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A Literature Review of Knowledge, Attitudes, and Perceptions about Human Papillomavirus and HPV Vaccines in West Africa

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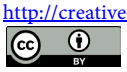

Abstract

Background: Human Papillomavirus is a sexually transmitted aetiologic agent causing cervical carcinoma. Human Papillomavirus vaccination is a novel primary prevention initiative to reduce the prevalence of cervical cancer globally. For this altruistic effort to succeed, it is imperative to determine the knowledge and willingness of parents to present their adolescent girls for vaccination before being sexually active. **Methods:** A review of 7 peer-reviewed studies was done to assess the level of knowledge and perceptions about HPV and its causal relationship to cervical cancer and the attitudes of parents towards allowing their adolescents to be HPV-vaccinated in West Africa. **Findings:** Some of the papers reviewed showed poor knowledge, awareness of HPV and cervical cancer, and poor attitude towards HPV vaccination, while a few participants in some studies showed a fair understanding of HPV and cervical cancer and were interested in accepting the HPV vaccine. However, there were barriers against a sizable uptake of the HPV vaccine in West Africa. Some of the militating factors against a high uptake of the HPV vaccines found were people's poor health-seeking behaviours, poor enlightenment about HPV on the part of the sub-regional governments about cervical cancer and the HPV vaccine, exorbitant cost of the vaccine and the unwillingness of parents to allow their eligible adolescents obtain the HPV vaccine in West Africa which were related to their cultural beliefs and poor knowledge about HPV and cervical cancer. However, some of the results were confounding from region to region. **Conclusion:** Rigorous health education and enlightenment campaigns are urgently needed to inform and help people make informed decisions about the HPV vaccine and increase its uptake by adolescents. So, cultural beliefs, parents' knowledge, and vaccine recipients' knowledge about HPV and its many pathologies and barriers, which may militate against a sizable vaccine uptake, have to be taken into consideration before an effective vaccination programme

can succeed in West Africa.

Subject Areas

Public Health

Keywords

Virus, HPV, Vaccination Programme

1. Introduction

There were 604,000 new cervical carcinoma cases and about 324, 000 mortalities in the year 2020 alone globally [1]. Developing economies of the world accounted for more than 90% of those deaths [1]. In the United Kingdom (UK), there are about 850 deaths from cervical carcinoma every year, and it is the 4th most lethal of all cancers in humans globally [1] [2].

It is the second most common cause of female cancer. In India, it is the 2nd commonest cause of gynaecologic cancers, and about 97,000 new cases are detected yearly among women aged between 15- and 44 [3] [4]. Cervical cancer prevalence differs from region to region globally. In developed economies, cases of cervical carcinoma have reduced in contrast to the developing world, which has more than 35% higher risk than in developed countries, and it remains a huge problem, claiming many lives [3] [4]. The risk factors incidence differs between these two economies, while for HPV and HIV infections, a dearth of screening and treatment modalities are responsible for this inequality in its prevalence worldwide [5] [6].

On an annual basis in the USA, about 13,000 new cases are reported, and approximately 4000 die from it [7]. Latino women have the highest prevalence of the disease, but black women have a higher risk of dying from it in the USA [7]. At any point in time, 3.2% of women harbour the most virulent strains (HPV 16, 18), which are responsible for about 80% of malignancies of the genital tract [8] [9]. Concerned about the prevalence and mortality associated with HPV and cervical cancer, the World Health Organisation (WHO) made a passionate appeal in 2020 on the necessity and urgency of eliminating cervical cancer and made it a top priority public health issue and hoped to achieve success through cervical screening, case management, and HPV vaccination as a primary preventive strategy globally [5].

In West Africa—the coverage area of this review—annually, more than 500,000 women are diagnosed with cervical carcinoma, and the mortality rate there is ten times higher than that of Northern Europe and Northern America [10]. Constant infection with the highly oncogenic variant of Human Papilloma Virus 16 and 18 are principally responsible for cancers of the cervix in West Africa, just as they are globally [11] [12]. Bivalent, quadrivalent, and 9-valent HPV vaccines have been

licensed in the USA since 2006 and were very efficacious against the oncogenic HPV-16 and 18 [11]. The remaining high-risk HPV genotypes that are not directly targeted by the Human Papilloma Virus vaccines may equally be susceptible to the immunity-potentials offered by the vaccines against the targeted highly oncogenic HPV, thereby providing some cross-protection [11].

2. Methodology

A systematic computerised search of 4 databases was done to evaluate the degree of knowledge and perception of the aetiologic factors of cancer of the cervix and the attitude of people to the HPV vaccine in West Africa. The systematic search was carried out using Medline, CINAHL, Pubmed, and Web of Science databases. According to Kokol [13] [14], these databases afford us reliable and dependable medical data relating to public health and behavioural science. The scope of the review was restricted to scholarly peer-reviewed journals published in the English language within the period of 2018 and 2023. In systematic reviews, to eliminate bias, it is necessary to have a well-defined search methodology [15]. Rather than being rigid, it is advised that a search strategy be amenable and routinely evaluated and revised. The effectiveness of this approach derives from its broad addition of relevant studies while excluding those that do not add to the expected outcome [16]. To do a comprehensive search of the selected databases, an assemblage of synonyms and MeSH keywords were added to each initial phrase, utilising the PICO framework. The database was searched utilising title, abstract, and indexing terms like MeSH (Medical Subject Headings) and Emtree to find pertinent primary studies from West Africa. Scholars utilise Boolean searches to make data retrieval, efficiency, and precision better [17]. Boolean operators like "AND", "NOT", and "OR" were used as search terms, aided in the reduction of results, and optimised time management for readers.

The search queries used a range of keywords and MeSH terms, including "knowledge", "awareness", "perception", "attitude", "HPV vaccine", "immunis", "immuniz", "immunisation", "immunization", and "west Africa". Truncations were used for the searches, too. The terms were amalgamated in various formats to search relevant journals. For instance, risk factors of HPV AND (West Africa) AND (knowledge and perception) AND (people). For this review, a search was done on reference lists of full-text papers to manually select and assess the applicability of additional articles. Data, facts, and terminologies were culled from well-established grey literature published by institutions including WHO, the United Nations (UN), and the National Health Service (NHS). The inclusion criteria were done in accordance with the PICOS framework, as seen in **Table 1**.

