Chapter One

Introduction

1.1 Background to the Study

Cervical cancer remains one of the prevalent cancers affecting women worldwide, with approximately 80% of cases concentrated in the developing world. As a result, it significantly contributes to the morbidity and mortality rates among women in Nigeria and other developing countries[1]. Emerging as a major factor in this disease, human papillomavirus (HPV) plays a critical role in both benign and malignant cervical disorders. Transmitted primarily through sexual intercourse and skin-to-skin contact, HPV ranks among the most common sexually transmitted infections, with an estimated prevalence of 50% among sexually active adolescents[2]. The risk of cervical cancer escalates as women approach their fifties, mainly due to persistent HPV infection. Additionally, certain factors like co-infection with HIV or immune impairment from malnutrition, pregnancy, or immunosuppressive chemotherapy further heighten the risk and progression of cervical cancer[3].

Globally, cervical cancer poses a significant public health challenge. 99% of cervical cancer cases have been linked to HPV infection, highlighting the critical role of this virus in the disease's development[3]. Projections for the near future are concerning, with an expected surge in new cases, projected to reach a staggering 700,000 by 2030. Equally alarming is the anticipated increase in annual deaths, which may rise from 311,000 to 400,000[4]. The Sub-Saharan Africa (SSA) region bears a particularly heavy burden of cervical cancer, with an alarming annual tally of over 75,000 new cases and an estimated 50,000 deaths. This region reports a significantly higher incidence and mortality rate compared to other parts of the world. In Africa, cervical

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cancer affects 27.6 per 100,000 women annually, and a significant proportion 17.5 per 100,000 women results in death compared to its incidence of 6 new cases per 100,000 women among the African American population[5]. Nigeria, a populous nation located in the West African region, faces public health challenges concerning cervical cancer. Data from the Cervical Cancer Global Crisis Card positions Nigeria as the 5th leading nation in cervical cancer-related deaths, following India, China, Brazil, and Bangladesh[6]. The age-standardized incidence rate for cervical cancer in Nigeria, as reported by two population-based cancer registries, stands at 34.5 per 100,000. The country shares the healthcare burdens of Low Health Development Index nations, witnessing 44,699 deaths and 73,417 new cases of cervical cancer in women during 2020. Cervical cancer constituted 12,075 new cases, accounting for 9.7% of all new cancer cases, and 7,968 deaths, representing 10.1% of all cancer-related deaths in Nigeria in 2020. This makes cervical cancer the second most prevalent cancer in the country, following breast cancer[7].

Despite numerous global scientific efforts geared toward finding an efficient and effective cure for Cervical cancer, it continues to affect the health and lives of many without a cure. Nevertheless, evidence from studies shows that access to early detection practices such as the Papanicolaou smear (Pap smear), visual inspection with acetic acid (VIA), and visual inspection with Lugol's iodine (VILI) has proven to be effective over the years in reducing the global prevalence of, and mortality from, cervical cancer[8]. The Pap smear is a useful and highly accurate cytological investigative tool that detects cervical cancer by examining cells of the cervix for precancerous and cancerous lesions. Despite its high degree of accuracy, the uptake of the Pap smear remains low in low-resource settings[9]. Early screening often detects abnormalities and can be treated before advancing into cancer. Evidence suggests that CC can be cured if

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diagnosed at an early stage and promptly treated. When cancer of the cervix is found early before progressing to the invasive level, the probability of treating it is high[10].

Cervical cancer screening plays a pivotal role in early detection and prevention, making it a cornerstone of public health efforts. Early detection through screening methods like the Pap smear enables the identification of precancerous lesions or cancer at its initial stages when treatment options are more effective and less invasive[11]. By detecting abnormalities early, healthcare professionals can intervene promptly, preventing the progression of these lesions into invasive cervical cancer. Moreover, regular screening allows for the identification of high-risk HPV infections, the primary cause of cervical cancer, leading to targeted interventions such as vaccination and surveillance. Through widespread screening programs, healthcare systems can significantly reduce the burden of cervical cancer and save countless lives by promoting timely interventions, providing women with the opportunity for optimal health outcomes and a better quality of life[9].

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1.2 Statement of the Problem

Cervical cancer presents a significant public health challenge in Nigeria, particularly among women aged 15 to 49, where it ranks as the second most prevalent cancer after breast cancer. Alarmingly, Nigeria faced a significant burden in 2020, witnessing approximately 604,127 new cases and 341,831 deaths attributed to cervical cancer caused by HPV. Each year, about 12,075 new cases of cervical cancer are diagnosed in Nigeria, highlighting the urgent need for effective prevention and early detection measures[12].

Despite the importance of early detection and treatment to prevent cervical cancer, comprehensive cytological screening procedures for HPV detection have proven challenging to implement in Nigeria. Moreover, concerning data reveal that a considerable proportion of women diagnosed with cervical cancer have not undergone screening, highlighting a critical gap in preventive measures. Developed countries have successfully reduced the burden and risk of cervical cancer through organized and high-quality cytology-based screening programs, but challenges persist in developing countries like Nigeria[6].

Despite low awareness and knowledge of cervical cancer and screening, recent data on these variables are limited, especially in the targeted region of Ibadan, Oyo State**.** It is crucial to assess the knowledge and attitude towards cervical cancer screening among women in this population, given their high risk of contracting HPV infection. Understanding their awareness and acceptability of screening, as well as identifying associated factors, can help design tailored interventions to address any identified gaps in knowledge and awareness. Thus, this study seeks to investigate the Knowledge and Attitude of Cervical Cancer Screening among Women Ibadan, Oyo State to inform targeted strategies for cervical cancer prevention and early detection among women.

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1.3 Aim and Objectives of the Study

The study aims to assess the knowledge, attitude, and practice of Cervical Cancer Screening among women in Ibadan, Oyo State.

Specific Objectives

The specific objectives of the study are to:

i. to assess the level of knowledge of cervical cancer, cervical cancer prevention and HPV vaccine among women in Ibadan, Oyo state

ii. determine the attitude towards cervical cancer screening among women in Ibadan, Oyo State.

iii. to determine the level of attitude of women living in Ibadan, Oyo state towards HPV vaccination identify factors associated uptake of cervical cancer screening among women in Ibadan, Oyo State**.**

iv. to assess the practice of HPV vaccination and cervical cancer screening among women living in Ibadan, Oyo state

v. to assess the intention to vaccinate and willingness to vaccinate among women living in Ibadan, Oyo state

1.4 Research Questions

The study answered the following research questions:

1. What is the level of knowledge of cervical cancer, cervical cancer prevention and HPV vaccine among women in Ibadan, Oyo state
2. What is the attitude towards cervical cancer screening among women in Ibadan, Oyo State?
3. What is the level of attitude of women living in Ibadan, Oyo state towards HPV vaccination identify factors associated uptake of cervical cancer screening among women in Ibadan, Oyo State.

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4. What is the practice of HPV vaccination and cervical cancer screening among women living in Ibadan, Oyo state
5. What is the level of intention to vaccinate and willingness to vaccinate among women living in Ibadan, Oyo state

1.5 Justification of the Study

Cervical cancer remains a significant public health concern in Nigeria, with a considerable impact on women's health and well-being. It is the second most prevalent cancer among women aged 15 to 44, following breast cancer. The burden of cervical cancer is particularly alarming, with a substantial number of new cases and deaths recorded annually due to human papillomavirus (HPV) infection. Early detection and preventive measures are crucial in reducing the morbidity and mortality associated with cervical cancer. The lack of comprehensive cytological screening procedures for HPV detection in Nigeria poses a challenge in effectively addressing cervical cancer. Additionally, a significant proportion of women diagnosed with cervical cancer have not undergone screening, pointing to critical gaps in preventive measures. Despite successful screening programs in developed countries, implementing such initiatives in developing countries like Nigeria remains problematic.

This study's importance lies in assessing the Knowledge and Attitude of Cervical Cancer Screening among Women in Ibadan, Oyo State**.** Understanding women's level of awareness and understanding of cervical cancer, its risk factors, and the significance of screening is essential in promoting early detection and prevention efforts. Exploring the attitudes and perceptions toward cervical cancer screening can provide valuable insights into the barriers and facilitators that

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influence women's participation in screening programs. By identifying the factors that hinder screening uptake, tailored interventions can be developed to increase awareness and improve the acceptance of screening services in the targeted population.

Furthermore, as awareness and knowledge of cervical cancer and screening have been noted to be low in certain regions, such Ibadan, Oyo State, this study will contribute up-to-date data to fill this knowledge gap. The findings can inform health authorities and policymakers on the specific areas where awareness campaigns and educational programs are needed to improve knowledge and awareness of cervical cancer and screening. This study can serve as a vital resource for designing evidence-based strategies to enhance cervical cancer prevention and early detection measures in the study area. The findings may also have broader implications for improving cervical cancer screening initiatives and outcomes across Nigeria and other similar developing countries facing similar challenges.

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1.6 Significant of the Study

At the public health level, cervical cancer remains a major concern in Nigeria, especially among women aged 15 to 49 years, with breast cancer taking the lead as the most prevalent cancer. By understanding the level of knowledge and attitude towards cervical cancer screening, this study aims to inform evidence-based interventions to reduce the burden of the disease and save lives. The findings of this study can have direct implications for targeted interventions. By identifying barriers and facilitators influencing women's participation in screening programs, tailored approaches can be designed to increase awareness and promote positive attitudes towards screening in the specific region. Policymakers can also use the study's data to make informed

decisions, allocate resources effectively, and strengthen existing screening programs, enhancing cervical cancer prevention and control efforts.

In addition to its immediate impact in Ibadan, Oyo State, this study fills critical gaps in knowledge. The updated information on cervical cancer and screening awareness can guide future public health campaigns and educational initiatives to address specific areas where intervention is most needed. Capacity building among healthcare professionals is another significant outcome of this study. The generated data can be used to design training programs and workshops, equipping healthcare providers with the latest information and best practices in cervical cancer screening and prevention. The study's relevance extends beyond Nigeria's borders. As developing countries worldwide grapple with similar challenges in implementing effective cervical cancer screening programs, the findings can serve as a blueprint for context-specific strategies to combat cervical cancer in various regions.

Empowering women's health is at the core of this study's significance. By enhancing knowledge and attitudes towards cervical cancer screening, the study aims to empower women to take charge of their health and well-being. Increased awareness can lead to regular screening and early detection, improving health outcomes and quality of life for women in the target population.

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1.7 Scope of the Study

This study include women in Ibadan, Oyo State**.** Women of reproductive age (15 – 49 years) used a self-developed and expert validated questionnaire and descriptive statistics of frequency counts, percentage, bar chart, pie chart, mean and standard deviation was done.

1.8 Operational Definitions of Terms

Cervical Cancer: a malignant neoplasm arising from the cells of the cervix, the lower part of the uterus. It includes all stages of the disease, from precancerous lesions to invasive cancerous growth.

Cervical Cancer Screening: the process of early detection and prevention of cervical cancer through various methods, such as the Pap smear, visual inspection with acetic acid (VIA), and visual inspection with Lugol's iodine (VILI). It involves the examination of cervical cells to detect precancerous changes or cancerous growth, allowing for timely intervention and treatment.

Human Papillomavirus (HPV): a viral infection primarily transmitted through sexual intercourse and skin-to-skin contact in the genital area. It is associated with cervical cancer risk.

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Chapter Two

Literature Review

The natural history of HPV infection, and an up-to 80% lifetime risk of cervical HPV infection, puts all sexually active women at risk for cervical cancer. The catastrophic consequences of cervical cancer can be prevented with early detection through screening, and more recently through vaccination as primary prevention. Routine cervical cancer screening is recommended for all women, including those vaccinated against high-risk HPV types, as current HPV vaccines only prevent an estimated 70-80% of HPV related cervical cancers. The epidemiology, etiology, and development of cervical cancer will be reviewed before exploring screening as a secondary prevention of cervical cancer. This review of the literature will provide the foundation for discussing cervical cancer screening, and the importance of this dissertation research and findings.

