

## Cervical Cancer Prevention: The Angolan Case

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### ABSTRACT

Cervical cancer is the leading cause of cancer-related mortality in Angola, posing significant challenges to the country's health system. This situation is the result of substantial deficiencies in public health infrastructure, population awareness, and access to preventive services, despite the availability of cost-effective interventions like HPV vaccination and cervical screening. The implementation of organized screening programs has proven to be difficult in low-resource settings. Although visual inspection methods have been introduced to address these challenges, they face limitations in diagnostic accuracy and coverage. Similarly, HPV vaccination campaigns, though promising, are also constrained by logistical and socio-geographical barriers.

This review explores the current status of cervical cancer prevention in Angola, identifying key challenges such as the lack of epidemiological studies, limited screening infrastructure, and socio-economic barriers to healthcare access. There remains considerable work ahead to fulfill the World Health Organization's 2030 elimination strategy - 90% vaccination, 70% screening, and 90% treatment coverage. Nevertheless, promising progress can be made by embracing innovative screening methods incorporating self-sampling and mobile health units, expanding HPV vaccination efforts, and tackling cultural and logistical obstacles.

**Key-words:** Cervical cancer, prevention, screening, Angola

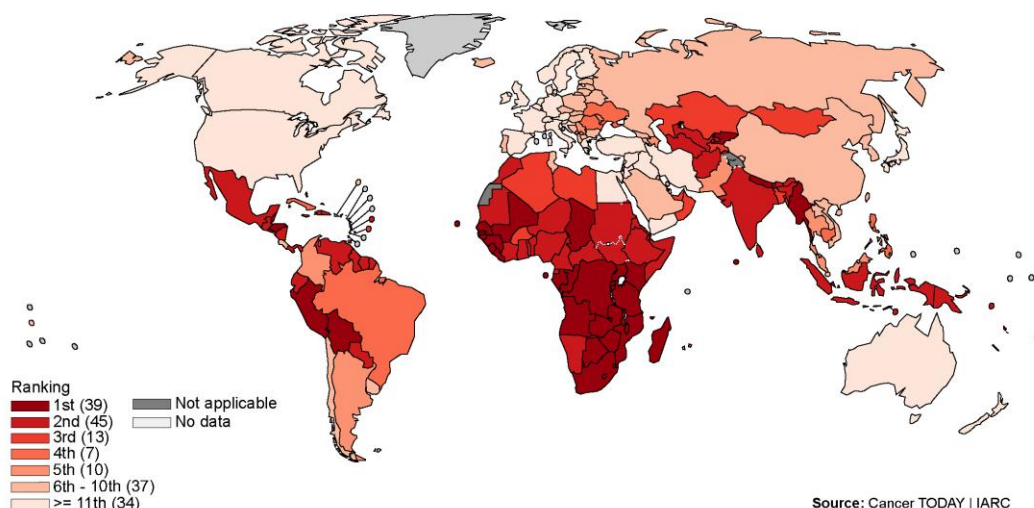
## INTRODUCTION

Cervical cancer (CC) is the fourth most common cancer among women worldwide, with over 600,000 new cases and nearly 350,000 deaths estimated in 2022<sup>1</sup>. This represents a significant public health challenge, affecting low-income countries disproportionately. CC is the most common type of cancer among women in 24 countries and the leading cause of cancer-related deaths in 39 countries, all located in the Sub-Saharan Africa, South America, and Southeast Asia (**Fig.1**)<sup>1</sup>.

There are several risk factors associated with the emergence of this neoplasia, however, its primary cause is the persistent infection with

oncogenic strains of the Human Papillomavirus (HPV)<sup>2</sup>. HPV is the most prevalent sexually transmitted infection worldwide, with a peak of incidence between the ages of 16 and 24<sup>3</sup>. Although HPV infection plays a significant role in triggering cancer, alone it is not sufficient for cancer development. Indeed, most infections are transient and tend to regress in healthy individuals spontaneously. For the malignant transformation to occur, other risk factors must be present, including genetic predisposition, concurrent infections (such as HIV), immunodepression, the number of sexual partners, and the specific type of HPV involved<sup>4</sup>.