2.1. Inclusion Criteria

- Scholarly articles peer-reviewed, published between January 2018 and December 2023.
- Studies were done in the English language and not more than 5 years from

days of publication to show recentness and relevance.

- Any study that brings to the fore the factors that militate against HPV vaccine uptake and evaluates the knowledge and perceptions of West Africans about HPV-associated pathologies.

Table 1. Inclusion criteria PICOS framework.

P	Population: Adolescents eligible for HPV vaccine, parents of eligible vaccinees.
I	Intervention or Exposure: HPV vaccination.
C	Comparison: Non-scope related research, no comparator.
O	Outcome: Assess the barriers to HPV vaccination and how high HPV vaccine uptake will reduce the prevalence of cervical cancers and other HPV-related infections and cancers in West Africa.
S	Types of Studies: Studies done between Jan 2019 through December 2023 that were peer-reviewed.

2.2. Exclusion Criteria

- Studies published in countries outside of West Africa.
- Studies published before January 2018, unless they provide significant historical context.
- The publication that does not address the obstacles or problems associated with HPV vaccine uptake in West Africa.

3. Results

The findings from the selected studies will discuss the knowledge or awareness of people about HPV, cervical cancer and their attitude to HPV vaccination in West Africa. The results of the quantitative studies are shown in Table 2 below.

3.1. Quantitative Studies

Knowledge and Perceptions of HPV and Cervical cancer: The five articles reviewed delved into the knowledge gap that existed between the various age-grades in the researchers' findings. Many respondents reported having low, moderate, or high levels of understanding of HPV and cervical cancer and risk factors. Fifty percent is the threshold for low; 50% - 69% as moderate; 70% and above were classified as good according to the study by Ebu *et al.* [18] in Accra, the capital city of Ghana. The respondents in the study were all female nurses and midwives with tertiary levels of education. Despite their level of education and being health workers, 29.6% (n = 94) out of 318 participants had poor knowledge of risk factors of cervical cancer like oncogenic HPV, and 17.6% (n = 56) were aware and received at least one dose of HPV vaccine.

In a study done by Adesina *et al.* [19] in Ilorin, a north-central city in Nigeria, 40.4% (n = 190) out of 470 participants knew that HPV was an aetiologic factor for developing cancer of the cervix and 35.1% (n = 165) were unaware of HPV vaccine. In the study done by Akpor *et al.* [20], 127 out of 200 female undergrad-

uates (69.4%) knew about HPV, and 21.5% (n = 39) lacked knowledge about what bodily HPV infection signifies. In a study done by Azuogu *et al.* [21] in Abakaliki, a city in the SE of Nigeria, 124 out of 290 participants (42.8%) knew HPV as a cause of cervical cancer, and only 6.9% (n = 20) allowed their adolescent girls to obtain HPV vaccine. In the research done by Adesina *et al.* [19], 40.4% of the respondents (190) knew that HPV could cause cervical cancer.

Table 2. Knowledge/perceptions of HPV, pathologies, risk factors, and HPV vaccine: quantitative studies.

Author, Year & Country	Setting	HPV Infections	Cervical Cancer	HPV Vaccine Knowledge	Attitude to HPV Vaccination
Adesina *et al.* (2018) [19] Nigeria	Cross-sectional study conducted in Ilorin, Kwara State, Nigeria. 600 questionnaires administered and 470 responded.	161 respondents knew HPV to be an STD. 34.5% knew condom, 27.9% claimed sexual abstinence and 37.7% claimed monogamous relationship were preventive against HPV.	40.4% knew HPV could cause cervical cancer, but 47.7% did not know HPV could cause cervical cancer.	35.1% knew the HPV vaccine while 58.7% did not. 29.1% knew the HPV vaccine to prevent HPV infection, and 25.5% knew it could prevent cervical cancer.	44.9% wanted their children vaccinated. 37.9% preferred further consultations. 22.3% would accept the vaccine only if given free. 33% would accept even if the vaccine was not free.
Azuogu *et al.* (2019) [21] Nigeria	A cross-sectional study done in Abakaliki, Ebonyi State, Nigeria. Questionnaires administered to 290 mothers of female High School students.	22.8% knew HPV, while 77.2% did not.	Not interrogated.	Not interrogated.	Only 7 respondents had HPV vaccination in the past, while 283 never had.
Akpor *et al.* (2022) [20] Nigeria	Quantitative study was done in Ado, Ekiti State, among 200 University undergraduates. All respondents filled out the questionnaires.	69.4% knew HPV, 30.4% did not, 80.1% knew HPV to be preventable.	Not interrogated.	92.3% knew the HPV vaccine to be preventive against genital infections. 90.7% believed the vaccine to be safe.	70% wanted to know more about the vaccine; 85.5% would allow their wards to be vaccinated; 42.2% contended that the vaccine was too expensive.
Williams *et al.* (2019) [22] Ghana	A cross-sectional study that administered questionnaires to 200 women aged between 19 and 64 years.	Not interrogated.	56.9% of the 200 knew the link between HPV and cervical cancer.	56.9% had heard about the HPV vaccine.	Not interrogated.
Ebu *et al.* (2019) [18]	Cross-sectional study done in Ghana which administered 318 female nurses aged between 20 and 59 at the tertiary hospital in Accra.	Not interrogated.	41.5% of the participants had a high knowledge, 28.9% had moderate knowledge and 29.6% had low knowledge about cervical risk factors.	Of the 56 that had taken at least one dose of HPV vaccine, 4.4% took the vaccine due to advice from friends or family while 6% strongly agreed and 5.7% agreed that receiving the vaccine was due to the fear about cervical cancer.	21.7% strongly agreed that HPV vaccine was expensive, 24.5% strongly agreed that there was inadequate information about it while 5% strongly agreed that HPV vaccination was a waste of time.