2.1 Human Papillomavirus

In the early 1990s, human papillomavirus was shown to be a necessary, though not a sufficient cause, of cervical cancer. Human papillomaviruses (HPV) are members of the Papovaviridae family, and are small double-stranded circular DNA viruses that infect the basal cells of the epithelium [1,2]. There are over 150 different types of HPV identified, with approximately 40 infecting the mucosal epithelial cells of the cervix. The International Agency for Research on Cancer (IARC) classification of HPV carcinogenicity varies by type, from highly to weakly carcinogenic [3,4]. Carcinogenic HPV involved in cervical malignancy are derived from the alpha species, of which there are currently 13–15 alpha HPV types considered high-risk (HR) and involved in cervical cancer development (32-34) [5]. IARC classification of Group 1, carcinogenic to humans, includes HPV 52, 33, 58, 16, 31, 35, 59, 18, 45, 39, 51, 56 and 66. HPV 6 and 11 are

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classified as Group 2B, possibly carcinogenic. Not all HR-HPV are equivalent in their role in cancer development, with an estimated 70% of cervical cancers caused by HPV 16 and 18 in the pre-vaccine era[6].

2.1.2 Taxonomy of Human Papillomavirus

Human Papillomavirus belongs to the genus Papillomavirus of the Papillomaviridae family. The Classification of the *Papillomaviridae* family is according to the sequence identity of their proteins across the L1 open reading frame[7] [8]. The *Papillomaviridae* family includes two subfamilies, *Firstpapillomavirinae* (which includes more than 50 genera and about 130 species) and *Secondpapillomavirinae* (with a single genus and species). Papillomavirus genera are named according to the Greek alphabet[9]. Based on their phylogenetic characteristics, they are classified into 5; Alphapapillomavirus (α-HPV), Betapapillomavirus (β-HPV), Gammapapillomavirus (γ-HPV), Mupapillomavirus (μ-HPV), and Nupapillomavirus (ν-HPV)[10].

2.1.3 Human Papillomavirus Protein and Structure

Human papillomavirus (HPV) is a small non-enveloped icosahedral deoxyribonucleic acid (DNA) virus, capable of replicating in the nucleus of squamous epithelium cells[11]. The virus is divided into three regions: a non-coding upstream regulator region (URR) that regulates gene expression; an early (E) region encoding genes involved in viral replication and cell transformation (E6, E7, E1, E4, E2, E5); and a late (L) region encoding the L1 and L2 capsid proteins that self-assemble to form the virion[12].

Based on its L1 capsid protein structure, HPV is classified according to its genotypes. Over 100 HPV genotypes have been identified, with about 40 being genital and 15 being oncogenic or high-risk due to their link to anogenital neoplasia and ability to cause cancers. Based on how strongly each HPV type is linked to ICC, the International Agency for Research on Cancer

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(IARC) divides them into different categories. Human cancer-causing HPV genotypes (HPV16, 18, 31, 33, 39, 35, 45, 51, 52, 56, 58, and 59) as well as those that are "probably carcinogenic" (HPV68) are considered high-risk. The potentially cancer-causing genotypes of HPV include 26, 53, 66, 69, 70, 73, and 82, while the recognized low-risk genotypes of HPV are 6, 11, 40, 43, 44, 54, 71, and 74[12].

2.1.4 Tissue Tropism of Human Papillomavirus

HPVs are species-specific viruses that have preferential tropism for epithelial tissues[14]. Although HPVs are linked to the development of a wide variety of benign and malignant skin and mucosal neoplasms and cancers, most of all, HPV infections clear off in about two years and do not result in any apparent lesions or disease[15]. However, human Pqapillomaviruses have been discovered in skin that may seem histologically normal and in other regions, including the oral, nasal, and cervical mucosas and mucocutaneous epithelia, such as those found in the anal canal and the penis[16 17].

Additionally, they have been identified in cases of anogenital warts and cervical intraepithelial lesions[18]. Furthermore, some prior research studies revealed that *Gamma*-PVs might be involved in developing skin warts premalignant cutaneous lesions, and head and neck cancer[19 20].

HPVs are known and notorious for infecting not just the cutaneous epithelium but also the mucosal and mucocutaneous epithelium. So far, they have been discovered in various clinical samples. These clinical samples comprise benign and malignant cutaneous neoplasms, clinically normal skin, the oral cavity, the nasopharynx, and the anogenital area. In addition, HPVs have a very broad tissue tropism and can infect all different types of the epithelium (penis, cervix, and anal canal)[21].

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All human papillomaviruses (HPVs) are classified and placed into one of two categories, cutaneous or mucosal, according to the type of tissue they are most commonly found[22 23].

2.1.4.1 **Cutaneous Human Papillomavirus**

Cutaneous HPVs are incredibly diverse, spanning all five genera of HPV, and are highly prevalent on skin tissues, accounting for more than 75 percent of all non-persistent HPV infections. Cutaneous HPVs can be spread through direct contact with infected skin[24].

Most cutaneous HPV genotypes are *gamma* and *beta* papillomaviruses, and these genotypes are not associated with an increased risk of cervical cancer[i]. However, it has also been established that cutaneous HPVs have a role in developing a range of skin lesions, including warts[26]. Plantar warts, common warts, flat warts, and butcher's warts are all skin conditions caused by low-risk genotypes of the human papillomavirus (lrHPV), which are present on the surface of the skin and infect the cutaneous epithelial tissues. On the other hand, mounting evidence suggests that non-melanoma skin cancer may be caused partly by *beta*-human papillomaviruses (*beta*-HPVs) and ultraviolet (UV) exposure[27].

The most typical symptom of cutaneous human papillomavirus infections in the genital area is the development of genital warts. Although HPV6 and HPV11 are often linked to about 90% of all genital warts, many other cutaneous HPV genotypes, such as HPV 2, 40, 42, 43, and 54, have also been implicated in genital warts[28].

Genital wart prevalence among young women has decreased in nations with high HPV vaccination rates, such as Australia and England. In contrast, genital warts are more common and more frequently occurring in the general population in Europe and the US. On the other hand, Sub-Saharan Africa lacks knowledge regarding genital warts (SSA). Most genital wart research

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in SSA has focused on high-risk individuals, like those who visited STD clinics or had jobs in the commercial sex industry, or those with genital warts[14].

Comparatively dissimilar to mucosal HPVs, mainly classified under the *alpha*-PV genera, cutaneous HPVs cover all five genera and account for more than 75% of all HPVs reported to date[29].

2.1.4.2 **Mucosal Human Papillomavirus**

Mucosal HPV genotypes are associated with many diseases because they frequently infect parts of the body with mucosal epithelial tissues[30]. *Alpha*-HPVs make up a great majority of mucosal HPVs, which means they can cause cancer in sites where persistent HPV infection has occurred[31]. Many of these HPVs are anogenital, infecting the genital tract. With more than 200 identified HPV genotypes, about 40 of these identified genotypes colonize the genital tract[32]. 13 of these genotypes (16, 18, 31, 35, 33, 39, 45, 52, 51, 56, 58, 59, and 68) regarded as high-risk and 2 (HPV53 and HPV66) classified as probably high-risk[33] [34]. Based on their carcinogenic characteristics, with HPV16 and HPV18 being the most virulent high-risk genotypes, accounting for over 70% of all cervical cancer cases[6]. However, the majority of HPV-positive oropharyngeal cancers—nearly 90%—are caused by HPV16[35].

2.1.5 Epidemiology of Human Papillomavirus Infection Worldwide

Infection with HPV, the primary cause of cervical cancer in women, has become increasingly prevalent worldwide[36]. Thereby making HPV a challenge of public health concern[37]. HPV infections remain one of the most common viral infections worldwide[38].

The epidemiologic distribution of HPV infection and HPV-associated burden varies significantly around the world, and morbidity—as well as mortality—related factors include geographic,

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socioeconomic, cultural, and genetic factors related to the viral genome variability, as well as intrinsic individual factors like age, gender, anatomic site of infection, and health status[39].

Among women with normal cervical cytology in 2007 and 2010, cervical cancer due to HPV prevalence was 10.4% and 11.7%, respectively, and thereafter, declined to 9.9% in 2019[38]. While adolescent girls and women under 25 are the most infected, the global prevalence rate of genital HPV infection in men have similar patterns to that in women, as are the transmission rates. This is understandable, given that genital or mucosal HPV is primarily transmitted through sexual contact[40].

The prevalence of HPV16 and HPV18 cervical HPV infection among women aged 15 to 44 years worldwide is 69.4%. About 2,869,000,000 women aged 15 years and above are at risk of cervical human papillomavirus. Out of which, 2,338,700,000 are in LMICs.

Annually, about 604, 127 new cervical cancer cases are recorded, of which LMICs record about 532,239[19].

2.1.6 **Human Papillomavirus Associated Diseases**

In both men and women, Anogenital warts, recurrent respiratory papillomatosis, oropharyngeal carcinoma, and various anogenital cancers can all be caused by HPV (including penile, anal, vaginal, vulvar, and cervical cancers)[41].

More than 80 percent of cases of cervical cancer are caused by HPV, with two strains, HPV16 and HPV18, accounting for about 70 percent of incidences. On the other hand, more than ninety percent of all HPV-positive oropharyngeal cancers may be traced back to HPV16[42].

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2.1.6.1 Genital Human Papillomavirus Infections

HPV is most commonly associated with genital infections, causing infection of the genital tract[ii]. HPV infections of the genital tract are the underlying cause of genital warts, squamous intraepithelial lesions, and cancer[44]. Sexual contact is the only way to transfer HPV strains that infect the anogenital tract[45].

The International Agency for Research on Cancer (IARC) categorizes the forms of genital HPV according to the degree to which they are linked with invasive cervical malignancies. hrHPV kinds include those that are classified as 'carcinogenic to humans', such as HPV 16, 18, 33, 31, 35, 39, 45, 52, 51, 56, 58, 59, and 68, as well as those that have the potential to cause cancer in people (HPV53 and 66)[46].

2.6.2 Genital Warts

Genital warts (*Condyloma acuminatum*) are the clinical symptoms of a sexually transmitted infection caused by many strains of human papillomavirus (HPV) referred to as low-risk HPV genotypes and they are typically transmitted from person to person through skin-to-skin contact, usually during sexual intercourse and activity[47] [48] [49]. They present themselves in clusters or separately and can be discovered in the genital or anal area of infected people including the penile shaft, scrotum, vagina, or labia majora[50]. They can also be present on the vaginal and anal interior surfaces[51]. They can manifest as filiform, pink, sessile, pedunculated papules, nodules, or soft growths as small as 5mm in diameter or as large masses in the vaginal or anal area[52]. Their color varies but tends to be skin-colored or more profound, and they may bleed spontaneously on

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occasion and can cause itching, redness, and swelling[48]. These lesions manifest asymptomatic and Exophytic growth, similar in appearance to cauliflower[49].

Although the two most virulent low-risk mucosal HPV genotypes, HPV6 and HPV11, are linked with around 90 percent of all genital warts, multiple additional HPV genotypes, including HPV 2, 40, 42, 43, and 54, have been obtained from genital warts[53].

2.1.6.3 Squamous Epithelial Lesions and Carcinoma

An abnormal region of tissue that can be found on an individual's intraepithelial tissues is referred to as a squamous intraepithelial lesion (SIL). It can also manifest in the back of the throat, the cervix, the vagina, the vulva, the anus, or the penis. These lesions have been classified as precancers, indicating that they are not cancerous but can potentially transform into cancer and spread to other tissues[54].

Cervical intraepithelial neoplasia, more often known as CIN, is an early stage of cervix cancer that can be cured if discovered earlier[55]. There is an agreement among researchers from all over the world that chronic infection with high-risk types of HPV, such as genotypes 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68, is required for the progression of squamous intraepithelial lesions (SIL) and cervical intraepithelial neoplasia (CIN)[56 57].