Ranking - Mortality in Females. Cervix uteri. 2022.



**Figure 1** - Ranking of cervical cancer mortality among females by country<sup>1</sup>. Regions marked as "not applicable" or "no data" indicate the absence of reliable mortality statistics.

HPV types can be categorized according to its oncogenic potential into low- and high-risk groups. Low-risk HPV types (lrHPV) are associated with the development of benign warts, whereas high-risk HPV types (hrHPV) are linked to the onset of several anogenital cancers, including CC<sup>5-9</sup>. There are 15 identified hrHPV types, with HPV16, 18, 59, 45, 31, 33, 52, 58, 35, 39, 51, 56, and 53 being the most prevalent worldwide, although with some regional variations<sup>3,10-13</sup>. Among these, HPV16, 18, 33, and 45 have been shown to be more virulent than any other HPV types<sup>14-18</sup>, being the first two responsible for approximately 70% of invasive cervical cancer cases<sup>19</sup>.

Having a well-established etiology, CC can be largely prevented through effective healthcare programs, including health promotion and education, vaccination, screening, and adequate treatment of the diagnosed cases. In developed countries where screening programs started to be introduced in the 1960s, CC-related mortality decreased by up to 80% over the following three decades<sup>20</sup>. Currently, there are six commercially available HPV vaccines approved for prophylactic use, grouped into three different formulations: two-valent (protecting against HPV types 16 and 18), four-valent (HPV types 6, 11, 16, and 18), and nine-valent (HPV types 6, 11, 16, 18, 31, 33, 45,

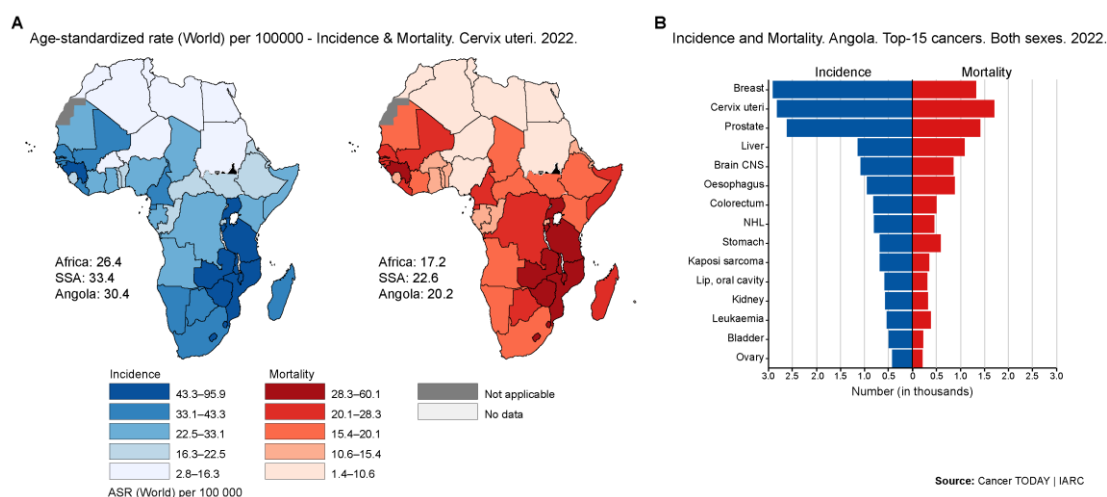
52, and 58)<sup>21</sup>. It is estimated that the protection offered by the nine-valent vaccine could prevent almost 90% of cervical cancer cases globally<sup>19</sup>.

Despite all these control strategies, especially vaccination, high rates of morbidity due to HPV and related diseases persist in certain regions of the world, particularly in low- and middle-income countries. This review focuses on Angola, a country where there is currently no organized screening program and limited research on the prevalence of the different HPV types present in the population. Estimates suggest nearly 3,000 new cases and close to 2,000 deaths from CC every year, making it the leading cause of death by cancer in the country (**Fig.2**)<sup>1</sup>. This review provides an overview of the current status of cervical cancer screening in Angola, discussing strategies,

challenges, and recommendations that could help to address this significant health problem.