3.2. HPV Vaccine Uptake

In a study done by Akpor *et al.* [20], 90.7% (n = 181) of the participants knew the HPV vaccine and agreed that it was safe, and a further 92.3% (n = 185) believed that the HPV vaccine could prevent diseases and this publication showed a great relationship (p = 0.013) between the level of education of the respondents and knowledge of HPV immunisation. 7.1% believed that only males should be HPV-vaccinated. In the study conducted by Adesina *et al.* [19], 35.1% (n = 165) had awareness of the HPV vaccine, while a larger percentage (58.7%, n = 276) had not heard of the HPV vaccine previously. Furthermore, 29.1% (n = 137) knew that HPV vaccines could prevent HPV-related infections, 25.5% (n = 120) of them said HPV could specifically prevent cervical cancer, while 9.6% (n = 45) opined that it could offer protection against genital warts. Concerning the availability of the HPV vaccine in Nigeria, 33.8% (n = 159) knew it was being sold in Nigeria, and 83% (n = 390) were coy on the available HPV

vaccine types in Nigeria. Specifically, only 1% knew that Cervarix and/or Gardasil are HPV vaccines. About 32.3% believed that all girls should be immunised, and 6.4% differed about that; 11.3% of the participants said it should be given only to sexually active girls, and 1.1% reasoned it offered to boys too. Azuogu *et al.* [21], in their study, had 6.9% of participants who knew about the HPV vaccine and would allow their adolescent girls to have the vaccine.

3.3. Attitudes toward HPV Vaccination

Akpor *et al.* [20] found out that 70% (n = 140) of the participants were ready to get vaccinated, 85.5% (n = 171) would allow family members to be vaccinated while 20.1% did not see any benefit for being vaccinated and 42.2% (n = 84) believed that the vaccine was costly and unaffordable. 18.5% of the participants had previously been vaccinated, 5.4% had had all three doses administered against HPV, 10.9% had had 1 or 2 doses prior to the time of the study, and 2.7% had received 1 or 2 doses and did not intend to complete the schedule. Ebu *et al.* [18] found out that only 56 respondents (17.6%) had received at least one dose of the vaccine, 6.3% (n = 20) strongly agreed, and 6.6% (n = 21) agreed that they received the vaccine after being prodded by health workers while 6.0% strongly agreed and 5.7% agreed that they had the vaccine due to the fear of having cervical cancer later in life. 21.7% (n = 69) participants strongly agreed, and 23.9% (n = 76) agreed that the cost of the vaccine was a barrier to its uptake. Furthermore, 10.1% (n = 32) strongly agreed, and 22.3% (n = 71) agreed that injection phobia was a reason for not being vaccinated.

Azuogu *et al.* [21] had 89.1% (n = 258) of the participants agree that if the vaccine was made free, they would like it administered to their adolescent girls. Adesina *et al.* [19] found out that the daughters of 91.9% (n = 432) of the 470 participants had not been vaccinated against HPV. Nine of the participating mothers in the study whose daughters had been immunised, did so between the ages of 11 and 20 years in 77.8% of them. Furthermore, 44.9% (n = 211) indicated their willingness for their children to be vaccinated even when just 13% (n = 61) had adequate information about the vaccine. About 37.9% (n = 178) would want to have more consultation with a doctor before accepting to be vaccinated; 22.3% (n = 105) of the mothers were willing to have their daughters get the vaccines if provided free while 31.5% (n = 148) were willing to have their children access the vaccine even if it was not given free. 32.3% (n = 152) of the respondents were willing to let all girls be vaccinated, while 11.35% (n = 53) were willing to let the vaccine be given to only sexually active adolescent girls.

The barriers to vaccination from the quantitative studies cited by the majority of the participants are the prohibitive cost of the vaccine, side effects, injection pain, and poor information about the vaccine.

3.4. Themes Synthesised from the Qualitative Studies as Shown in Table 3 Below

Qualitative study I: Agyei-Baffour *et al.* [23]

- Knowledge about HPV
- Knowledge about HPV vaccinations

Qualitative study II: Balogun and Omotade [24]

- Awareness about cervical cancer
- Ways to prevent cervical cancer
- Opinions about HPV vaccine as a primary prevention strategy and barriers to vaccination

Table 3. Qualitative studies reviewed.

Author, Year, Country	Setting	HPV Infection	Cervical cancer	HPV Vaccine Knowledge	HPV Vaccine Uptake
Agyei-Baffour *et al.* (2020) [23] Ghana	A qualitative study involving 3 FGD was done with Healthcare practitioners in a 1-hour discussion.	HCPs knew HPV was an STD and it causes genital warts but did not know the burdens of HPV burdens.	HCPs knew that HPV cause cervical cancer.	HCPs knew there was HPV vaccine as a primary preventive strategy against HPV vaccine.	HPV vaccine uptake negatively affected by the lack of knowledge about the age of eligibility for the vaccine. HCPs knew 3 doses were the required dose for the prevention to be efficacious.
Balogun and Omotade (2018) [24] Nigeria	Qualitative study with FGD including parents, religious, traditional leaders, school teachers and adolescents.	Not interrogated.	Many FGDs were aware of cervical cancer and attributed it to different causes other than HPV.	Few were aware of HPV vaccine as primary prevention but majority claimed different ways to prevent it other than the conventional scientific methods.	Many of the FGDs expressed their minds that they would not take HPV vaccine. Only few participants agreed that they would take the vaccine.

3.5. Knowledge and Perception of HPV

The study by Agyei-Baffour *et al.* [23] reviewed delved into the knowledge gap that existed among the healthcare personnel interviewed. The authors used the Multi-Theory Model constructs for their interview of the participants. Many respondents reported a high level of understanding of HPV and its link to genital infections and cervical cancer. However, the health personnel did not know the health burden of HPV in Ghana with respect to the dearth of epidemiological data about prevalence, morbidity, and mortality. Agyei-Baffour *et al.* [24], in their own study, had all the focus group discussants agree that vaccinating all sexually active adolescents was imperative. They also knew two types, Cervarix and Gardasil, and the dosing schedules. In their own study, Balogun and Omotade [24] had FGDs with diverse knowledge about the HPV vaccine, but there was a glaring knowledge gap among them. Among the FGD participants in the qualitative study conducted by Agyei-Baffour *et al.* [23], the physicians and nurses had a basic knowledge of HPV transmission, its clinical implications, and vaccination, but they expressed diverse opinions about the recommended eligible age for vaccination, safety outline, and vaccine efficacy. In the study conducted by Balogun and Omotade [24], many of the participants in the focus group discussion opined that allowing their adolescent girls to be vaccinated was like licensing them for promiscuity. The level of knowledge, awareness, and perception of HPV and the attitude of the participants of the qualitative studies are shown in Table 3 below.