2.1.7 Natural History of Human Papillomavirus

HPV infection is primarily a sexually transmitted infection. As a result, both men and women are part of the virus's epidemiological chain, and they can simultaneously be asymptomatic carriers, transmitters, and sufferers of HPV infection[58]. In this regard, the risk factors for HPV infection are inextricably linked to an individual's sexual behaviour[59]. The most crucial are: early coitarche, having multiple sexual partners, and sexual interactions with high-risk persons such as prostitutes and people with multiple sexual partners. In addition, male circumcision and the

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appropriate use of condoms can reduce the risk of HPV transmission, though it will only prevent the risk of transmission between sexual partners[60].

Female sex workers and people living with the Human Immunodeficiency Virus (HIV) belong to the high-risk groups[61] [62]. Transmission occurs mainly through sexual contact; the organs most susceptible to infection are the cervix (transformation zone) and the pectineal line of the anal canal. HPV infections are commonly sheeting and HPV DNA can be discovered in the woman's cervix, vagina, and vulva, the glans, prepuce and skin of the penis and scrotum in the man, and the anal canal and perianal area in women and men[63].

The viral type, the duration of the infection over time, and, most likely, the viral load per cellular unit, as well as the integration of viral DNA into cellular DNA, are all well-known indicators of the progression of infection[64]. HIV infection is a risk factor for HPV infection and neoplastic development, especially during immunosuppression[65]. Long-term usage of oral contraceptives, high parity, and cigarette smoking has also been identified as progression factors[66]. Other possible factors include diet, in particular, diets poor in fruits and vegetables, and co-infection by other sexually transmitted agents such as Chlamydia trachomatis and Herpes Simplex Virus type 2[67].

HPV clearance took 9.4 months in women (both oncogenic and non-oncogenic strains)[iii]. After an incident infection with HPV 6 or 11, the median time to wart development was 6–10 months (range up to 18 months). This is longer than the earlier reported median period of 2.9 months for HPV type 6 or 11 infected women[69].

Regression of warts among both women living with human immunodeficiency virus (HIV)/AIDS and HIV-negative women has been reported to be common even in the absence of

treatment; 60% of women living with HIV/AIDS and 80% of HIV-negative women demonstrated regression of warts in the first year after diagnosis[70].

2.1.7.1 **Signs and Symptoms of Human Papillomavirus Infection**

The majority of persons who develop HPV infections have no symptoms. Some HPV-positive individuals develop noticeable genital warts and precancerous alterations in the cervix, vulva, anus, and penis. Genital warts are soft, moist, pink, or flesh-colored swellings that generally develop in the genital area[71]. They present in various shapes and sizes, including elevated or flat, single or several, and small or huge. They may appear on the vulva, in or around the vaginal or anus openings, cervix, penis, scrotum, groin, or thigh. Warts may occur weeks or months after sexual contact with an infected person or may not appear at all[72].

2.1.8 **High-risk Human Papillomavirus Genotypes**

There are over 200 different genotypes of the human papillomavirus (HPV)[73]. Based on epidemiologic association, the oncogenic potential, and the potential risk of cervical cancer, sexually transmitted HPV genotypes are divided into two categories: high-risk (HPV16, HPV18, HPV31, HPV33, HPV35, HPV39, HPV45, HPV51, HPV52, HPV56, HPV58, HPV59, HPV66, and HPV68) and low-risk (HPV-6, -11, -26, -40, -73 and it is crucial to highlight that people who are infected with numerous high-risk HPV genotypes have an increased chance of developing big tumors and a poor treatment response, which are risk factors for HPV infection persistence[74]. This is because high-risk HPVs are more likely to co-exist with other high-risk HPVs than low-risk HPVs[75 76].

The presence of a persistent infection with certain strains of hrHPV (16, 18, 31, 35, 33, 39, 45, 52, 51, 56, 58, 59, 66, and 68) is essential to the progression of cervical cancer[77]. It was known

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that the prevalence of different forms of hrHPV varied greatly between countries and regions of the same country[78]. Although the genotype of the HPV does not influence the clinical management of women at a larger risk for the development of cervical cancer, it is essential for epidemiology and ensuring that the appropriate HPV vaccination program is put into place[79].

IARC has identified 13 high-risk HPV genotypes as being either definitely associated with cancer or probably associated with cancer. These 13 types known as high-risk (HR) types and include HPV 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68 are definitely associated with cancers[80].

HPV16 and HPV18 are the primary etiologic agents of cervical cancers and a proportion of oropharyngeal cancers[81]. HPV-associated oropharyngeal and oral cancers show better prognosis and response to therapy[82].

Cervarix (bivalent; prevents infection by high-risk HPV types 16 and 18), Gardasil4 (quadrivalent; prevents infection by lrHPV types 6 and 11 and hrHPV types 16 and 18), and Gardasil9 (nonavalent; prevents infection by HPV genotypes 6, 11, 16, 18, 31, 33, 45, 52, and 58) are the three HPV vaccines that are presently available for the prevention of cervical cancer[83].

A small percentage of HPV infections are regarded as persistent and potentially develop into precancerous lesions which may later develop into cancer[84]. It has been hypothesized that persistence may be influenced by a variety of viral, host, and environmental factors, such as the type of human papillomavirus (HPV), the number of times an individual has been infected with HPV, the amount of virus present, infection with the human immunodeficiency virus (HIV), advanced age, and smoking[85]. In 2018, the incidence of cervical cancer was 43,1 per 100,000 women in Southern Africa and 40,1 per 100,000 women in Eastern Africa, standardized by age[86].

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Sub-Saharan Africa, especially Southern and Eastern Africa, has the highest incidence rate of cervical cancer. Some HPV strains, such as HPV52 and HPV35, may be more widespread in Sub-Saharan Africa than in Europe, even though HPV16 is the most common. This is true even though HPV16 is the most prevalent form overall. However, little is known about the natural history of HPV in Africa, where HPV infection is more prevalent[87].

High-risk human papillomavirus infections are thought to be the cause of cancers of the cervix and other anogenital organs, such as vulvar cancer[88]. This is because high-risk HPVs are associated with these infections. In 2005, IARC determined that thirteen distinct genotypes of the human papillomavirus (HPV) had a high cancer risk or were carcinogenic. These genetic variants are denoted by the numbers 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68 respectively[89].

2.1.9 Epidemiology and Etiology of Cervical Cancer

The cervix is a part of the female reproductive tract that is located at the inferior aspect of the uterus. It is cylindrical and narrow, and surrounds the external opening of the uterus at the end of the vaginal cannel. The cervix regulates mucus secretions to prevent bacterial infections of the uterus (especially during pregnancy), aids in the transportation of sperm into the uterus, and regulates flow of the sloughed endometrial lining into the vagina during menstruation.

Cancer of the cervix is defined as cancer that originates in the cells of the cervix. Cervical cancer is the fourth-most common cancer in women worldwide, with an estimated 528,000 new cases diagnosed in 2012 alone [90]. Cervical cancer deaths account for 7.5% of all female cancer deaths, with over 87% of deaths due to cervical cancer occurring in less developed regions. Infection with oncogenic HPV is a necessary, but not sufficient cause, for the development of cervical cancer [91].

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The HPV can be detected in 99.7% of cervical cancers and is extremely common. Over 50.0% of sexually active women acquire the virus by 50 years of age. Different types of HPV are identified as precursors to cervical cancer. However, the two most common subtypes, HPV 16 and 18 are found in over 70.0% of all cervical cancers. The squamous epithelium cells found at this junction of the cervix and uterus divide rapidly and have the potential to undergo an abnormal transition to dysplastic cells, if exposedto carcinogens such as HPV 16 and 18 [92].

Cervical changes progress from mild to severe over a period of years before changing to cancer. This indicates that more than 90.0% of cervical changes can be detected early through regular screening and can be treated before progressing to malignancy. Most HPV infections are transient. Only 3−10% of women whose infections are not cured becomes persistent HPV carriers, constituting a high risk group for progression to cancer of the cervix. Women may contract HPV when they are young but only progress to cervical cancer once they become 35 years of age or older. Pre-cancerous stages of cervical dysplasia are frequently asymptomatic, emphasising the importance of screening for early detection. Risk factors for HPV include early age at first sexual intercourse, increased number of sexual partners, smoking and immune-suppression including the Human Immunodeficiency Virus (HIV), high parity, and low socio-economic status [93]. Cervical Intraepithelial Neoplasia (CIN) is common in HIV infected women because both HIV andHPV are sexually transmitted and HIV infected women are more likely to have persistent HPV infections.

Global efforts to detect cervical cancer have focused on screening women for abnormal cervical tissues, treating the condition before it advances and providing appropriate follow-up care. In developed countries, there has been a 75.0% decrease in the incidence and mortality of cervical cancer over the past 50 years while in developing countries it remains the second most common

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cause of cancer-related morbidity and mortality. The discrepancy is largely due to the widespread institution of cervical cancer prevention and screening programmes in developed countries. Conversely, these programmes are essentially non-existent in most developing countries. A recent meta- analysis of process of care failures in prevention of cervical cancer in developing countries revealed that poor screening history was the primary factor: 54.0% of invasive cervical cancer patients had inadequate screening histories and 42.0% had never been screened [94].

Incidence of cervical cancer begins to increase in women after the age of 30, with the highest peak incidence being among women 40-44 years of age, which is considerably younger than most other cancers. Cervical cancer is still rare in young women <25 years (<1 case per 100,000 women). Likewise, death from cervical cancer is a rare event in young women. After the age of 40, mortality rates steadily increase with age [95].

In Nigeria, all-cause cancer mortality is higher in urban compared to rural areas, with the exception of cervical cancer. Rural women 20–44 years of age are up to two times more likely to die from cervical cancer compared to their urban counterparts, which is likely due to later stage diagnosis due to lower rates of cervical cancer screening. In the most rural regions of Canada the incidence of cervical cancer is up to 13.1 cases per 100,000 women, which exceeds that of urban areas at 9.6 cases per 100,000 women [96].

2.1.10 Cervical Cancer Development

Cervical HPV infections are sexually transmitted through skin-to-skin or skin-to-mucous contact, and not exclusively through vaginal intercourse. HPV is highly transmissible between sexual partners. Transmission of HPV from an infected partner occurs when a break in the skin or

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mucosal lining (epithelial layer) enables the virus to infect the basal cell layer of the cervix in the uninfected partner [97].

The probability of HPV transmission between partners has been estimated to be 0.20 over 6-months (or 3.7 transmissions per 100-person months), with persistent infections having a slightly higher probability. HPV transmission rates are comparable to bacterial sexually transmitted infections (STIs). However, unlike many bacterial STIs, condoms only offer moderate protection against HPV transmission.

The transformation zone of the cervix is particularly susceptible to carcinogenic changes caused by HPV infection, as demonstrated by a 20- to 40-fold increase in cancer at this site compared to other anogenital tract sites (with the exception of the transformation zone of the anus). The cervical transformation zone is a natural break in the epithelia layer where columnar and stratified cells meet each other, which facilitates access to the basal cell layer. HPV can also infect basal epithelial cells in other anogenital tract sites causing warts or other genital cancers.

As the infected cells mature, they move to the surface of the epithelium and begin viral replication, which takes place over approximately six weeks. The viral replication, cellular growth, and immune response can result in a variety of cellular lesions including warts or cervical dysplasia. Most infections are asymptomatic with a period of active infection, followed by regression of lesions, and then clearance of the infection. Upwards of 90% of infections resolve spontaneously within the first 24 months, with the mean length of time of infection with an oncogenic HPV type being just over a year [98]. However, the rates of clearance vary depending on HPV type, with lower clearance rates observed in HPV 16, 18, 31, and 33. Clearance of infection is thought to be a host cell mediated immune response, with approximately 10–15% of

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women failing to mount an immune response and developing persistent infection. Women who develop persistent infections are most at risk for the development of cervical cancer [99].

Persistent infections are regulated by the integration of the HPV genomes into the host cells. In particular, the viral-replicating genes E6 and E7 are important carcinogenic markers as they produce proteins that interfere with tumour-suppressing proteins, p53 and pRh, which are important cellular regulators. In addition to the presence of HPV integration, cervical cancer development requires an accumulation of mutations, which can arise from active, persistent HPV infections, and usually develop over an extended period of time.

