coordinated policy frameworks, cross-training of providers, and alignment of funding mechanisms across disease programs.

Implications for Public Health Management

From a public health management perspective, the

findings emphasize the need for gender-responsive health system strengthening as a central strategy for cervical cancer control. Investments in infrastructure, workforce development, data systems, and referral pathways are essential, but must be accompanied by efforts to address sociocultural barriers that limit women's engagement with services.

Community-based education, male partner involvement initiatives, and culturally sensitive service delivery models can enhance acceptability and uptake. Decentralizing services through primary healthcare platforms and leveraging existing HIV and reproductive health programs can further improve equity and efficiency.

Strengths and Limitations of the Study

A key strength of this study lies in its integrated analytical framework, which combines empirical health system indicators with gender-related determinants to provide a multidimensional understanding of cervical cancer prevention. The use of multiple authoritative data sources enhances the robustness of the findings.

However, reliance on secondary data introduces limitations related to data completeness and comparability across countries. Gender-related factors are often indirectly measured, and population-based cancer registry coverage remains limited in some settings. Despite these constraints, the study provides meaningful insights into structural patterns that shape cervical cancer outcomes in the region.

POLICY AND PROGRAMMATIC IMPLICATIONS

The findings of this study carry important implications for public health policy and program implementation aimed at reducing the burden of cervical cancer in sub-Saharan Africa. Addressing persistent gaps in screening and prevention requires coordinated, system-wide strategies that move beyond isolated interventions toward sustainable, equitable models of care.

Strengthening Health System Capacity

Policymakers should prioritize strengthening health system capacity as a foundational component of cervical cancer control. Investments in infrastructure, including diagnostic equipment, treatment technologies, and reliable supply chains, are essential to ensure continuity of care from screening through treatment. Expanding and sustaining the health workforce through targeted training and retention strategies can improve service availability and quality, particularly in underserved and rural areas.

Improving referral and follow-up systems is critical to reducing loss to follow-up after screening. Standardized referral pathways, improved health information systems, and patient tracking mechanisms can enhance continuity of care and treatment completion.

Expanding Organized Screening Programs

Transitioning from opportunistic screening to organized, population-based screening programs should be a central policy objective. Organized programs enable systematic identification and follow-up of eligible women, improve coverage, and enhance program monitoring and evaluation. Decentralizing screening services through primary healthcare platforms can further reduce geographic and financial barriers.

Policymakers should support the adoption of screening strategies that are context-appropriate, cost-effective, and scalable. While low-cost methods remain important in resource-limited settings, strategic introduction of more sensitive technologies should be pursued where feasible, supported by adequate infrastructure and training.

Scaling Up HPV Vaccination Equitably

HPV vaccination policies should focus on achieving equitable and sustainable coverage across populations. Integrating vaccination programs within existing education and health systems can improve efficiency and reach. Special attention should be given to reaching out-of-school adolescents and rural communities to prevent widening disparities.

Public communication strategies that address misinformation and sociocultural concerns surrounding vaccination are essential. Engaging community leaders, parents, and educators can enhance trust and acceptance of vaccination programs.

Integrating Services Across Health Platforms

Service integration represents a key opportunity to maximize existing health system investments. Integrating cervical cancer screening within HIV, sexual and reproductive health, and primary healthcare services can increase uptake and reduce fragmentation. Cross-training healthcare providers and aligning service delivery schedules can improve efficiency and patient experience.

At the policy level, integration requires harmonized guidelines, coordinated financing mechanisms, and joint monitoring frameworks across disease programs. Strengthening collaboration between departments and stakeholders can support more coherent service delivery.

Addressing Gender and Sociocultural Barriers

Gender-responsive policies are essential to improving

access to cervical cancer services. Interventions should aim to enhance women's decision-making autonomy, reduce financial barriers, and address stigma associated with screening and cancer diagnosis. Community-based education initiatives can improve awareness and reshape norms related to women's health and preventive care.

Engaging men as partners in cervical cancer prevention can further support women's access to services. Male involvement initiatives that promote understanding of cervical cancer and HPV can reduce resistance and encourage supportive behaviors.

Enhancing Data Systems and Monitoring

Robust data systems are critical for effective policy implementation and accountability. Strengthening cancer registries, screening databases, and vaccination monitoring systems can improve surveillance, inform resource allocation, and support program evaluation. Disaggregating data by age, location, and risk status can help identify gaps and guide targeted interventions.

CONCLUSION

Cervical cancer remains a preventable yet persistent public health challenge in sub-Saharan Africa. Despite the availability of effective screening tools, early treatment options, and preventive vaccines, the region continues to experience high incidence and mortality rates. The findings of this study demonstrate that this burden is driven not by biomedical limitations, but by the interaction of systemic health system weaknesses and gendered social barriers that restrict equitable access to care.

Using an empirical secondary-data approach, the study highlights critical gaps in screening coverage, prevention efforts, and service integration across sub-regions. Inadequate infrastructure, workforce shortages, fragmented referral systems, and inconsistent implementation of screening and vaccination programs undermine the effectiveness of cervical cancer control strategies. These challenges are compounded by gender dynamics, including limited decision-making autonomy, financial dependence, stigma, and sociocultural norms that influence women's health-seeking behavior.

The analysis underscores the importance of adopting integrated, gender-responsive health system approaches to cervical cancer prevention. Strengthening primary healthcare platforms, expanding organized screening programs, scaling up equitable HPV vaccination, and integrating services within HIV and sexual and reproductive health systems are essential steps toward reducing the disease burden. Addressing sociocultural barriers through community engagement and male involvement further enhances the effectiveness and sustainability of these interventions.

From a public health management perspective, cervical cancer control offers a lens through which broader health system performance and gender equity can be assessed. Investments that improve service delivery, data systems, and community engagement will not only advance cervical cancer prevention, but also contribute to more resilient and responsive health systems.

Achieving regional and global goals for cervical cancer elimination in sub-Saharan Africa will require sustained political commitment, coordinated policy action, and equitable resource allocation. By aligning biomedical interventions with strengthened health systems and gender-responsive strategies, meaningful progress toward reducing cervical cancer morbidity and mortality can be realized.

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