3.6. Perceptions of Cervical Cancer

Of the two qualitative studies reviewed, only Balogun and Omotade [24] asked its focused group about their knowledge concerning their knowledge regarding HPV and cervical cancer. Some of the participants in the FGD had heard about the link between HPV and cervical cancer, and some had seen women with cervical cancer in the past. More of the women participants had seen cervical cancer cases than their male counterparts. While some who had seen cervical cancer cases opined that it was caused by unprotected sexual intercourse, condom use during sex, and promiscuity, others contended that it was caused by civilisation, lifestyle changes, and consumption of excess meat, refined foods, and salt. The knowledge gap existed concerning the link between HPV and cervical cancer among the participants.

3.7. Attitudes to HPV Vaccination

The Agyei-Baffour *et al.* [23] study conducted in Accra, Ghana, showed differing opinions about the age of eligibility, infection status—whether HPV positive or negative—of individuals and gender were the crucial issues that the participants harped on about HPV vaccination. The healthcare personnel interviewed observed that the age of HPV vaccination was between 11 and 12 years of age. Furthermore, many of them believed that only immunocompromised and everyone were eligible for the vaccine. In the study of Balogun and Omotade [24] in Ibadan, Nigeria, many of the FGD participants applauded the introduction of the HPV vaccine, while some were averse to having the vaccine or having their children of eligible ages receive the vaccine. This aversion was loudest with the Christian and Islamic participants. However, many participants expressed their minds about the high cost of the vaccine as a barrier to vaccination. Also, some thought that vaccinating girls would be a license to promiscuity among the girls so vaccinated. The barriers to vaccination from the qualitative studies cited by the majority of the participants are the prohibitive cost of the vaccine, side effects, injection pain, and poor information about the vaccine. Phobia of vaccine, doubts about the potency of the vaccine, parents' refusal, and stigmatization of recipients as being licensed for promiscuity

4. Discussion

This study is premised on assessing the knowledge and awareness regarding HPV as it relates to cervical cancer in the West African sub-region. Incontrovertibly, the HPV vaccine is primarily to prevent cervical cancer globally. Knowing those risk factors that can predispose a woman to developing cervical cancer is crucial to taking preventive measures within the demographics of the study population. Lack of understanding of the risk factors of cervical cancer is a reason for not embracing the primary prevention strategy in the form of HPV vaccination and developing the disease, presenting late at an advanced stage, and looking for its remedies in the wrong places [25]. The awareness and knowledge about HPV and

cervical cancer in the studies reviewed were mixed. According to some of the studies reviewed, the population had poor knowledge of the existence of the disease, and awareness about its prevention was also low [19] [21] [23] [24]. By contrast, some studies found a high degree of knowledge and awareness of HPV and cervical cancer [18] [20] [23]. It was not surprising then that the uptake of the HPV vaccine was very low among the participants who had low awareness and knowledge about HPV and cervical cancer. Because of the existing knowledge gap, even when the cost of the vaccine was subsidised or offered free by the government among those who lack awareness and knowledge of cervical cancer and HPV, the eligible populations still did not see the need to receive the vaccine. Tertiary education and professional status tend to reduce the knowledge gap, as seen in the study conducted by [18] [20] [23]. Therefore, being knowledgeable about cervical cancer, HPV, and HPV vaccines will translate proportionally to a high uptake of HPV vaccines [26].

But despite the level of education of some respondents, the knowledge about HPV and willingness for vaccination was disproportionate, as seen in a study done by Azuogu *et al.* [21] where 37.3% had tertiary education, and 35.5% had secondary education, and those who had some knowledge about HPV was 42.8% while those who did not know was 57.2% and only a paltry 2.4% of the total respondents had obtained HPV vaccine in the past. This was in tandem with the study of Balogun and Omotade [24], where the respondents had a low level of education and demonstrated poor knowledge of the disease and measures for preventing it. This finding was also true in the study by Adesina *et al.* [19], where the majority of the respondents had only primary education (n = 174), constituting 37% of the total sample size, and only 35.1% knew about HPV and 58.7% never heard anything about it. This poor knowledge across all the reviewed papers was in sharp contrast to what was found among Cameroonian school-attending adolescents, where the awareness or knowledge about cervical carcinoma, HPV, and HPV vaccine was quite high [27]. This contrasting finding may be because of an intensive, rigorous promotional campaign embarked upon by the Cameroon Baptist Convention Health Services (CBCHS) against cervical cancer and the need to sensitise the public on the advantages of getting vaccinated with the HPV vaccine. Similarly, there was previous health education on HPV, cervical cancer, and HPV vaccine in Zambia, which considerably increased awareness of and readiness for HPV vaccination [28].

The importance of health education and campaigns for cervical cancer prevention cannot be over-emphasized, and these have been demonstrated in some studies that they could instigate behavioural changes positively and reverse the low HPV vaccine uptake in West Africa and reduce the high prevalence of cervical cancer in the continent consequently [29] [30].

In this review, it is apparent that parents who are highly educated, with both mother and daughter HPV-vaccinated, and are ready to encourage other women to do likewise would increase the degree of consciousness about cervical cancer,

HPV, and HPV vaccination in the population [31]. Furthermore, there is a statistical correlation between some demographic data, such as parents' level of education, knowledge about HPV, maternal wages and occupation, and daughter's age and readiness for HPV vaccine uptake [31]. In the cross-sectional study to determine how awareness and knowledge affected HPV vaccine uptake conducted in Shandong, China, in 2013 among 1850 mothers who had daughters aged 9 to 17 years attending elementary and high schools, Yu *et al.* (2016) [31] concluded that awareness and knowledge of HPV/HPV vaccine uptake were higher in mothers with a higher education level and was statistically was significant (P = 0.02).

In all the reviewed papers, very few mothers agreed that their adolescent daughters had received the vaccine. This is due to the knowledge gap and perception about the diseases HPV can cause and the primary prevention capability of the HPV vaccine. Although Balogun and Omotade [24] found in their study that participants worried that having their daughter HPV-vaccinated would be a license to promiscuity, this is a mere conjecture and cannot be substantiated in literature as HPV-vaccinated adolescents were not known to initiate sex earlier than their HPV-unvaccinated counterparts [32]. This has the same similarity with a South Korean study, which recorded a 7.2% willingness on the part of mothers to allow their adolescent daughters to have the HPV vaccine [33]. This is in sharp contrast to a study that found that Cambodian American mothers had a 32.6% readiness to allow their adolescent daughters to have the vaccine [34].