2.1.11 Cervical Cancer Progression

Understanding the different pre-cancerous disease states, and their related risks for development of invasive cancer, compared to self-resolution, is important to screening strategies so that the medical community can balance the benefits of disease avoidance with the harms of invasive treatments and psychological distress.

Cytological changes associated with cervical dysplasia are currently described using the Bethesda System of classification and are evaluated as cervical intraepithelial neoplasia (CIN) and squamous intraepithelial lesion (SIL). Very mild cervical dysplasia is denoted as atypical squamous cells of undetermined significance (ASC-US), which is characterized by observable abnormalities, but not sufficient to be CIN or SIL [100]. Mild dysplasia is characterized by early changes to the cellular structure and is classified as CIN1 or low-grade SIL (LSIL). Moderate to severe dysplasia is characterized by moderate to severe changes to the cells' shape and size, with abnormal appearance, and is classified as CIN 2/3 or high-grade SIL (HSIL). CIN3 designation includes carcinoma in situ, which is when cancer cells are found in the cervical tissue but have

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not spread beyond to the surrounding tissues or to deeper tissue levels of the cervix. The final classification is carcinoma, where invasive cancer is suspected.

The most common types of invasive cervical cancer (ICC) are squamous cell carcinoma (cancer of the squamous cells, typically around the transformation zone of the cervix) and adenocarcinoma (cancer of the glandular cells of the endocervix), both of which typically begin as pre-cancerous lesions [101]. Cervical cancer progression is slow and does not always end in invasive cancer. The estimated progression rate from CIN 1 to ICC is approximately 1%, with the rate of progression to ICC rising to 12% from CIN 3. The rate of pre-cancerous lesion progression is difficult to measure in natural history studies; however, estimated average progression times for women infected with oncogenic HPV from ASCUS to LSIL was 5.5 years, and progression from LSIL to HSIL, or worse, was just over 6 years [102]. Lesion progression appears slower in women not infected with HPV or infected with non-oncogenic types. Pre-cancerous stages of disease can be targeted due to the relatively slow progression from HPV infection to pre-cancerous lesion to invasive cervical cancer.

HPV infections are identified in over 99% of cervical cancers, and in the majority of high-grade lesions (HSIL/CIN3) (25, 51). Identification of HPV in cervical lesions is more common as cytological abnormality increase in severity [103].

2.1.12 Impact of cervical cancer

Worldwide, cervical cancer accounts for approximately 12.0% of all cancers in women.It is the second most common cancer in women worldwide, but the most common cancer among women in developing countries. It is estimated that over a million women worldwide currently have cervical cancer [104]. Most of these women have not been diagnosed, nor do they have access to

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treatment that could cure them or prolong their lives. In a WHO report that in the year 2012, 528 000 new cases of cervical cancer were diagnosed, and 266 000 women died of the disease, nearly 90% of them in low- to middle-income countries. Without urgent attention, deaths due to cervical cancer are projected to rise by almost 25% over the next 10 years [105]. At least 85.0% of cervical cancer deaths occur in developing countries with most occurring in the poorest regions which include, South Asia, sub-Saharan Africa (SSA) and parts of Latin America. In SSA, cancer of the cervix is the leading cancer with an estimated 75 141 new cases in 2008, which is 14%of total world incident. The countries with highest rates include Zimbabwe, Uganda and Kenya [106, 107]. The disparity is attributed to the lack of effective screening programmes in developing countries that have a high incidence of cervical cancer. Thus, cervical cancer has a devastating impact on women's health around the world, particularly among women in the developing world. Invasive cervical cancer (ICC) is the most common cancer diagnosed in women in SSA, with 75 141 new cases reported per year, and also the leading cause of cancer death at 50 233 deaths annually. Rates of cervical cancer vary considerably indifferent sub-regions; Guinea, Zambia, Tanzania, Malawi, and Mozambique have some of the highest ICC incidence rates in the world at >50/100000. The writers note that the rate of cervical cancer in the United States of America (USA) between1947 and 1949, prior to the introduction of the Pap smear in the 1960s, was 40/100 000 in white women and 73/100 000 in black women [108]. These rates have considerably reduced. Within the SSA region, estimated age standardised incidence rates (ASIR) are the highest in Eastern and Western Africa with ASIR of 34.5 and 33.7 per 100 000 women, respectively, and age standardised mortality rate (ASMR) of 25.3 and 24.0 per 100 000 women, respectively. Not surprisingly, ICC is the most important cause for cancer death in women in Eastern, Western and Middle Africa and second most important cause after breast cancer in

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Southern Africa. The burden of ICC is highest in Guinea, Zambia, Tanzania, Malawi and Mozambique with ASIRs greater than 50/100 000 women and 25 per 100 000 in Kenya. Cervical cancer is not a disease of old age, the majority of its victims are women who are at the peak of their biological and economically productive stages of life. This means, when a woman dies of cervical cancer, a life is not simply lost. Rather, a husband loses a wife, the children lose a mother, and the family is destabilised psychologically, financially and socially. At the same time, economically there is loss of a productive pair of hands and also a loss to the country which pays a large part of the cost of treating cervical cancer.

It was noted that during the period 2004-2008, Kenya registered a total of 8 982 cases consisting of 3 889 men an ASIR of 161 per 100 000 and 5 093 women (ASIR 231 per 100 000) [109]. Prostate cancer was the most common cancer in men (ASIR 40.6 per 100 000) while breast cancer was themost common among women (ASIR 51.7 per 100 000). Cervical cancer ranked the second most common cancer among women in Nairobi with and ASIR of 46.1 per 100 000. According to WHO/ICO (2015:5), the annual number of cervical cancer cases in Kenya is estimated at 4 802 and annual number of cervical cancer deaths is 2 451. Screening coverage is low for all women, 18−69 years, 3.2%. Many women in Kenya remain unaware of cervical cancer and have no access to cervical cancer screening services. The incidence and mortality of cervical cancer has decreased during the past 30 years, especially in developed countries. This is as a result of comprehensive efforts to screen women for HPV, and cervical dysplasia. Additionally, there has been improved treatment of carcinoma in situ and early stage cervical cancer. Although the progression to cervical cancer can be stopped through early detection and treatment of precancerous changes, it still remains a major burden on public health resources in Kenya. Service challenges for cervical cancer screening and treatment are similar to those for

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other health interventions. They include: competing health needs, lack of political will, limited access to services, under developed health care structures, lack of knowledge about screening and treatment, limited financial, equipment, and human resources, costs, long queues and waiting times, missed referrals and follow-up.

2.1.13 Risk Factors for HPV Infection and Cervical Cancer

Persistent infection with oncogenic HPV remains the most significant risk factor for the development of cervical cancer. However, other factors have been identified as increasing the risk of cervical cancer, as well as the risk of HPV acquisition. Factors associated with cancer development, mainly age and screening history, also play an important role in the risk of cervical cancer development. Age is an important risk factor, as the development of cervical cancer can take decades from the time of infection to invasive disease. This is exemplified by the increased incidence of cervical cancer after the age of 30, and with the greatest incidence observed in middle-aged women. The other important risk factor related to the physical development of cervical cancer is cervical cancer screening. Women most at risk for developing cervical cancer are those who do not participate in regular cervical cancer screening [110].

Environmental factors that increase the risk of cervical cancer and dysplasia include cigarette smoking, hormonal contraception usage, multiparity, and co-infection with other STIs. Many of these factors are also shared with HPV acquisition, which can make it difficult to tease apart the underlying factors individually. As HPV is a sexually transmitted infection, the number of lifetime, as well as recent, sexual partners plays an important role in exposure to HPV and acquisition. Many of these environmental risk factors for cervical cancer have also been shown to be associated with increased number of sexual partners and subsequent exposure to HPV. In general, the risk factors are:

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Cigarette Smoking: Women who currently smoke have been found to have a higher risk of cervical cancer (specifically squamous cell carcinoma), and a dose response is observed for number of cigarettes per day, as well as starting to smoke at younger age. The magnitude of that risk is estimated to be roughly two-fold; but, the risk estimates for cigarette smoking and cervical cancer can be highly confounded as cigarette smoking, including the number of cigarettes smoked per day, has also been associated with HPV infections and increased number of sexual partners. Despite issues of confounding by HPV, cigarette smoking does appear to be an important risk factor for cervical cancer development [111].

Oral Contraception: Oral contraception use has also been associated with cervical cancer. Risk of cervical cancer appears to be associated with current usage and the length of time of use; women who have been on oral contraception for 5 or more years have about a two-fold increased risk of cervical cancer compared to women who have never been on oral contraception. However, 10 years after stopping use of oral contraception this risk is similar to never users.

Multiparity: Multiparity and younger age at first pregnancy have been associated with increased risk of cervical cancer, again on the order of about a two-fold increase in risk for women with ≥7 full-term pregnancies compared to nulliparous women, even after controlling for sexual behaviours. The suggested mechanisms include hormonal changes, trauma exposing the underlying epithelium to HPV, or immune suppression.

Co-infection with other STIs: Immunosuppression due to co-infection with HIV can also increase the risk of cervical cancer development due to the decreased immune function against HPV infections preventing clearance of transient infection, although antiretroviral therapy may improve HPV clearance. Other sexually transmitted co-infections have also been associated with

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increased risk of cervical cancer, including Chlamydia trachomatis and Human Herpes virus-2, due to chronic inflammation.

The relative risk of cervical cancer to most of these aforementioned risk factors is on the order of magnitude of no more than a two-fold increase in risk, compared to a greater than 100- fold increase in risk with a HR-HPV infection [112]. Preventing HPV infection is the most effective way to prevent cervical cancer. Preventing HPV infections is difficult, and condoms reduce the risk of transmission but do not prevent HPV infections. Since the mid-2000s HPV vaccination has been available for the prevention of some, but not all, HPV types linked to cervical cancer.

2.1.14 Cervical Cancer Screening

Cervical cancer is a condition that can be avoided if caught early. The World Health Organization promotes cervical cancer prevention and identifies intervention possibilities. There are various preventative methods. The first line of defence against cervical cancer is a two-dose vaccination program for both girls and boys aged 9 to 14 years [113]. Secondary prevention involves detecting and treating pre-cancerous cervical lesions through screening and treatment. Tertiary prevention is the treatment of cervical cancer to reduce morbidity and mortality as well as increase quality of life in post-treatment care for women in African countries who do not have access to treatment. Early screening for diagnosis and treatment of pre-cancerous lesion prevents up to 80% cervical cancer; however, this occurs when cervical cancer screening is regular practice in high resource countries.

Cervical cancer prevention includes three types of pre-cancerous lesion and treatment screening methods. Cytology, visual inspection, and HPV testing are the three methods. Cells are scraped from the squamous columnar junction of the cervix and examined after being fixed by a

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competent cytologist. There is a significant logistical and program barrier in cytologic evaluation and notification of women's results.

Visual screening is the other type of screening. It is inexpensive, simple to learn, and requires little equipment. The major goal is to find an intracellular protein with a higher concentration of aceto whitening effect. Sensitivity and specificity of detecting CIN 2, CIN 3 and invasive cervical cancer was 49-96% and 49-98% respectively. In India, Kenya, and South Africa, cervical cancer screening programs indicated that a single screening at age 35, followed by one or two visits for screening and treatment with VIA, reduced lifetime risk by 25-36% [113].

The other type of screening method is HPV DNA detection, which has a sensitivity of 45.7-80.9% for detecting cervical intra epithelial neoplasia grade two and above. HPV testing is costly and requires more laboratory infrastructure, but it is the most reproducible.

The oldest and most widely used cancer screening approach is cytology screening (Pap test) for cervical cancer in organized screening programs. In many developed countries, this method has lowered the incidence and mortality of cervical cancer. In the developed world, this is one of the most successful illness prevention strategies; however, this technique has failed in low-income countries. A cytology-based screening program necessitates the involvement of a cytopathologist and a colposcopy specialist, as well as multiple visits from women to determine whether or not they require treatment.