## EPIDEMIOLOGY OF CERVICAL CANCER IN ANGOLA

Cervical cancer is the second most common type of cancer in Sub-Saharan Africa (SSA), only behind breast cancer. It is responsible for the highest number of cancer-related deaths in the region, regardless of gender. According to estimates by the International Agency for Cancer Research (IARC), there were 117,994 new cases and 76,140 deaths in 2022, making it the region with the highest age-standardized rates (ASR) of incidence and mortality in the world (33.4 new cases and 22.6 deaths per 100,000 people) (**Fig.2**)<sup>1</sup>.



**Figure 2** - Cervical cancer incidence and mortality in Africa and Angola<sup>1</sup>. **(A)** Age-standardized incidence and mortality rates of cervical cancer per 100,000 women across African countries. ASR in the whole African continent, Sub-Saharan Africa, and Angola are highlighted. **(B)** Top 15 cancers by incidence and mortality in Angola for both sexes, showing cervical cancer as one of the most prevalent and fatal cancers. ASR: Age-standardized rate; CNS: Central nervous system; NHL: Non-Hodgkin lymphoma; SSA: Sub-Saharan Africa.

In Angola, there are no official statistics or reliable data on cancer incidence and mortality due to the absence of an organized population-based cancer registry<sup>22</sup>. As of 2022, it is estimated that 2,823 new cases and 1,715 deaths occur every year, making it the deadliest type of cancer in the country<sup>1</sup>. Compared to its neighbors, Angola is slightly below the SSA countries' average incidence and mortality rates (ASR incidence 30.4 and mortality 18.1).

However, these figures are ten times higher than the lowest mortality rates found in some high-income countries in Europe, Australia, or New Zealand (**Fig.2**)<sup>1</sup>.

To our knowledge, the only study assessing the prevalence of cervical abnormalities in Angola was performed by Alfredo and colleagues<sup>23</sup>, who revised clinical data from 2,342 women screened for CC in two Angolan provinces. They found a prevalence of 23% for

low-grade lesions, 9% for high-grade lesions and 1% of cases with invasive cancer. These figures indicate a notably high rate of abnormalities compared to findings from studies in neighboring countries, especially regarding the prevalence of low-grade lesions<sup>24–27</sup>. This data highlights a reality where most women tend to seek medical attention only when lesions are present, often at advanced stages.

The incidence of cervical cancer is intimately linked to several associated risk factors, with HPV infection being the most significant. Indeed, populations from low-income regions present the highest prevalence rates of hrHPV, particularly in SSA, which ranks at the top. A comprehensive meta-analysis conducted across five continents estimated a global prevalence of hrHPV in women with normal cytology at 11.7%, contrasting with the 24% observed in SSA<sup>3</sup>. However, studies from Africa show considerable variability, with prevalence rates ranging from 3.2% in Sudan to 47.9% in Guinea<sup>28</sup>.

In Angola, the only published data on HPV prevalence comes from a small cross-sectional study involving 64 women diagnosed with pre-cancerous lesions in Luanda<sup>29</sup>. This study reported an overall prevalence of HPV infection of 71.9%, with hrHPV genotypes being identified in 53.1% of the analyzed samples. The most prevalent hrHPV genotypes found were HPV16 (51.4%; 19/37), followed by HPV18 (13.5%; 5/37), and HPV31, 33, 58, 66, and 82, each detected in one sample<sup>29</sup>. However, since this study focused exclusively on women with cytological abnormalities, it likely overestimates the infection's overall prevalence. Similarly, another large meta-analysis, which included 121 studies with 1,682,422 participants, confirmed that the prevalence of HPV infection in patients with abnormal cervical findings was significantly higher than that in women with normal cervical cytology (82% versus 21.2%)<sup>30</sup>. Studies performed in the neighboring countries have also found highly variable prevalence rates of

hrHPV infection, ranging from 15.4% in Chad and 47% in a population studied in Gabon<sup>31–37</sup>. In African Countries of Portuguese Official Language (PALOP), the data published to date indicate a prevalence of 25.1% in Cape Verde<sup>24</sup>, and two studies performed in Mozambique found prevalence rates of 63.6% and 28.6% among women aged 18 to 24 years<sup>38,39</sup>.