4.1. Knowledge of Risk Factors of HPV and Cervical Cancer

The causal relationship between smoking and cervical cancer has complex pathophysiological pathways that may not be easily understood by educated elites, l*et al*one understood by those at the lower rungs of the ladder. It's been hypothesized that smoking is a cofactor, acting in conjunction with the presence of the oncogenic variants HPV 18 or HPV 16 in the dysplastic and metaplastic changes that occur in the epithelial layers of the cervix, thereby leading to cancer of the cervix. Some of the respondents in the study done by Akpor *et al.* [20] were able to identify smoking as a risk factor for cervical cancer. This was consistent with similar findings by [35]-[37]. A cohort study concluded that there was a considerably higher risk of cervical cancer in people who smoked 20 cigarettes or more in a day, and a case-control study found that there was a monumental increased risk of cervical cancer in those who smoked 10 cigarettes per day [37].

Furthermore, other independent analyses on the smoking period and the number of cigarettes smoked also showed a positive correlation with cervical cancer risk. The Japan Collaborative Cohort Study (JACC) on cigarettes submitted that a higher increased risk of cervical cancer in people who smoked for 40 years than those who smoked less than 40 years [37] [38].

Having multiple sexual partners is a presage for developing cancer of the cervix. A man with many wives or an unfaithful monogamous man risks having and transmitting different variants of HPV to his wife (or mistresses) with a conse-

quent risk of cervical cancer development. The serotypes 16 and 18 are the notorious ones that can predispose philandering individuals to cancer of the cervix, vagina, and vulva. The respondents saw promiscuity to be a major causative factor for cervical cancer in the study conducted by Balogun *et al.* [24]. This was corroborated in a study done in Italy [39].

The first sexual experience in an adolescent girl predisposes her to metaplastic changes due to the oncogenic potentials of the HPV encountered during sex. It is for this reason that screening for cervical changes is done before sexual debut and repeated after regular coitus. 26 out of 200 participants (15.9%) in the research conducted by Akpor *et al.* [20] agreed that early sexual exposure was a risk factor for acquiring different strains of HPV and subsequent development of cancer of the cervix. This was compatible with similar research done on 9,988 University students in Italy [39].

Poverty and low socio-economic status in any population have a potentiating effect in increasing the prevalence of cervical cancers. In West Africa, poverty is rife. In a study conducted by Adesina *et al.* [19], low social class participants were the highest, 174 (37%) out of 470. Likewise, in the research conducted by Azuogu *et al.* [21], 121 out of 290 (41.7%) participants earned between $16.0 a month, translating roughly to less than $1 a day. Multi-dimensional poverty is a catalyst or a harbinger of developing cervical cancer. This correlated well with the study done in India between April 2016 and March 2017 on 1000 participants, where 67.9% of rural women with multi-dimensional poverty interviewed developed highly invasive cancer of the cervix [36].

Immunocompromised states like pulmonary tuberculosis and HIV/AIDS act independently to catalyse the neoplastic changes that may be occasioned by the presence of the oncogenic variants of HPV 16, 18, and other variants. When immunity wanes in humans, the propensity that leads to oncogenicity becomes higher [40] [41].

4.2. Barriers to HPV Vaccination

Healthcare personnel are key to the success or otherwise of the vaccination programme and how willing parents are to have their children vaccinated in West Africa and other countries. HPV vaccine has had many problems in its wide acceptability in Africa because of a lack of knowledge about the benefits derivable from being inoculated with it as it is bogged down by many multi-factorial problems [42]. This multi-factorial nature of the problems has not made the HPV vaccine gain inroads into the continent seamlessly as it should. Many healthcare personnel who should be at the forefront of sensitisation the public and giving up-to-date information about the efficacy, dosing, cost-effectiveness, benefits, safety profile, and dispelling many local conspiracies against the vaccine, are not doing so adequately with passion [43] [44].

Many health workers do not have adequate knowledge about the vaccines. This is one of the many problems confronting the uptake of HPV vaccines in Africa.

In the review of the study of Agyei-Baffour *et al.* [23], although there was basic knowledge about the mode of transmission of HPV and its pathologies, the respondents expressed reservations and divergent opinions about the age of eligibility for immunisation, accessibility, efficacy, and safety profile [45]. These findings support the findings in another study where paediatricians worry about the safety and efficacy of the vaccine [46]. The lack of clear-cut immunisation recommendations and counselling sessions by healthcare professionals also was consistent with what was found in another study carried out during an AAP-sponsored conference [47].

Cost, apart from poor knowledge about HPV and poor attitudes to HPV vaccination, has been a major hindrance in the uptake of HPV vaccine in West Africa [48] [49]. This is very glaring in the reviewed articles, as few participants who wished to receive the vaccine were handicapped financially. Each dose of the bivalent HPV vaccine cervarix costs about $100.00 per dose, and an eligible adolescent must take three doses which will translate to about $300.00 in Nigeria and GHC 750 ($150) in Ghana [18] [21]. This is a humongous amount for a continent bedevilled by socio-economic maladies and a huge population. So, the out-of-pocket affordability of this vaccine is a big issue in the continent. In Africa, where many cannot afford three square meals, and many people live on less than $1.00 per day, the cost of the vaccine is seen as unaffordable. Many households that can afford it may not see the urgent need to have the vaccination. This vaccine has been licensed in the USA since 2006 and has had a tremendous impact on the prevalence and incidence of cervical cancer in that population and in other developed economies of the world. Any laudable initiative that will reduce the price of this vaccine will translate to an increased uptake of the vaccine.

To obviate the all-important factor of the unaffordability of the vaccine, a novel strategy by The Vaccine Alliance (GAVI) that will make the vaccine free and readily available to all eligible populations has been launched in many African countries [50]. This has the potential to sharply reduce the prevalence and incidence of HPV-related cancers, including cervical, vaginal, vulvar, and penile cancers and cancers of the head and neck among the teeming population of developing countries.

Morbid fear of the untoward effects of the vaccine as a barrier was found in 35.9% of the participants in the study by Ebu *et al.* [18] in Ghana. And these barriers were cited in a similar study conducted by Akpor *et al.* [20]. This was consistent with similar findings where eligible adolescents shunned the vaccination exercise due to adverse effects, inconveniences, and psychological factors [51]. Literature was replete with facts that only mild untoward effects like pain and swelling at the site of injection were reported, which would resolve within a few days [52] [53].