Pap smear screening is a highly specific but only moderately sensitive diagnostic for highgrade lesions. The term "high specificity" refers to cytology's ability to appropriately identify women who do not have a high-grade lesion. Moderate sensitivity means that cytology detects a high percentage of women who have cancer or a high-grade lesion. According to the above statements,

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implementing high-quality cytology programs in low-income countries is relatively effective. With a single screening, the current pap test misses almost half of all high-grade precursor lesions and cancers. Women in low-income countries are likely to get screened only once or twice during their lifetime.

The World Health Organization has approved the use of visual inspection with acetic acid (VIA) or visual inspection with Lugol's iodine for cervical cancer screening in low-resource settings (VILI). Pre-cancerous and cancerous lesions appear white when acetic acid or Lugol's iodine is applied directly to the cervix, making them visible to the naked eye. This method is highly sensitive in both HIV-positive and HIV-negative women. This method employs the "screen and treat" strategy. Since the results are immediate, women who test positive for precancerous lesions might theoretically be treated with cryotherapy at the same visit, assuming the health facility has the capacity. This strategy has shown to be cost-effective, affordable, and an ideal first-line treatment for CIN of any grade if the cervical lesion size and location allows the cryo probe tip to make adequate contact.

The 'screen and treat' technique can help avoid inconvenient follow-up visits, significant treatment delays, and missed appointments. Visual inspection (VIA) involves applying freshly prepared 4% acetic acid with a cotton swab and looking for a well-defined opaque aceto white lesion next to or around the squamous columnar junction for one minute (SCJ). Numerous studies have evaluated VIA. Pooled data meta-analysis of 26 studies conducted in high- and low-income countries discovered that the VIA method has a sensitivity of 80% and a specificity of 92% [114]. Even if sensitivity differed significantly between studies, another meta-nalysis that combined data from 11 studies conducted in Africa and India found that VIA had a sensitivity of

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79% and a specificity of 85% for CIN 2 lesions or worse (CIN2+). VILI appears to increase VIA's sensitivity by 10%, without affecting the specificity [115].

VIA has a low specificity of 85% and is unable to detect endo cervical lesions. VIA is simple, low-cost, and results are available in real time. Women who have had a hysterectomy that was not performed to treat a precancerous lesion or cancer must be screened. To reduce the burden of cervical cancer, low-cost alternative screening methods are being implemented in low- and middle-income countries. Visual inspection with acetic acid (VIA) and visual inspection with Lugol's iodine are two methods of visual inspection (VILI). VILI uses dilute lugols iodine to stain glycogen-rich squamous epithelium while leaving glycogen-depleted proliferating pre-cancerous and cancerous cells unstained.

Cervical cytology, on the other hand, is not a viable way of screening in many African countries due to a lack of medical, laboratory, and trained workers, as well as the inability of a poor patient to return numerous times. In Sub-Saharan Africa, the number of women who have had a pelvic exam and pap test in the past three years is extremely low (1.0% in Ethiopia to 23.2% in South Africa), with 40% of Tunisian women and 94% of women in Malawi who have never had a pelvic exam [116,118]. In low-income countries, patient tracking strategies and services are frequently limited to capital cities. As a result, the utilization of less resources and the availability of quick results, such as visual inspection with acetic acid or HPV DNA testing, are recommended. Due to financial and technical constraints, low-income countries prefer VIA with 3 to 5% acetic acid as a satisfactory screening method [119].

Cervical cancer has decreased in as a result of widespread cervical cancer screening, with death rates falling from 2.8 to 2.3 per 100,000 women from 2000 to 2015 in the US. In 2018, there are

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expected to be 13240 new cases and 4170 deaths. The majority of cervical cancer cases and deaths occur in women who were not properly checked, followed up on, or treated for the disease.

There is a significant geographic disparity in cervical cancer incidence, which is due to differences in screening availability. The prevalence of HPV infection ranges widely, from the highest to the lowest: Africa accounts for 21% of infection, Latin America, and the Caribbean for 16%, Asia for 9% and North America for 5% [120].

The majority of cervical cancer deaths occur in developing countries, accounting for 90% of all deaths: 144400 in Asia, 60100 in Africa, and 28600 in Latin America and the Caribbean [121]. Almost all cervical cancers are caused by certain forms of the human papillomavirus. Shortly after sexual intercourse begins, high-risk HPV infections increase. According to HPV molecular tests, cervical cancer can be caused by high-risk HPV strains.

When it comes to the possibilities of surviving cervical cancer, a woman in Thailand has a 58% probability of surviving, whereas she only has a 42% chance in India. In addition, survival is even more critical in Sub-Saharan Africa, where women only have a 21% chance of surviving cervical cancer [122]. Overall mortality to incidence ratio is 52%.

Cervical cancer patients experience negative psychological and physical morbidities, which have an influence on the quality of life. African countries continuously have a higher age-adjusted daily adjusted life year (DALY) loss from cancer than high-resource countries. In Sub-Saharan Africa, the estimated DALY lost due to cervical cancer is 641 years per 100,000 women.

When a lesion is inoperable and treated with radiotherapy, the patient's quality of life worsens. The majority of people say their physical, emotional, social, and financial support has worsened. Bladder or bowel malfunctions, as well as psychosocial effects, cause long-term impairment.

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Extended vaginal bleeding and chronic radiation enteritis are two common treatment-related adverse effects.

In a paternalistic country like South Africa, women must ask permission to get medical help which can be linked to women's disempowerment and inadequate screening practices. While data for low-resource settings is limited, literature reviews from high-resource countries show changes in body image, vaginal function, sexual satisfaction, and sexual relationship with partner following treatment, indicating a clear need for better integration of sexuality rehabilitation into routine clinical care.

2.1.15 **Screening and Utilisation of Screening Services**

Women in developed countries are often screened for cervical cancer, every one to three years. However, this screening frequency is not possible in most developing countries. In such cases decisions regarding the frequency of screening are based on available resources and on the age range that will result in the largest reduction in cervical cancer incidence and mortality. The authors state that the greatest impact on cervical cancer reduction appears to result from screening women aged 30 to 35 years. This is supported by a sub-group analysis from a randomised trial conducted in India. Over 80 000 women aged 30−59 were assigned either VIA screening or cervical cancer health education. At seven years follow-up, women who had been screened showed a 25.0% decrease in age standardised rate of cervical cancer incidence [123].

Recent studies have also calculated the optimal screening frequency and age. One such study utilised clinical data from India, Thailand, South Africa and Peru to evaluate cervical cancer screening in women once in a lifetime at the age of 35 years [124]. It was discovered that screening with VIA or HPV within these parameters would reduce thelife time risk of cervical

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cancer by 25.0%−36.0%. Unfortunately, the success of the approach used in developed countries has not been replicated in developing countries, mostly attributable to a shortage of human and material resources. A recent study estimated that 63.0% of women in developed countries receive cervical cancer screening with the highest ranging from 80.0% to 90.0% [125]. In developing countries, screening is estimated at 19.0%, ranging from 1.0% in Bangladesh, Ethiopia and Myanmar to 73.0% in Brazil [126]. Many women in Kenya remain unaware of cervical cancer and have no access to cervical cancer screening services. Although there is a 75.0% decrease in the incidence and mortality of cervical cancer in developed countries, it remains the second most common cause of cancer related morbidity and mortality in developing countries.

2.1.16 Importance of Cervical Screening

Cervical cancer screening is a secondary prevention approach that allows for early detection of the disease. World health organization identifies cervical cancer as one of the most important health care concerns of the 21st century. Cervical cancer in women of reproductive age is reduced by routine screening.

Cervical cancer is the most common cancer in women, accounting for 4732 deaths each year. Screening is crucial, yet it is neither widely available nor widely used. Cervical cancer kills half of the people who are diagnosed with it. In low-income countries, it is a major public health issue that reduces life quality and causes death. Women can use screening methods to detect precancerous lesions and receive appropriate treatment before cancer develops.

Women who are not screened are at risk of developing cervical cancer and dying as a result of the disease. Other health concerns have obscured the lack of screening. Cervical cancer

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screening can reduce mortality in women by 40 to 50% in the Western world and 4 to 5% in low-income countries.

2.1.17 **Impact of Screening**

The WHO has identified screening coverage as being crucial for providing effective early detection of the cervical cancer. In high income countries, declines in cervical cancer incidence and mortality have been largely accredited to effective screening programs. In such countries, cervical cancer has become a relatively rare disease with the ASIR of less than 10/100 000 compared to developing countries with the ASIR ranging from 25 to 55/100 000. The WHO states that, in most middle income countries such as China and Brazil, screening is in place but may be largely restricted to maternal child health services [127]. However, this could result in those screened tending to be at low risk for the disease, because of their younger ages. Several pilot projects in India found that 99.0% of respondents had never been screened despite the massive effort to implement cytology screening during the previous 30 years. Latin American countries remain among those with the highest cervical cancer incidence rates of 52 000 new cases per year. In parts of SSA where cytology screening programmes have been attempted, data suggest that cervical cancer rates are rising. For example, in South Africa, pathology-based information reported by 80 private and public laboratories in 1986 demonstrated an increase in cervical cancer rates. In 1986, about 16 559 cervical cancer cases were reported, of which 2 897 were new cases of histologically confirmed cervical cancer [128].

In 1992, the total number of reported cases had increased to 25 143, of which 4 467 were new cases. The problem stems not only from failing health care infrastructures but also from the tradition of targeting prevention programmes on opportunistic screening of relatively young women who attend clinics for pregnancy-related care. Minimal outreach programmes for the

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screening of women have been implemented in Kenya. As a result, screening among the majority of at-risk women occurs too early to be useful, or not at all until symptoms occur during the later stages of cervical cancer. Excellent compliance with periodic screening, evaluation of abnormal Papanicolaou smears, and treatment of precursor lesions correlate with decreased incidence and mortality of cervical cancer. In developed countries, there has been a 75.0% decrease in the incidence of mortality of cervical cancer, but not in developing countries. Situational analysis study evaluating cervical cancer in developing countries revealed that a poor screening history was the primary contributing factor to high mortality; 50% of patients present with invasive cervical cancer patients had inadequate screening histories and 42.0% had never been screened [128]. In addition, a study conducted on the coverage of cervical cancer screening in 57 countries. The results indicated that high rates of effective coverage of cervical cancer screening had been achieved in developed countries. The population-weighted means of crude coverage and effective coverage of screening across all included countries were 68.0% and40.0% respectively. In the 30 developing countries surveyed, these rates were much lower at 45.0% and 19.0% respectively [129]. It also indicated that over 80.0% of women in Australia had received effective screening as compared to 1.0% in Ethiopia and Bangladesh. In some middle-income countries such as China, Brazil and former communist countries, the majority of women had pelvic examinations during their lifetimes though cervical cancer screening was not included. This indicates that a large proportion of women in these countries had contact with obstetric or gynaecological health services and that the health system might have the capacity to provide effective screening to a large proportion of these women, but failed to do so. It might be possible to build on missed opportunities or insufficient screening using the existing health services in these identified countries. In most developed countries, such as the USA, it is estimated that

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between 50 and 60 million (94.0%) cervical Pap tests are performed each year while the population weighted means of crude coverage and effective coverage of cervical cancer screening across 30 developing countries were 68.0% and 40.0% respectively [130]. The proportion of unscreened women was higher in Kenya, Ethiopia and Bangladesh where more than 90.0% of the women reported that they had never been screened. In developed countries, this high rate of screening has resulted in cervical cancer being a relatively rare disease with an ASIR of less than 10/100 000 versus 25 to 55/100 000 in developing countries.

2.1.18 Awareness of Cervical Cancer Screening

Cervical cancer awareness and knowledge in Africa is yet to be recognized as a major public health issue in Sub-Saharan Africa. Several studies have revealed that Africans have poor understanding of the condition, which cuts across literacy levels. In Africa, health care workers, in addition to patients, do not have thorough understanding of cervical cancer.