In addition to the high prevalence of hrHPV infections in SSA, various risk factors contribute to the high incidence of CC in this region<sup>27</sup>: early initiation of sexual activity is prevalent in Angola with nearly one-quarter of the adolescents engaging in sexual activity before the age of 15, and two-thirds do so before 18 years old<sup>40</sup>; limited access to screening or treatment strategies exacerbates the situation; gender inequalities also play a significant role, with an illiteracy rate of about 26% among women, compared to approximately 14% among men. These inequalities are more pronounced when comparing urban populations with rural ones, which tend to be poorer and have less access to education and healthcare facilities<sup>41</sup>. These factors combined increase the risk of sexually transmitted infections, including the Human Immunodeficiency Virus (HIV). Research has shown that HIV infection significantly raises the risk of persistent hrHPV infection and cervical disease<sup>42–45</sup>. Women living with HIV are considerably more likely to be diagnosed with precancerous lesions, and six times more likely to develop invasive cervical cancer<sup>46–48</sup>. According to the Joint United Nations Programme on HIV/AIDS (UNAIDS) approximately 320,000 people live with HIV in Angola, corresponding to a relatively low prevalence of 2% when compared to neighboring countries<sup>49</sup>. This may help explain the slightly below-average incidence and mortality of CC in Angola compared to other SSA countries.

## **CURRENT SCREENING PRACTICES**

Screening is critical for early detection and prevention of CC, however, there is currently no formalized national cervical cancer screening program in Angola, nor governmental recommendations in this regard. Estimates suggest that only 25% of women aged 25–65 have ever been screened and only 20% have been screened in the last five years, reflecting low overall coverage and limited access to diagnostic methods<sup>50,51</sup>. Screening in Angola is predominantly opportunistic or conducted as part of small-scale pilot initiatives, with the majority of services concentrated in urban areas, highlighting the disparities in access for rural populations, which are at higher risk<sup>23,52</sup>.

Different methods are widely available to detect the lesions caused by HPV or the virus itself. The most common include cytology and molecular tests for HPV detection, which can be used individually or in combination. In low-resource settings like Angola, screening by visual inspection of the cervix serves as a cost-effective method for detecting CC and its precursor lesions.

### **Cytology-based screening**

Cervical cytology-based screening (Pap test or Pap smear) has been the gold standard for preventing and detecting cervical cancer for decades. This method involves collecting cells from the cervix and preparing them for examination under a microscope to identify precancerous or cancerous changes. Pap screening is one of the most successful disease-prevention programs ever implemented, especially in developed countries. In the United States, it has been responsible for a 75% decrease in the number of deaths since its implementation<sup>53</sup>. Cervical cytology is considered to be a very specific test for high-grade precancerous lesions or cancer but its sensitivity is only moderate and depends on a series of factors like the quality of sample

collection and processing, and the subjectivity of the microscopic analysis<sup>54</sup>.

### **Visual inspection methods**

Visual inspection methods, such as Visual Inspection with Acetic Acid (VIA) and Visual Inspection with Lugol's Iodine (VILI), have emerged as cost-effective and practical alternatives to cytology-based screening in low-resource settings like Angola<sup>52,55–57</sup>. These methods involve the application of a chemical solution to the cervix followed by a visual examination to detect abnormalities, which manifest as color changes. VIA and VILI are highly feasible in settings with limited infrastructure as they do not require laboratory equipment or extensive training. Additionally, the immediate availability of results allows for the screening and management of positive cases on the same day, reducing the number of visits required<sup>58</sup>. Studies in Angola and other low- and middle-income countries (LMIC) have demonstrated their utility<sup>52,56,57</sup>, showing high sensitivity for detecting precancerous lesions. However, specificity of these methods is lower compared to cytology, leading to potential over-treatment, once they lack the detailed cellular analysis provided by cytology.