4.3. Perceptions about HPV and Cervical Cancer

It is evident from the reviewed studies that people across West Africa firmly believed that cervical cancer was caused by promiscuity. A woman with the diagno-

sis would likely be stigmatised and rather not seek remedy in conventional hospitals in the full glare of other patients and relations. Instead, she would go secretly to herbalists or prefer to die a slow, agonising death (Williams *et al.*, 2019) [22]. Stigmatisation could affect the quality of life of any woman undergoing cervical cancer treatment [24] [54]. Also, many West Africans believed that cervical cancer was a curse or spell invoked by a roving, unseen enemy. This also could extract stigmatisation from the locals, who would feel the woman has done abominable things against ancestral spirits [55]. Feminisation of the cause is another issue. Women were seen as reservoirs of infections, and that cervical cancer was a result of the myriads of infections she was harbouring. Men would blame women for being responsible for their cervical cancer, and they would exonerate themselves and want to be seen as saints, even when they had multiple wives and concubines [56]. This is contrary to the views expressed in a South African study where men were blamed for STDs like gonorrhoea, and women were blamed for cervical cancer (Wood *et al.*, 1997). Some elderly people also believed that modern lifestyle changes, consumption of refined products, experimentation, and adventurism common with the younger generation were responsible for more cases of cervical cancer in our recent history [21].

Furthermore, contrary to the widely held belief that cervical cancer was caused by evil spirits, many respondents believed in the efficacy of the HPV vaccine as a primary preventive strategy against cervical carcinoma 8). Remorsefully, they blamed the dwindling fortunes of African traditional medicines and their lack of potency against cervical cancer on the westernisation of Africa's indigenous culture [57].

4.4. Attitudes of Respondents to HPV Vaccines

The poor attitudes shown to HPV vaccination across all the selected studies are consistent with what was found in a South Korean study where only 7.2% of mothers interviewed agreed that their daughters had had the HPV vaccine [33]. This finding contrasted with what was found in a Cambodian American study where women reported that 32.6% of the mothers said their daughters had been vaccinated [34].

Many were unaware of HPV, cervical cancer, and HPV vaccines and the nexus between them. Among those who were aware, the enthusiasm to do what was right by asking for more information was lacking. Reticence was the common denominator that made the majority of the respondents feel relaxed and not do the needful to reduce the incidence of cervical cancer development through proactive and preventive action like HPV vaccination. [21] [57]. Another reason for the preponderance of cervical cancer in West Africa is the fact that sexuality issues and education are seldom discussed between families or in schools. As such, it is perceived to be a taboo in African societies [24].

The findings of this review showed that the association between awareness of cancer of the cervix and human papilloma virus as an etiologic factor is predicated

upon the characteristic demographics of the study population, including their locations, educational backgrounds, and beliefs [18] [23] [24]. Access to the media, enlightenment campaigns against cervical cancer, and promotion campaigns to increase HPV vaccine uptake, level of education, HPV vaccine cost and access have been demonstrated to be strong predictors of willingness of individuals in West African countries. The disparities between the uptake of HPV vaccine in urban-rural settings can plausibly be due to the educational gap between urban residents and rural dwellers [23].

Print and electronic media play a pivotal role in news dissemination and enlightenment campaigns. They are capable of influencing people to make the right choice through persuasion regarding their health [58]. Through vigorous dissemination of such all-important message of the HPV vaccine as a primary prevention against the deadly cervical cancer on radio, television, podcasts, and health campaigns by advocacy groups, there is bound to be a change of mindset and attitude toward taking the human papillomavirus vaccine as a panacea for eradicating cervical cancer [59].

5. Theoretical Critiques on Knowledge, Perceptions, and Attitudes about HPV and Its Vaccines

In West Africa

Different theoretical models explain the knowledge or awareness of HPV, the perception of HPV and its pathologies, and HPV vaccine acceptability in West Africa. These are explained below.

5.1. Diffusion of Innovation Theory

Diffusion of innovations is a theory that explains the procedure of instituting novel ideas into a system through different means of dissemination, and it was refined by Rogers [60] [61]. This theory is credited for its valuable change model for enabling new ideas and inventions, which are then re-modelled and offered in manners that meet the yearnings of each level of adopters [62]. Additionally, it emphasises the invaluable necessity of news dissemination and peer interactions in the adoption procedure. This explains why some West Africans accepted the HPV vaccine early and why some were hesitant up till today.

Without any equivocation, this theory is about the procedure that takes place as a population embraces a novel idea like philosophy, medicine, practice, or HPV vaccine. Rogers designed the procedure, positing that a large percentage of people, including a few of them, would welcome the new idea and make use of it initially. The more these early innovators publicise this new initiative, the more people welcome it, and it translates to the evolution of a critical mass. With time, the new idea or innovation is widespread or commonplace within the population until a saturation point is reached. Quite distinctly, Rogers categorised 5 different adopters of a new idea: innovators, early adopters, early majority, late majority, and laggards. Sometimes, a sixth group is combined with them, making it become non-adopters.

The initial five distinct categories are depicted in the bell-shaped curve diagram. Furthermore, for clarity's sake, Rogers idealised or proposed the likely percentage of each category, which, more often than not, reflects the values seen in a normal bell-curve [63].

With an implicit knowledge of this theory of diffusion of innovation, all other variables remaining constant, one can understand why the uptake of the HPV vaccine may meet some early acceptance, scepticism, resistance, and, in some quarters, rejection. It will take some persistent intensification of campaigns to get people on board with these vaccines, reassurances of their safety profiles, dispelling some myths, misgivings, and concocted propaganda, accessibility, and availability at no cost to the citizenry before there can be any meaningful adoption and uptake of these vaccines.

5.2. Witchcraft Theory and Occult Belief

As attested to in the study of Balogun and Omotade [24], many West Africans attributed cervical cancer and HPV infections to witchcraft and did not accept anything like HPV. This elucidates the fact that the spiritual importance of the healing process in African religion is more significant than the biologically effective systems of any treatment [63]. Africans tenaciously idealise that their traditional healing system is god-ordained for better health. Buttressing this assertion is the fact that before, Western medical practice in Africa was the efficacious traditional healing practice that gained so much popularity as the only known treatment for all infirmities.