Only 4.3% of 500 people who attended a maternity and child health clinic in Lagos, Nigeria, were aware of cervical cancer. In Lagos, 81.7% of 139 patients with advanced cervical cancer had never heard of the disease before, and 20%, 30%, and 10% of them, thought their symptoms were caused by return of menses, lower genital infection, and irregular menses, respectively. Almost all of the women (98%) thought their advanced sickness was treatable, whereas only 12% thought it was not a serious disease and only 9% realized it was cancer and thus serious. According to similar research, patients in Kenya and Tanzania had relatively little understanding of the condition [131].

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Clients and health-care workers must be made aware of the situation. According to a study conducted in the Southern Ethiopia region, 77% of health workers in Ethiopia are aware of cervical cancer screening [132].

Community groups could help raise awareness among women who have passed their reproductive years by linking screening to significant events in their lives (becoming a grandmother or with contraceptive sterilization). Furthermore, high-quality care should be provided because if women fear they would be treated badly if they go to a preventative care service, they will not go.

2.1.19 Knowledge of Cervical Cancer Screening

Patients aren't the only ones with poor understanding; health care workers, who are expected to be more knowledgeable, also have poor awareness about the disease. Women presenting with late-stage disease in Lagos were shown to be a result of delays in referring instances of cervical cancer by primary health care providers. Primary health care providers waited an average of 9.35 12.9 months to diagnose and refer women with cervical cancer to a tertiary institution for treatment. Another study in Sub- Saharan Africa found that market women in Zaria, Nigeria have low knowledge of cervical cancer screening (43%) [133].

Cervical cancer affects 445000 women in low- and middle-income countries, compared to 83000 in developed countries. The main cause of the disparity is the use of cytology- based screening. According to studies conducted in various regions of Ethiopia, limited understanding is associated with a low use of screening methods [134]. According to research conducted in Arbaminch, 38.9% of respondents were checked. The low use of screening services was

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attributable to the fact that an individual was in good health (60.02%). Increased service intake was linked to having more than 5 children and having a monthly income of more than 1170 birr.

According to a study conducted in Dessei, north-eastern Ethiopia, 46.3% of the population has low comprehensive knowledge, and 9.9% has been screened for cervical cancer. In Dessei town, 51% of women had enough awareness of cervical cancer screening, which is linked to higher education [135]. Women with an average monthly household income of >1500 Ethiopian birr are more likely to have sufficient knowledge than women with an average monthly household income of 500 Ethiopian birr. The level of education and economic status were discovered to be key factors of cervical cancer knowledge. There is a lack of knowledge and attitude, and the screening service is poorly utilized. In Gonder's southwest, 53% had heard about cervical cancer, 33.9% of the survey participants had insufficient knowledge, but 61% had a favourable attitude towards cervical cancer screening [136].

2.2 Theoretical Framework

The health belief model (HBM) is one of the major approaches and perspectives to the utilization of cervical cancer screening. It is a model that attempts to explain and predict health behaviour. It focuses on the attitudes and beliefs of the individual. The health belief model was split out in terms of four constructs representing the perceived threat, net benefits, perceived susceptibility and perceived barrier. These variables were proposed as accounting for people's "readiness to act". An added concept, cues to action, would activate that readiness and stimulate behaviour. A recent addition to the HBM is the concept of self- efficiency or one's confidence in the ability to perform an action successfully. The model has been applied to preventive health behaviour, which includes health promotion (e.g., diet and exercise) and health risk (smoking) behaviour, as well as vaccination. The theory lays more emphasis on the understanding that a person will take

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a health-related action (e.g., health screening) if that person feels that an adverse condition can be avoided (i.e., unintended pregnancy, cancer and STI). Also, if that person has a positive expectation that by taking a recommended action, he/she will avoid a harmful health condition (unintended pregnancy, cancer and STI), and by doing this, an individual can comfortably and confidently use a condom.

The "major assumption of this model is that in order to engage in healthy behaviours, women needs to be aware of their risk for severe or life-threatening diseases and perceive the benefits of behavioural change outweigh potential barriers or other negative aspects of recommended actions". In line with this study, HBM holds that if the target participants are aware and believe that cervical cancer screening could improve their health status, they are likely to adopt and promote healthy practices. Conversely, if women are aware and believe that by not yielding to the adoption of cervical cancer screening, they will be susceptible to hazards which are perceived to be severe. Perceived severity refers to subjective feeling on the seriousness or grievous of the risk to which an individual is exposed (for example, unintended pregnancy, Caner, STI, HIV transmission), which could determine attention given to the risk. Perceived benefits describe subjective real or assumed advantages of adopting recommended actions (cervical cancer screening) by perceived barriers, the model attempt to capture an individual's obstacles to adopting recommended actions (inadequate knowledge and accessibility). Cues to action refer to the embracement of a healthy sexual attitude. For instance, if women are adequately equipped with the necessary information on cervical cancer screening, they will be able to embrace recommended changes. It has a close link with the perceived severity enumerated earlier. The self-efficacy component of the HBM model depicts the self-assurances of an individual that women could perform and sustain the recommended behaviour with little or no help from others.

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2.3 Review of Empirical Studies

2.3.1 Knowledge of Cervical Cancer and Screening

In southeast Nigeria knowledge of cervical cancer about its preventable nature, cervical screening and screening centers were all below 40%. A Study done on South African university student's shows that 33% of the participants heard of cervical cancer screening and 33% knew that cervical cancer screening can prevent cervical cancer [137]. Another study in rural South Africa, nearly half (49%) of the respondents mentioned ever heard of Pap smear test. And from the rest 51% almost half of the respondents (43%) received information on Pap smear mainly from health care workers. South Africa has a national policy on pap smear [138].

In Ethiopia, community-based study done in Gonder 47% did not know about the risk factors of cervical cancer, 39.6% did not know about the symptoms, 36.1% did not know the preventive measures, 33.9% did not know treatment options and 63.9% know it can be prevented [139].

According to this study only 13.7% of the women had heard about Pap smear. The results of this study revealed that knowledge about cervical cancer was poor though, majority of the women had heard about the disease. Specifically, the knowledge of women on risk factors, signs and symptoms was poor. Education about the disease must include information on risk factors, sign and symptoms of cervical cancer [140]. In Addis Ababa most respondents (81.2%) had never heard of Pap smear testing. From those who had heard of Pap smear, only 38 out of 52 (27%) had reasonably detailed knowledge of Pap smear testing [141]. A KAP study of Pap smear among nurses in Addis Ababa showed a low knowledge among these groups of health care providers. In Ethiopia most participants from Addis Ababa had heard of "cancer" but none spontaneously

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mention cervical cancer. In contrast, rural participants had limited awareness about any type of cancer. In particular, awareness about cervical cancer was almost non-existent [142].

2.3.2 Attitude towards cervical cancer and screening

A study done in UK showed that some women consider Pap smear test is unnecessary or of no benefit and considered themselves not to be at risk of developing cervical cancer [143]. Additionally, they expressed that feeling of embarrassment and/or pain during Pap-smear test. The receipt of an abnormal result and referral for colposcopy causes high levels of distress, especially fear. Many women are frightened of medical procedures and believe that the abnormal smear is indicative of cancer and that their reproductive ability will be threatened. The resulting anxiety can have a severe effect on day-to-day functioning leading to depressed mood, decreased libido, and low self-esteem with feeling of less attractive, tarnished, defiled or contaminated and dirty. Apart from women not having regular pap smears because of their cultural, ethnicity and socio-economic backgrounds, historically, they have tendered to look to family and economic needs first and placed their own welfare as least priority. The needs of family or extended families compete with the need to have regular pap smear test performed or, indeed, any other aspect of preventative health.

A study in Boston showed that, most adolescents perceived their health concerns about STI, pregnancy, breast cancer, abnormal Pap smear or cervical cancer and smoking. All of them reported that prevention and early diagnosis are benefits of Pap smear testing. Their perceived barriers include pain or discomfort, embarrassment, fear of finding a problem, fear of the unknowns, denial, poor communication or rapport with the provider, not wanting to look for trouble, lack of knowledge and peers advise [144]. Beliefs about health and cancers have altered predictors of adherence among white women with abnormal pap smears but these were not

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applicable to other groups because health beliefs can vary by ethnicity. In some studies, Latinos and women of Asian descent endorsed more misconceptions about cancer and fatalistic beliefs.

Study In rural India shows that 84.6% of the respondents were willing to undergo cervical screening test as they felt it would benefit them in the long run and 62.5% were willing to be screened. Having good attitude is mostly followed by having knowledge about the cervical cancer and screening. Those who have heard about cervical cancer and screening have positive attitude about cervical screening than those who have not heard about it. There are deferent beliefs and perception regarding cervical cancer screening. Some negative beliefs mentioned among rural areas are "cervical cancer screening is only for commercial sex workers" and other positive beliefs like "pap smear decrease early death". And increase in positive belief was significantly associated with fivefold increase in the likelihood of accessing cervical screening. Another study in Tanzania suggested that 79.2% of study participants were agreed that cervical cancer screening can prevent cervical cancer and also on similar study in Kenya 87% of respondents agree [145].

Analysis of data from a study conducted in Netherlands showed that women's beliefs about cervical screening and attendance are the best predictors of screening uptake [146]. A study from Nigeria suggested that only 6% of all women interviewed reported ever receiving cervical cytology testing. The main reasons for not screening were lack of awareness of cytology testing (48%), dislike of pelvic examinations (47%) and absence of symptoms (17% rural, 31% urban. Long distance travel to service delivery points was also reported as a barrier by rural women (62%) [147].

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2.3.3 Practice towards Cervical Cancer Screening

A study conducted in the UK revealed that reasons for not participation in screening programs include administrative failures, particularly, incorrect addresses. Although, many GPs made use of opportunistic screening, this was often performed during contraceptive or obstetric consultations and resulted in post-menopausal women being overlooked [148]. It has also been revealed that most post-menopausal women are less likely to be screened regularly, and their non-participation may be a result of uncertainty as to whether the smear test is appropriate for their age and also the belief that part of their body is "finished with'. Many women also do not participate due to unavailability of female screeners and also appointments being only during working hours. In America, the question is how to reach those women who do not get Pap smear teats. The answer is most likely a complicated mixture of many factors, including limited or sporadic access to health care and cultural attitudes that are fatalistic toward diseases such as cancer.

A study conducted in India on women who were non-compliant with pap smear screening revealed that most of them have lower literacy rate compared to those who were compliant. Most common reasons cited for non-attendance were being reluctant to go for test in the absence of any symptoms and apprehension to have a test that detects cancer. For those women who were willing to go, the most common hurdles were inability to leave household chores, pre-occupation with family problems and lack of approval from husbands [149].

According to study conducted In Botswana cervical cancer screening rate is far too low and do not reach the Ministry of Health's goal of cervical cancer screening of at least 75% or more. In the same study only 40.0% of study participants had ever had a Pap smear test [150]. This low participation of cervical cancer screening and low follow-up of screening is consistent with other

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studies done in less developed countries which reported an average participation rate of 23% and follow up rates of 46% within 3 years interval. Result from study in Tanzania and Kenya shows that practice of cervical cancer screening is 14% and 22% respectively [151]. Nigerian study describes that absence of gynecologic symptoms, fear of outcome of screening, lack of information and lack of health workers request as common reason for not undergoing screening practice [152]. In contrary in Ethiopia prevalence of cervical cancer screening is only 0.6%.

A study done in Gonder Ethiopia, the participants that have knowledge about cervical cancer screening only 14.7% of them had the test [152]. In Addis Ababa, facility based cross sectional study that assesses KAP, only 6.5% of all the respondents had ever had a Pap smear test. This is by far low even compared to other developing countries.

The major findings in a study in Nigeria among female health workers showed that Pap smear utilization was very low and there was a wide gap between their personal knowledge and uptake of Pap test. Polygamous setting and superstition and inappropriate belief were the commonest excuse for not having a Pap smear test [153]. In Uganda, only 19% of female health workers have ever had a cervical cancer screening and reasons for this included not feeling at risk, lack of symptoms, carelessness, fear of vaginal examinations, lack of interest and test being unpleasant [154].