### **HPV molecular detection**

The understanding that persistent infection with carcinogenic HPV types is the primary cause triggering the development of cervical cancer<sup>2</sup> has paved the way for using HPV detection as a primary screening method. Unlike cytology, which relies on visualizing cellular abnormalities, HPV testing directly identifies the viral agent of infection that precedes these changes, enabling earlier and more accurate detection of women at risk of developing cervical cancer. Its importance lies in its ability to provide a reliable screening option by allowing longer intervals between screenings for women who test negative<sup>59</sup>. HPV tests can detect viral markers using signal amplification techniques,

such as the Digene Hybrid Capture® II assay, or by amplifying nucleic acid with polymerase chain reaction (PCR). When combined with Pap smears, HPV tests can achieve nearly 100% sensitivity and a specificity of 93% in women aged 30 years and older, with a negative predictive value of almost 100%<sup>60</sup>. Several projects in LMICs have demonstrated the effectiveness of integrating HPV testing into community health programs, emphasizing its potential as the optimal primary screening method to expand coverage and improve early detection rates<sup>55,61–64</sup>.

### **Triaging of positive women**

The most recent WHO guidelines suggest using HPV DNA detection as the primary screening method among the general population, starting at the age of 30 years with regular screening every 5-10 years<sup>65</sup>. Most HPV infections in individuals younger than 30 are transient, especially since the introduction of the HPV vaccination. Thus, the screening of young women would lead to unnecessary assessment and potentially to treatment of cervical lesions that might have regressed spontaneously<sup>66</sup>. Additionally, a negative HPV test only indicates a low probability for the patient to develop CC within 5 - 10 years, and a positive result is only an indication of the presence of an essential risk factor. Therefore, women who test positive for HPV must be further evaluated to determine the optimal management (triage). Three different methods can potentially be used as triage tests: visual methods (VIA/VILI), cytology, and molecular testing.

Recently, the WHO recommended using dual-stain cytology (DS) to triage women after a positive HPV nucleic acid test result<sup>65</sup>. This test is used to detect cervical cancer precursors by simultaneously identifying two biomarkers: p16 and Ki-67. It is based on the principle that the overexpression of the protein p16 is indicative of the disruption of the retinoblastoma protein (pRb) pathway by HPV oncoprotein E7. Ki-67 is

a marker of cell proliferation and indicates active cell division. The expression of these two markers is mutually exclusive under normal physiological conditions, therefore its simultaneous expression in the same cell is highly specific to HPV-induced cellular dysregulation and the presence of high-grade cervical intraepithelial neoplasia (CIN)<sup>67–69</sup>. DS is a robust marker for the risk of developing CIN3+ lesions, therefore it is a useful test for identifying patients at higher risk of cancer development among the HPV-positive<sup>70</sup>. Likewise, patients with a positive result for both HPV and DS would be referred for colposcopy, whereas women negative for DS would be rescreened after one year to determine if the infection persists<sup>65</sup>. Moreover, analysis of DS tests does not rely on subjective interpretation of cellular morphology, making it a valuable tool in enhancing diagnostic accuracy, particularly in low-resource settings where cytology expertise may be limited.

### **CHALLENGES AND BARRIERS**

In low-resource settings, such as certain African countries, implementing screening programs can be quite challenging. WHO recommends a “screen-and-treat” approach, in which the treatment decision is made based on the result of a screening test. If the test yields a positive result, treatment of precancerous lesions is initiated immediately, bypassing the triaging step<sup>65</sup>.

At present, however, very few developing countries have managed to implement CC screening programs effectively. The main reason for this failure is the complexity of the screening process and the obstacles inherent to these countries. Key obstacles include poverty, limited health promotion programs, the absence of sustained prevention programs, inadequate healthcare infrastructure, and a shortage of trained practitioners<sup>71</sup>.

Culturally, African women often seek medical assistance only when they experience

symptom of illness, reflecting a limited emphasis on preventive care and early diagnosis. A lack of awareness about HPV, combined with an underestimation of the risks associated with CC and the importance of screening, further discourages participation in preventive health programs. Other significant barriers include difficulties in taking time off work, restrictions imposed by male partners, a perceived lack of necessity for the examination, and general unawareness about the screening process. Prejudice and taboos associated with the procedures, fear of pain from past negative experiences, and anxiety over the potential results also contribute to low adherence to screening programs<sup>72–74</sup>.