Even though Africans accept Western medical practice for managing ailments, their idea of mystical, supernatural forces—such as sorcery, amulets, herbs, witchcraft, and medicine—grows more intensely. It is in this context that adversities, disease, mishaps, and illnesses are frequently believed to be due to ancestral spirits, witchcraft, and spells of diviners or herbalists (rationalised to afflict the victims telepathically) rather than to biological or medical pathologies [57] [63]. This lends credence to the stance the traditional medicine practitioners and herbalists maintain in the management of sicknesses of African people. Many Africans venerate these traditional healers as specialists, experts with metaphysical powers who can recognise the causes of all such adversities and ailments. They concoct effective remedial measures as oblations of appeasement offered sacrificially to the ancestors to nullify the spells from the evil spirits or counter the sorcery to ward off the ailment cast on the victim. Furthermore, many traditionalists in West Africa believe that orthodox medical practice is more expensive and slower to get healing from [57] [63].

5.3. Health Belief Model

The inferences and analyses made from the selected studies Health Belief Model (HBM). This model originated from the Psychological and Behavioural Theory developed by Becker [64].

This research underscores the relevance of the Health Belief Model to explain the knowledge and awareness about HPV and people's attitudes to HPV vaccines in West Africa. The key HBM constructs, such as perceived susceptibility, severity, benefits, barriers, self-efficacy, and cues to action, reinforce our knowledge of the complex interplays that shape people's health behaviour in West Africa.

The Health Belief Model (HBM), considered one of the most widely used theories of health behaviour with six key constructs; risk susceptibility, risk severity, benefits to action, barriers to action, self-efficacy, and cues to action, can predict health behaviour [64]-[67]. The HBM was primarily formulated to mirror the adoption of preventive health practices in the United States and has had remarkable success in its adaptation to many socio-cultural and everyday issues [68] [69].

According to the Health Belief Model (HBM), people are likely to take preventive measures against illness if they perceive themselves as vulnerable to a condition (perceived susceptibility), believe the condition would have serious consequences (perceived severity), rationalise that taking a critical action would lessen the severity or vulnerability and bring other benefits (perceived benefits), and perceive some negative impediments connected with the health action (perceived barriers). Subsequently, scholars suggested the expansion of HBM by adding self-efficacy, which entails the belief that people can properly do the activity they delight in despite perceived obstacles [66] [70]. Practically, self-efficacy is often downrated in Health Belief Model (HBM) research [70]. The model also proposed that some cues, including environmental factors, can dictate the final decision made [67]. These cues for action can be either internal or external, such as being exposed to a campaign or grappling with symptoms of a disease.

In interrogating why people will seek to know about or be aware of HPV and its deadly consequences without a primary prevention approach, the Health Belief Model (HBM) is a veritable framework [66] [71]. The perceived vulnerability to unpleasant outcomes due to socio-cultural norms, financial impediments, and other pertinent issues forms an important aspect of the model [72]. These impediments constitute the obstacles that influence one's decision to seek knowledge about HPV, embrace cervical smear testing, and adopt the HPV vaccine [66] [72].

A review of this kind of HPV vaccine uptake and its primary prevention approach is in tandem with the HBM constructs. According to the HBM, individuals will readily adopt a primary prevention approach to HPV and cervical cancer if they feel they are at risk of cervical cancer and other HPV-associated pathologies. The severity mentioned in this study showed that the narrative is changing fast. This is the cue to action, encouraging people to overcome some perceived obstacles. Education, ignorance, and myths are enshrined factors that can play a crucial role in shaping self-efficacy, which is the confidence a person exudes in being able to seek knowledge and information about HPV, cervical cancer, and prevention strategies. Recognising these tweaking factors is necessary to modify prevention strategies to target demographic groups. The HBM enables us to identify the barriers to HPV vaccine uptake and stress vaccination advantages, as well as dictate

how to target any intervention to improve its uptake and the imperatives of taking concrete actions not to get inflicted. They will also figure out the militating barriers to seeking those preventive strategies.

Perceiving vulnerability to disease, Weyori *et al.* [67] harped on the significance of knowing the inherent aetiologies linked with a condition and its complications. The authors showed in their studies that people who had previous health complications by not accessing healthcare would readily access it the next time to avert those complications as they would then be more knowledgeable. This lends credence to the HBM's construct of perceived susceptibility as an important determining factor of health behaviour.

Moreover, the research touches upon the concept of self-efficacy, a construct later added to the HBM, emphasizing an individual's belief in their ability to successfully complete a health-related behaviour. Although the direct mention of self-efficacy is limited in the research, factors like educational attainment and empowerment of women suggest a connection to self-efficacy in the context of ANC utilization. Furthermore, the studies discuss cues to action, both internal and external stimuli influencing health-related behaviour. Proximity to health institutions, literacy rates, and access to electronic media serve as cues that prompt women to seek ANC services, reflecting the HBM's emphasis on cues to action.

The perceived severity of complications of unmanaged HPV or cervical cancer outcomes resonated in the studies of [73] [74]. Their studies underscored the complications associated with poor health-seeking behaviours and how the participants remedied the situation through better utilisation of health facilities in subsequent years by proactiveness in prevention strategies.

When a population sees the benefits of their increased utilisation of a health initiative, they will automatically be more interested in continuing on that trajectory. This perceived health benefit is also one of the constructs of the HBM. For instance, Bain *et al.* [75] emphasised the benefits of adequate maternal healthcare utilization like ANC, which translated to reduced maternal mortality risks. The perceived benefits motivated women to seek ANC services, as HBM idealised.

Some perceived barriers to healthcare access are poor education, poor media exposure to access news and information, and poverty, as attested to by [76] [77]. These studies showed that people grappling with those barriers would have poor health-seeking attitudes. This is in consonance with the HBM, which idealises that people will more likely not seek healthcare when there are perceived obstacles. This lends an empirical credence to HBM on perceived barriers.

5.4. Extended Parallel Process Model

Another theory that can help improve HPV vaccination in many developing countries is that which supports instilling fear into the target population about the deadliness of cervical cancer and that a cardinal way to avoid getting the disease is primarily by vaccination. That theory is known as the extended parallel process model, where an individual is subjected to a fear factor about a disease to encour-

age him /her to seek ways to remedy the situation as was done during the COVID-19 pandemic [78] [79]. Seeking a remedy in this context is by changing one's behaviours and attitude, which will translate to having an improved HPV vaccination

6. Strength of the Study

This review offers an incisive inquisition into the available studies on the knowledge and perception about HPV, cervical carcinoma, and West African people's attitudes toward taking the HPV vaccine or not in the West African sub-region. These findings were generated after carefully and painstakingly exploring the details of the reviewed papers involving the synthesis of quantitative and qualitative information related to the topic. The inclusion of qualitative studies in this review allowed the understanding of the complexities involved in the acceptability of the HPV vaccine to reduce the staggering prevalence of cervical cancer and, by extension, other cancers and genital warts among the African population in whom it is most prevalent throughout the world and how to circumvent the barriers militating against the seamless acceptance of the noble promotional primary prevention strategy against the deadly cancer. Furthermore, the qualitative studies reviewed showed the FGD participants baring their minds freely about their knowledge or lack of it, the misconceptions about the risk factors and causes of cervical cancer, and what the barriers were against HPV vaccine uptake in West Africa. Within the contextual framework of this review, a theory underscoring the reasons for low-level HPV vaccine uptake was also discussed.