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2.4 Conceptual Framework

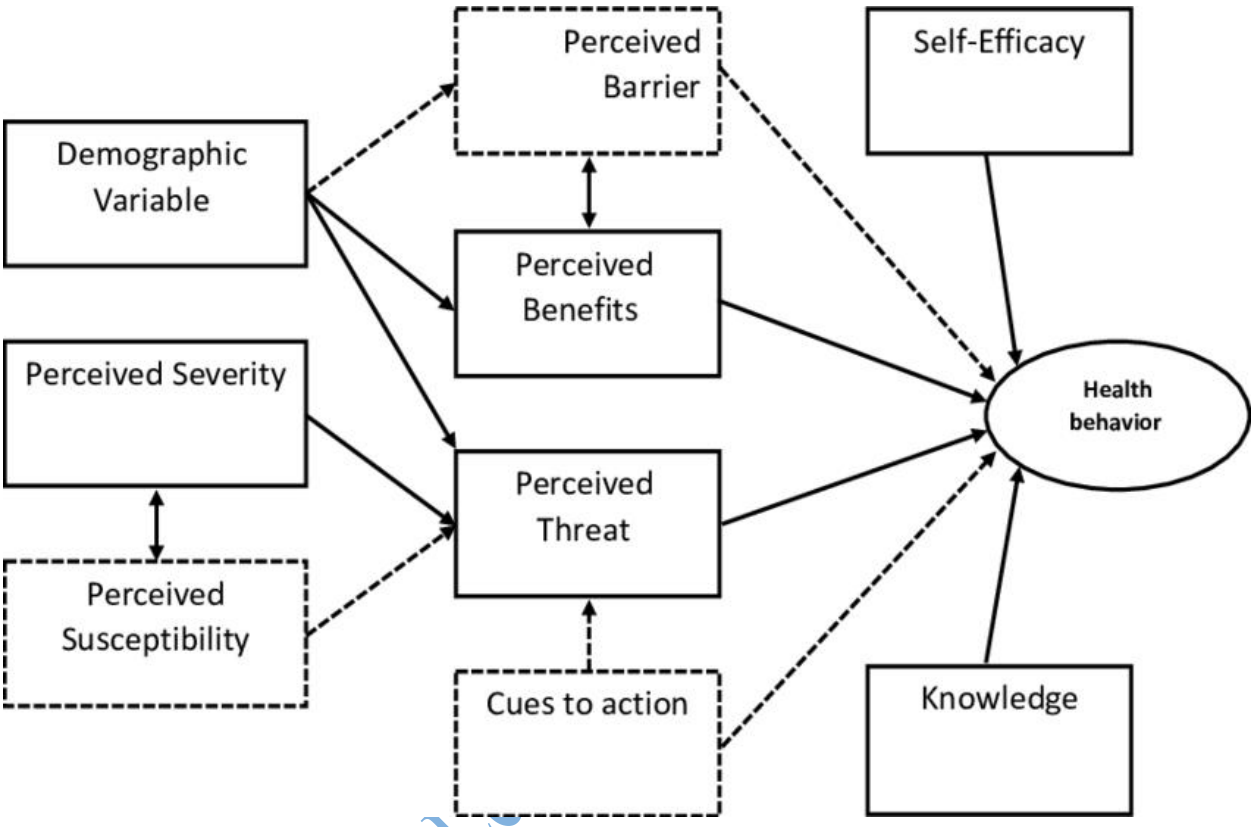

Fig 2.2: Health Belief Model Conceptual Framework

Source[45]

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2.5 Summary of Gaps in Literature

The literature examining the Knowledge, Attitude, and Practice (KAP) of cervical cancer screening among women in Ibadan, Oyo State, reveals several critical gaps, prompting the need for further investigation. Notably, there is a pervasive lack of comprehensive knowledge among

women about cervical cancer causes, risk factors, and screening methods. This gap signifies a crucial need for research to explore and address specific knowledge deficits.

Cultural and societal influences on attitudes towards cervical cancer screening have been acknowledged, but the literature lacks an in-depth analysis of the specific cultural beliefs and societal norms that act as either barriers or facilitators to screening uptake. Understanding these intricacies is crucial for designing culturally sensitive interventions.

Barriers to accessing and utilizing screening services, such as limited awareness, financial constraints, transportation issues, and perceived stigma, have been identified but require more nuanced exploration. A comprehensive examination of these barriers is essential to develop targeted strategies for overcoming obstacles to screening.

The effectiveness of existing health education programs aimed at improving cervical cancer knowledge has been assessed to some extent. However, there is a need for a more thorough evaluation, considering content, delivery methods, and long-term impact, to refine and optimize these initiatives.

Age-specific and socioeconomic disparities in the KAP of cervical cancer screening have been inadequately explored. Investigating how factors such as age and socioeconomic status influence women's engagement with screening services will enable the tailoring of interventions to specific demographic groups.

The literature predominantly focuses on women's perspectives, with limited exploration of healthcare provider attitudes and experiences related to cervical cancer screening. Understanding the viewpoints of healthcare professionals and identifying system-level challenges can contribute to the development of more effective and patient-centered screening programs.

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In conclusion, addressing these gaps in the literature is imperative to gain a comprehensive understanding of the current status of cervical cancer screening in Ibadan, Oyo State. It will also enable the development of targeted interventions to improve knowledge, attitudes, and practices among women, ultimately contributing to the effectiveness of cervical cancer prevention efforts in the region.

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Chapter Three

Methodology

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3.1 Research Design

This study adopted a cross-sectional design to assess the knowledge and Attitude toward Cervical Cancer Screening among Women in Ibadan, Oyo State.

3.2 Population of the Study

The target population for this study were women aged 15 to 49 in Ibadan, Oyo State.

3.3 Sampling Methods and Size

A random sampling method was used to randomly select participants from the target population, ensuring that each member of the population has an equal chance of being included in the study.

Sample Size

The sample size for this study was determined using Fisher's formula for the determination of sample size for descriptive studies. The sample size for this study is determined considering the following factors:

1. The estimated proportion of knowledge of cervical cancer in a similar study is 27.7 % [1]
2. A standard normal deviate of 1.96,
3. 95% confidence interval
4. The acceptable margin of error is 5%. Based on the Cochrane formula, that is

$$n = \frac{Z^2 p\,(1-p)}{d^2}$$

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Where: n - minimum sample size required

d - Is the margin of error 5%

z - Confidence level 95%

p - The estimated proportion of knowledge of cervical cancer in a similar study is 27.7 % [1]

Correcting for a possible non-response rate of 10%, the final calculation n/0.9

$$n = \frac{(1.96)^2\, 0.277\, (1 - 0.277)}{(0.05)^2}$$

n=307

Correcting for a possible non-response rate of 10%, the final calculation 307/0.9 =342

A total number of 342 women are estimated to be interviewed in this study.

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3.4 Eligibility Criteria

The Eligibility criteria refer to a construct that helps to select individuals to be selected or excluded from the study.

Inclusion criteria for this study were restricted to women who reported to:

(a) aged between 15 and 49 years;

(b) participants should voluntarily agree to take part in the study

The exclusion criteria for this study were those who are sick and as a result, could not respond to the question.

3.5 Research Instrument

Data were collected using a self-structured questionnaire. The questionnaire was closed-ended. The following instruments were used in the study:

1. Socio-Demography Data Questionnaire
2. Cervical Cancer Knowledge Questionnaire
3. Cervical Cancer Prevention Knowledge Questionnaire
4. Cervical Cancer Screening Questionnaire
5. Cervical Cancer Screening Practice Questionnaire
6. Perceived factors that influence Cervical Cancer Screening Questionnaire

3.5 Method of Data Collection

Data was collected through a systematic and efficient approach utilizing Google Forms. This method ensures convenience and accessibility for participants while maintaining the integrity and confidentiality of the collected data. A comprehensive questionnaire will be designed to cover a wide range of aspects related to cervical cancer knowledge and attitudes toward screening. The designed questionnaire will be transformed into an interactive online form using Google Forms. Commencing with a clear and concise informed consent statement, the questionnaire will respect ethical considerations by outlining the study's purpose, data usage, and confidentiality assurances. Employing headers, sections, and page breaks, the form's layout will be thoughtfully organized, ensuring clarity and ease of navigation for participants. The form's

access link will be shared through various channels, such as emails, social media, community organizations, and relevant networks. Translations into local languages will be considered for inclusivity. The responses will be compiled into a Google Sheets spreadsheet, ready for subsequent data analysis.

3.6 Data Analysis

Information obtained from the questionnaire was entered into Statistical Package for Social Sciences (SPSS) version 28.0 for analysis and statistical calculation. Descriptive statistics were used to summarize the demographic characteristics of the study population and the level of knowledge, attitude, and practice of cervical cancer screening among the participants. Logistic regression was done to ascertain the risk factors associated uptake of cervical cancer screening among the participants.

3.7 Ethical Approval and Consideration

Ethical approval for this study was obtained from the University Research Ethics Committee (HREC) of Lead City University, Ibadan, Oyo State, and the University College Hospital Ethics Committee. Ethical considerations, including informed consent, confidentiality, and risk management, will be upheld throughout the data collection process to ensure the well-being of participants.

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Endnotes

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Chapter Four

Results and Discussion of Findings

This chapter presents the findings of the study and the discussion. The results are presented in the other, in which the objectives were stated in Chapter one of the study.

4.1. **Demographic Data Analysis**

Table 4.1 shows that the study surveyed 537 participants, , with the majority falling in the Under 20-29 age group (62.8%). This suggests a relatively young study population, with significant representation in the young adult age bracket.

The majority of participants were single (54.4%), followed by those who were married (39.7%). Only a small percentage reported being divorced, widowed, separated, in a partnership, or preferring not to disclose their marital status which was categorized as “Not Married”. A substantial portion of participants held a bachelor's degree (61.3%), while 28.1% had a master's degree or higher. A smaller group had secondary education (10.6%). This suggests a relatively well-educated sample. A significant proportion of participants were employed full-time (54.2%), some were unemployed (43.8%), while others were retired (2.0%).

The data indicates that 30.5% of participants had a monthly income exceeding 110,000 Naira, while 21.8% fell within the 20,000 - 50,000 Naira income bracket. Only 6.3% reported a monthly income of less than 20,000 Naira. A substantial portion of participants (23.1%) preferred not to disclose their income. The majority of participants resided in urban areas (86.8%), while a smaller percentage lived in rural areas (13.2%).

The study found that a significant majority of participants (67.8%) reported having no daughter, while the rest reported having one (16.4%), two (10.8%), or three (5.0%) daughters. Among participants with daughters, the age distribution of their daughters varied. 35.3% of them have

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daughters under the age of 9, 57.8% have daughters aged 9-14, 55.5% have daughters aged 15-20 and 39.9% have daughters aged 21 years and above.

Table 4.1: Sociodemographic of Participants

Variables	Frequencies	Percent (%)
Age Range (n=537)		
20 -29	337	62.8
30-49	92	17.1
50 above	108	20.1
Marital Status (n=537)		
Single	292	54.4
Married	213	39.7
Previously Married	32	6.0
Educational Level (n=537)		
Secondary education	57	10.6
Bachelor's degree	329	61.3
Master's degree or higher	151	28.1
Employment Status (n=537)		
Employed full time	291	54.2
Unemployed	235	43.8
Retired	11	2.0
Monthly Income (Naira) (n=537)		

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< 20000	34	6.3
20000 - 50000	117	21.8
51000 - 80000	38	7.1
81000 - 110000	60	11.2
>110000	164	30.5
Prefer not to say	124	23.1
Where do you live (n=537)		
Rural area	71	13.2
Urban area	466	86.8
Number of Daughters (n=537)		
None	364	67.8
One	88	16.4
Two	58	10.8
Three	27	5.0
Age range of Daughters (n=173)		
Under 9		
Yes	61	35.3
No	112	64.7
9-14		
Yes	100	57.8
No	73	42.2

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15-20		
Yes	96	55.5
No	77	44.5
21 and above		
Yes	69	39.9
No	104	60.1

Source; Field survey, 2023

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4.1 **Presentation of Data**

4.2.1. **Objective One**: To assess the level of knowledge of cervical cancer, cervical cancer prevention and HPV vaccine among women in Ibadan, Oyo state

Table 4.2 shows that out of the 537 respondents, a substantial majority, specifically 472 individuals (87.9%), had heard of cervical cancer before. This indicates a relatively high level of general awareness about the disease within the surveyed population. When asked about their ability to identify early signs and symptoms of cervical cancer, 246 respondents (45.8%) claimed they could do so, while 291 (54.2%) admitted they couldn't. This suggests that a significant portion of the surveyed group may not be well-informed about the warning signs of cervical cancer.