Addressing these challenges requires the implementation of impactful global and localized health education initiatives aimed at raising awareness and improving understanding of cervical cancer prevention. Such programs should focus primarily on promoting prevention through proper hygiene practices and safe sexual behaviors. Moreover, it is important to demystify the screening processes, highlighting the importance of early detection, and addressing cultural and gender-based barriers to care. Engaging the community and designing culturally sensitive educational campaigns are crucial for fostering a preventive health mindset and improving participation in screening services<sup>72,75</sup>. These initiatives can significantly contribute to reducing cervical cancer-related morbidity and mortality in Angola.

Despite its proven effectiveness in reducing cervical cancer incidence and mortality in high-resource settings<sup>76–78</sup>, cytology-based screening has failed to be widely implemented in low-resource countries due to significant logistical and infrastructural challenges. Cytology requires access to laboratory facilities, skilled cytotechnologists, and efficient follow-up systems to ensure that women with abnormal results receive appropriate care<sup>79</sup>. Unfortunately, these resources are often

unavailable or underdeveloped in countries like Angola, limiting the feasibility of large-scale implementation.

Another important obstacle to CC screening in LMIC is the process of sample collection. Typically, samples for cytology or HPV testing are obtained by clinicians during gynecological examinations. However, many women may be reluctant to undergo screening or may live in areas hard to reach. Self-sampling offers the opportunity to overcome these issues as well as addressing the shortage of healthcare personnel across LMICs<sup>80,81</sup>. Indeed, self-sampling has been shown to be highly acceptable to women in various settings<sup>82,83</sup>.

## RESEARCH GAPS AND OPPORTUNITIES

Despite the high disease burden, there are limited numbers of studies conducted on the prevalence, incidence, and mortality of cervical cancer in low and middle-income countries. In Angola, the lack of a population-based cancer registry<sup>22</sup>, hinders the collection of accurate epidemiological data, which is critical for identifying high-risk populations and tailoring interventions. While cervical cancer is the second most common cancer among women in the country, the absence of comprehensive studies on the prevalence of HPV infection and genotype distribution limits the ability to predict disease trends and evaluate the impact of HPV vaccination efforts.

Despite regional variations, overall screening coverage remained stagnant in SSA countries over the last two decades with only Southern Africa witnessing important increases. It has been estimated that only 14% of SSA women aged 30 to 49 years had ever been screened for CC in 2020<sup>84</sup>. For Angola, no reliable data on cancer screening coverage is available. It is predicted that current screening strategies are reaching less than 10% of the target population, and in most cases, this screening is done by VIA or PAP cytology<sup>23</sup>. As discussed, in low-resource settings, VIA is a

low-cost effective method for CC prevention. A study by Muwonge *et al.*<sup>52</sup> demonstrated the feasibility and effectiveness of these methods in Angola, with VIA showing a specificity of 94.5% and VILI achieving a sensitivity of 88%. However, the subjectivity of these methods poses a challenge, as variability in interpretation can reduce diagnostic accuracy. Additionally, only 90% of women detected with cervical intraepithelial neoplasia received treatment, highlighting gaps in follow-up care. This underscores the need to integrate more robust, evidence-based screening programs into the national healthcare framework.

In 2020, the World Health Organization (WHO) adopted a global strategy for the elimination of CC as a public health threat by 2030. This strategy included the “90-70-90” targets that calls for 90% of all girls to be vaccinated against HPV by 15 years of age, 70% of all women screened with a high-performance test (such as HPV DNA tests) once by age 35 and again by 45, and 90% of all pre-cancers treated and invasive cancer cases managed by 2030<sup>85</sup>. In order to eliminate CC, it is essential for countries to develop adequate national primary (e.g., HPV vaccinations) and secondary (e.g., CC screening) prevention programs. National vaccination programs have been recently scaled-up among girls but two-thirds of countries in sub-Saharan Africa had yet to implement a program in 2020<sup>86,87</sup>. Currently, it is estimated that 20% of girls in sub-Saharan Africa have been fully vaccinated against HPV<sup>86</sup>. Angola has recently received its first 2 million doses of the bi-valent vaccine Cecolin<sup>®</sup>, aiming to start the vaccination process in November 2024 with the goal of covering 90% of the country’s girls aged between 9 and 12 years<sup>88</sup>.