7. Limitations of the Studies

Heterogeneity in research findings may obviate the imperatives of meta-analysis. This is also applicable to this review. A meta-analytical study would have been more appropriate and given broader insights into the variables, dynamics, and findings in the study. Educational level, cultural norms, and peculiar variables in different countries and even within a complex country such as Nigeria make the findings not uniformly assessable. Nonetheless, the study still offers quantitative and qualitative aggregations of the available information about the knowledge of HPV as having a nexus with many genital infections and cancers and gleaning the perspectives of respondents and what the barriers are against a wide embrace of the altruistic efforts at ridding the continent of the burdens of cervical cancer. The applicability and interpretation of this review should be done with some restraints. This is not unconnected with the use of some current studies with the inherent capability of introducing biases since the methodologies, sampling method sizes, and country-wide differences existed in the whole of West Africa. Differences in the findings between Nigeria and Ghana were not analysed as both countries have many things in common as anglophone countries with many cultural and religious similarities.

Additionally, the study used, to a large extent, data culled from existing research in two countries, Nigeria and Ghana, which may not truly capture the silent and

country- and context-specific situations in the whole 16 counties of West Africa. A deeper exploration with the use of primary information collection methods, like surveys and interviews, in more West African countries other than Nigeria and Ghana would have been more appropriate and generalisable. Some of the results from participants may not be outrightly reflective of their actual knowledge, perceptions about HPV, and attitudes about the uptakes of HPV vaccines.

Lastly, the multi-cultural, socio-religious, and different healthcare terrains within West Africa are not homogenously represented in the study reviewed. Understanding these peculiarities is crucial to developing pinpoint strategies that take into cognizance the unique factors affecting HPV uptake in many countries, thereby engendering more robust and equitable healthcare campaigns to improve the current practice. The studies' results may not be universally applicable to all sub-regions within West Africa, underscoring the necessity for future studies to address the observed limitations by including more robust perspectives, updated data, and a more detailed study procedure for a thorough understanding of HPV knowledge, perception and HPV vaccine uptake in West Africa.

8. Conclusion

Poor knowledge and lack of awareness of what the aetiologic factors of cervical cancer are and the poor health-seeking attitudes of people in the West African subregion are the harbingers of the increasing prevalence of cervical carcinoma in the region. Divergent opinions were expressed on what the aetiologies of cervical cancer are. Major beliefs about cervical carcinoma have no scientific basis. Myths, superstitions, and false attributions of cervical carcinoma to a perceived enemy or witchcraft are some of the factors that account for the poor knowledge and carefree, poor health-seeking behaviours of many West African populations. Education plays a major role in making people universally aware of some basic things about many topics or events. A situation where there are many illiterate people in society does not augur well for such an understanding of the scientific basis of diseases, as their beliefs, attitudes, and uptake of those scientific breakthroughs are shaped by their limited knowledge educationally. To the uneducated people, every debilitating and lethal disease must be caused by witches and wizards. To talk them out of that line of reasoning is a herculean task. A universal message approach may be effective in explaining that the witchcraft and spiritual causal theory is unfounded as it relates to HPV, cervical cancer, and HPV immunisation.

9. Recommendations

Education is a veritable weapon that empowers people to have convincing evidence about something before believing it. It is unscientific to believe that some alien, unseen extra-terrestrial forces or spirits are behind what has been proved irrefutably by different authorities on this topic for many years. Many people, through a lack of adequate education and knowledge, hold on tenaciously to unsubstantiated fallacies about the causal relationships between cancers and witch-

craft. Some still believe cervical cancer is a curse and retribution for promiscuity. Even some of those who have some level of education still find it difficult to extricate themselves from the line of reasoning that supports spiritual undertones and links with cancers. In this regard, education will gradually change the majority's perceptions and mindsets, and those spiritual attributions will fizzle out. Through intense campaigns and sensitisation of people, stigmatisation of cases of cervical cancer, myths, and other fallacies being peddled about the disease will be removed. The GAVI-piloted programme making this vaccine available almost free of charge is highly commendable. It is a laudable effort to drastically reduce the incidence and prevalence of genital warts, cervical, vaginal, and vulvar cancers, cancers of the head and neck, and other debilitating conditions associated with HPV serotypes 16, 18, 11, 31. This initiative will have multiplier effects by reducing the amount of money spent yearly on managing these conditions. What is spent on managing any of these HPV-induced cancers is not only in monetary terms, but the invaluable man-hours lost to work by the spouses of the affected patients. Productivity is negatively impacted as it is customary that the immediate family grapples with caring for those diagnosed with any of the aforementioned conditions. Succinctly put, cultural beliefs and religious biases should be holistically addressed as they have detrimental effects on the understanding and perceptions about HPV and reduce the uptake of HPV vaccines.

Policy makers should make it a priority to incorporate HPV vaccination into the existing mainstream immunisation programmes in all the countries of West Africa. Doing this will automatically and naturally make it mandatory for adolescent girls of eligible age to benefit from the immunisation programme.

Furthermore, when there is enough coverage of adolescent girls and a saturation point is reached, adolescent boys should also be considered concerning having them vaccinated against penile cancers and tumours of the head and neck. Doing this will rid the developing world of the debilitating effects of diseases associated with the oncogenic serotypes of human papilloma virus.

Finally, it is apparent through this review that Africa has a long way to go. Knowledge-gap is wide, the attitudes to accept new concepts and scientifically proven methods of diagnosis and management are poor, and the uptake of this vaccine is still abysmally low in all the West African countries. Opinion moulders, highly influential figures in society, government parastatals, healthcare workers, religious leaders, traditional rulers, and the mass media should not relent in their efforts to sensitise the whole population about HPV and cervical cancer on the need to assess the available primary preventive strategies of cervical screening and immunisations for all eligible girls.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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