A few years after introducing prophylactic HPV vaccines in national immunization programs, various articles reported a reduction in infections by vaccine HPV types. Notably, there was also a decrease in benign tumors from I<sub>r</sub>HPV and dysplastic lesions from hrHPV,

especially types 16 and 18<sup>89</sup>. Although bivalent and quadrivalent vaccines have shown positive results, this strategy would only prevent approximately 70% of cases, as epidemiological studies estimate that HPV16 accounts for 40–50% of cancers and HPV18 for 15–20%. Vaccination with a nonavalent vaccine should cover approximately 90% of cervical cancer cases<sup>90</sup>. Moreover, it also offers protection against vulvar, vaginal, and anal cancers, and their precursor lesions caused by HPV types 16, 18, 31, 33, 45, 52, and 58<sup>91</sup>. Recent evidence about the immunogenicity, long-term protection, and effectiveness of single-dose HPV vaccine regimens in girls and young women reveals that this approach is effective. It offers significant advantages by simplifying the implementation of national programs, improving vaccine coverage, and reducing costs<sup>92–97</sup>.

Data on the prevalence of different HPV genotypes in Africa shows that HPV16 and 18 are not always the most common types. A recent meta-analysis, which compiled information from 28 studies conducted in nine SSA countries, ranked the observed genotypes by prevalence as follows: HPV16 (18%), HPV35 (10.12%), HPV52 (9.98%), HPV18 (9.7%), HPV45 (6.82%), HPV51 (6.60%), HPV58 (6.40%), HPV56 (6.20%), HPV33 (6.10%), HPV31 (5.90%), HPV39 (4.20%), HPV68 (3.96%), HPV59 (3.41%), HPV66 (2.20%), HPV62 (0.30%), and HPV61 (0.10%)<sup>98</sup>. It is important to note that many of these prevalent genotypes in Africa are not included in the currently available vaccines. This issue is particularly significant in SSA countries, where access to vaccines is mostly limited to bivalent and quadrivalent vaccines.

Therefore, to effectively address the cervical cancer burden in Angola, it is essential to conduct comprehensive studies that characterize the prevalence and genotyping of HPV within the population. Such research will enhance our understanding of the specific contribution of each genotype to the disease and



guide informed decisions on the types of vaccines and vaccination strategies that should be implemented.

In many countries, a significant challenge to HPV vaccination efforts stems from a lack of understanding regarding susceptibility to HPV infection and related disorders, coupled with low confidence in vaccination programs<sup>99,100</sup>. Furthermore, limited knowledge about HPV among healthcare workers in Angola undermines their ability to educate patients and advocate for screening<sup>101</sup>. Logistical issues, such as insufficiently trained personnel and inadequate healthcare facilities, further hinder the effective implementation of comprehensive screening and vaccination initiatives. To address these challenges, it is essential to invest strategically in healthcare worker training, community education, and the development of healthcare infrastructure.

Recent technological advances also offer new opportunities for improving the detection, treatment, and follow-up of women with CC. The introduction of mobile health and screening units and the implementation of digital health platforms, including medical mobile applications, would allow to extend the screening services to rural and underserved populations, thereby raising public awareness and reducing geographical disparities in access to healthcare<sup>102,103</sup>. Moreover, the advent of artificial intelligence allows these strategies to be combined with telehealth interventions for remote diagnosis and follow-up, further increasing access to cancer care<sup>104,105</sup>. Until recently, the main limitations of HPV testing were the requirement for costly laboratory infrastructure and the lengthy processing time for test results. The introduction of rapid molecular methods for detecting HPV DNA represents a significant advancement in cervical cancer screening, particularly in low-resource settings<sup>79</sup>. Additionally, considerable research efforts have been dedicated to the development of smaller and portable solutions for nucleic acid

amplification to achieve point-of-care testing (POCT) and assist in CC diagnosis<sup>106</sup>. Achieving this goal would create enormous opportunities for cancer screening, patient stratification, and accessible monitoring, particularly in rural and more remote areas<sup>107</sup>.

## CONCLUSION AND PERSPECTIVES

Cervical cancer remains a major public health challenge in Angola, marked by low screening coverage, inadequate healthcare infrastructure, and significant geographical and socio-economic barriers. Despite these challenges, recent initiatives to implement low-cost screening methods such as VIA and VILI, or relatively small-scale screening campaigns using PAP cytology or HPV molecular detection, combined with the introduction of HPV vaccination, represent critical steps toward reducing the cervical cancer burden. However, these initiatives require scaling to achieve a meaningful population-level impact, which demands substantial investments in healthcare systems, community education for health, and support policies.

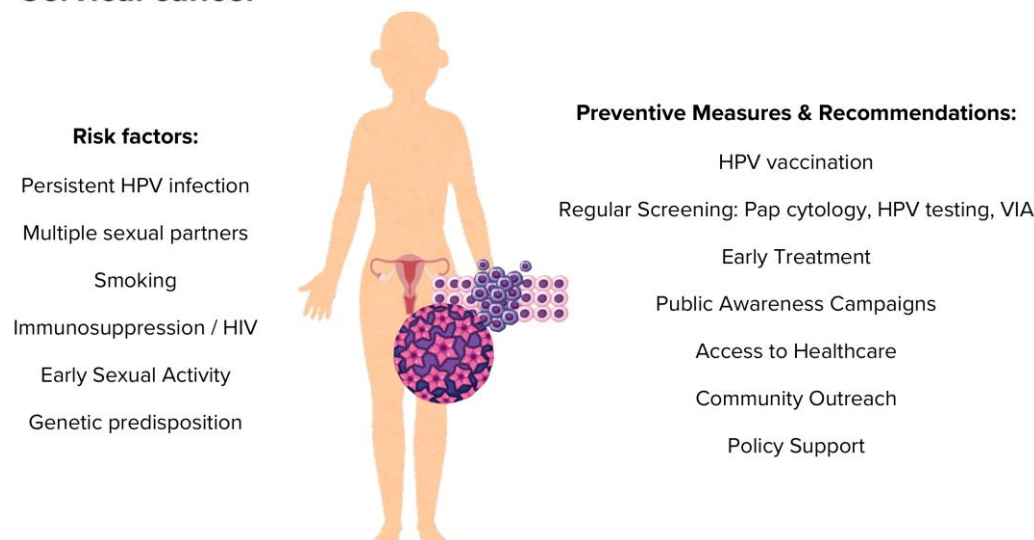
WHO has set an ambitious target of eliminating cervical cancer as a public health problem by 2030, defined as achieving less than 4 cases per 100,000 women annually. To reach this goal, WHO recommends a "90-70-90" strategy: vaccinating 90% of girls by age 15, screening 70% of women at least twice in their lifetime, and ensuring that 90% of those with pre-cancer or cancer receive appropriate treatment. For Angola, aligning with this global vision will require addressing critical gaps, such as expanding HPV vaccine coverage, integrating effective screening technologies, and establishing a robust referral system for treatment.

Innovations like mobile health clinics and point-of-care HPV testing could extend screening to underserved areas. Collaborations with global health organizations can facilitate resource mobilization and technical expertise to

build comprehensive cancer control programs. Furthermore, enhancing awareness among healthcare providers and the general public will be pivotal in driving demand for preventive

services (**Fig.3**). Achieving this vision requires sustained commitment by the public authorities, ensuring that no woman is left behind in the fight against cervical cancer.

## Cervical cancer



**Figure 3** - Risk Factors and Preventive Strategies for Cervical Cancer. Collectively these strategies provide a framework for reducing the burden of cervical cancer, particularly in low-resource settings like Angola.

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