A question regarding the primary cause of cervical cancer revealed that 279 respondents (52%) correctly believed it to be caused by a virus, while 258 (48%) did not have this knowledge. A majority of respondents, 322 (60%), reported that they could list risk factors associated with cervical cancer, while 215 (40%) stated they couldn't. This implies that a significant portion of

the respondents might have some understanding of the factors that increase the risk of developing cervical cancer.

When asked if they had received information about cervical cancer from healthcare providers, 297 respondents (55.3%) confirmed they had, while 240 (44.7%) had not. This indicates that a little over half of the surveyed individuals have been educated about cervical cancer by healthcare professionals. An overwhelming majority of respondents, 455 (84.7%), were aware that early detection of cervical cancer increases the chances of successful treatment, while 82 (15.3%) were not aware of this fact. A significant number of respondents, 430 (80.1%), correctly believed that cervical cancer is not exclusive to sexually active women, while 107 (19.9%) believed otherwise. A notable finding is that only 151 respondents (28.1%) were aware that cervical cancer can be prevented, while a substantial 386 (71.9%) were not aware of preventive measures.

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Table 4.2 Knowledge of Cervical Cancer

Variables	Frequencies	Percent(%)

Have you heard of cervical cancer before? (n=537)		
Yes	472	87.9
No	65	12.1
Can you identify any early signs and symptoms of cervical cancer? (n=537)		
Yes	246	45.8
No	291	54.2
Is cervical cancer most often caused by a virus? (n=537)		
Yes	279	52
No	258	48
Can you list any risk factors associated with cervical cancer? (n=537)		
Yes	322	60
No	215	40
Have you ever received information about cervical cancer from a healthcare provider? (n=537)		
Yes	297	55.3
No	240	44.7

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Are you aware that early detection of cervical cancer increases the chances of successful treatment? (n=537)		
Yes	455	84.7
No	82	15.3
Do you believe that only sexually active women can develop cervical cancer? (n=537)		
Yes	430	80.1
No	107	19.9
Are you aware that cervical cancer can be prevented? (n=537)		
Yes	151	28.1
No	386	71.9

Source: Field survey, 2023

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Grading of Knowledge of Cervical Cancer among Respondents

Fig 4.1 shows the knowledge of participants about cervical cancer, it was assessed that 86% of the respondents had good knowledge about cervical cancer.

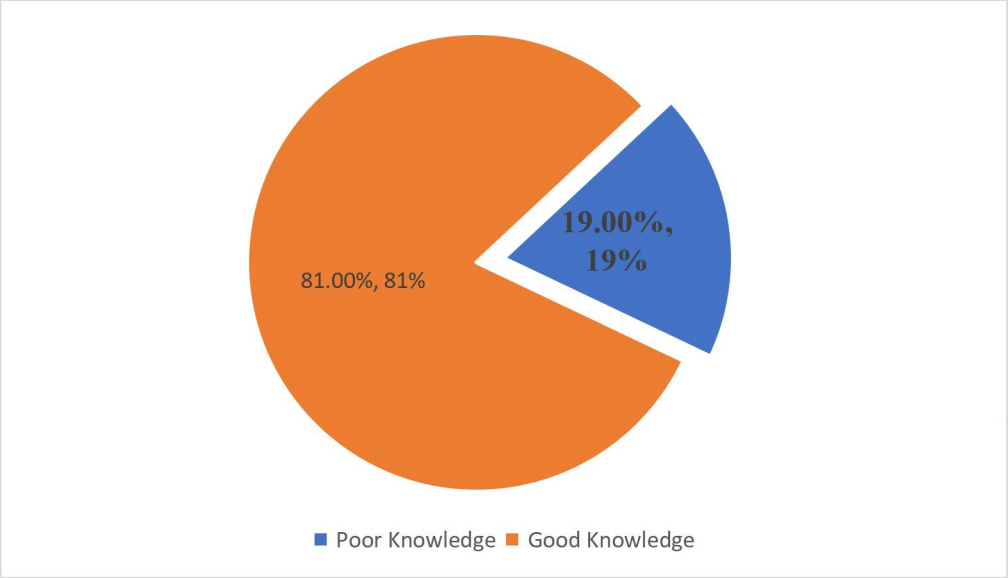

Figure 4.1: showing the overall knowledge of Cervical Cancer among participant

Source: Field Survey, 2023

Factors Associated with Knowledge of Cervical Cancer

Table 4.3 shows a number of factors influencing the participant's knowledge of cervical cancer. Following adjustment of the twelve significant associated variables in the logistic regression analysis (a significance value < 0.05),: educational level (p=0.00,0.00), employment status (p = 0.00,0.00), monthly income (p = 0.028, 0.005, 0.00), place of residence (p = 0.003), Number of daughters (p=0.049), Age range of daughters under 9 (p=0.018), 9-14 (0.003), 15-20 (0.013), and 21 and above (p=0.001). The table shows that participants with a bachelor's degree and master's degree or higher were significantly more likely to have good knowledge of cervical cancer than those with secondary education, with a COR of 0.189 (95% CI: 0.104, 0.341) and 0.107 (95% CI: 0.051,0.222). The Odds of having good knowledge of cervical cancer among those who were unemployed and retired is 6.027 and 22.50 times more likely than those

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employed full time, this means that participants that were unemployed (COR of 6.027{95% CI: 3.576,10.157}) and retired (COR of 22.50 {6.094,83.077}) were significantly more likely to have good knowledge of cervical cancer compared to thoses that were employed. The table also shows that participant's monthly income also contributes to having good knowledge of cervical cancer with table showing that those earning 20,000 – 50,000 naira, 51,000 – 80,000 and more than 110,000 are 0.395, 0.138 and 0.094 times more likely to have good knowledge of cervical cancer respectively. Also, the table shows that place of residence is also a significant factor associated to having good knowledge of cervical cancer. Using the AOR of 31.591 (95% CI: 1.012,985.927), number of daughters, is significantly associated with having a good knowledge of cervical cancer, showing that those who have three or more children are 31.591 times more likely to have good knowledge of cervical cancer compare to those who have two or less. Age range of their daughters is also a contributing factor to having good knowledge.

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Table 4.3 Factors Associated with Knowledge of Cervical Cancer

Variable	**COR (95%CI)**	**P-Value**	**AOR (95%CI)**	**P-Value**
Age Range				
20 -29	Ref		Ref	
30-49	0.606(0.325,1.130)	0.115	02.361(0.678,8.217)	0.177
50 and above	0.422(0.220,0.810)	0.009	1.365(0.242,7.704)	0.724
Marital Status				

Single	Ref		Ref	
Married	0.399(0.243,0.654)	0.000	0.869(0.230,3.288)	0.837
Previously Married	0.556(0.206,1.496)	0.245	0.392(0.0821.878)	0.241
Educational Level				
Secondary education	Ref		Ref	
Bachelor's degree	0.189(0.104,0.341)	0.000*	0.254(0.118,0.548)	0.000*
Master's degree or higher	0.107(0.051,0.222)	0.000*	0.110(0.037,0.326)	0.000*
Employment Status				
Employed full time	Ref		Ref	
Unemployed	6.027(3.576,10.157)	0.000*	5.591(2.148,14.549)	0.000*
Retired	22.500(6.094,83.077)	0.000*	681.861(23.278,19972.808)	0.000*
Monthly Income (Naira)				
< 20000	Ref		Ref	
20000 - 50000	0.395(0.173,0.905)	0.028*	0.394(0.145,1.076)	0.069
51000 - 80000	0.138(0.035,0.543)	0.005*	0.352(0.069,1.789)	0.208
81000 - 110000	0.447(0.177,1.127)	0.088	1.139(0.336,3.861)	0.834
>110000	0.094(0.036,0.246)	0.000*	0.104(0.025,0.437)	0.002*
Prefer not to say	0.827(0.377,1.815)	0.636	0.780(0.294,2.073)	0.619
Where do you live				
Rural area	0.435(0.250,0.755)	0.003*	0.382(0.179,0.813)	0.013*
Urban area	0.999(0.000,0.000)	1	0.999(0.000,0.000)	1

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Number of Daughters				
None	Ref		Ref	
One	0.615(0.325,1.166)	0.136	4.584(0.272,77.338)	0.291
Two	0.487(0.213,1.115)	0.089	1.180(0.034,41.511)	0.927
Three	0.444(0.130,1.512)	0.194	31.591(1.012,985.927)	0.049*
Age range of Daughters				
Under 9				
Yes	0.317(0.123,0.818)	0.018*	Ref	
No	0.680(0.388,1.192)	0.178	0.001(0.000,0.030)	0.000*
9-14				
Yes	0.309(0.144,0.663)	0.003*	Ref	
No	0.918(0.494,1.706)	0.787	0.151(0.024,0.937)	0.042*
15-20				
Yes	0.413(0.205,0.831)	0.013*	Ref	
No	0.721(0.378,1.376)	0.321	0.192(0.022,1.683)	0.136
21 and above				
Yes	1.161(0.636,2.117)	0.627	Ref	
No	0.217(0.092,0.514)	0.001*	39.153(4.608,332.667)	0.001*

Source; Field Survey 2023

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Knowledge of Cervical Cancer Prevention

Table 4.4 below , the majority of respondents, 415 (77.3%), correctly believed that regular Pap tests can detect cervical cancer in its early stages, while 122 (22.7%) were unaware of this fact. A significant portion of the respondents, 374 (69.6%), knew that there is a vaccine available to prevent cervical cancer, while 163 (30.4%) did not have this awareness.

When asked about the use of condoms during sexual intercourse and its impact on lowering the risk of HPV infection, 308 respondents (57.4%) acknowledged that condoms can lower the risk, whereas 229 (42.6%) were not aware of this. 58.8% of the respondents correctly understood that smoking increases the risk of cervical cancer, while 221 (41.2%) did not possess this knowledge. A roughly equal number of respondents were split on whether they knew when girls/women should get their first cervical screening, with 269 (50.1%) indicating they had this knowledge, and 268 (49.9%) stating they did not.

About 46.9% (252), were aware that having multiple sexual partners increases the risk of HPV infection, while 285 (53.1%) were not aware of this relationship. Meanwhile, a substantial majority of respondents, 384 (71.5%), knew that certain types of HPV are high risk for developing cervical cancer, while 153 (28.5%) did not possess this knowledge. A significant portion of respondents, 349 (65%), were aware that a healthy immune system can help the body fight off HPV, while 188 (35%) did not have this awareness.

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Table 4.4: Knowledge of Cervical Cancer Prevention

Variables	Frequencies	Percent (%)
Can regular Pap tests detect cervical cancer in its early stages? (n=537)		
Yes	415	77.3
No	122	22.7
Is there a vaccine available to prevent cervical cancer? (n=537)		
Yes	374	69.6
No	163	30.4
Can using condoms during sexual intercourse lower the risk of HPV infection? (n=537)		
Yes	308	57.4
No	229	42.6
Does smoking increase the risk of cervical cancer? (n=537)		

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Yes	316	58.8
No	221	41.2
Do you know when girls/women should get their first cervical screening? (n=537)		
Yes	269	50.1
No	268	49.9
Are you aware that multiple sexual partners increase the risk of HPV infection? (n=537)		
Yes	252	46.9
No	285	53.1
Do you know that certain types of HPV are high-risk for developing cervical cancer? (n=537)		
Yes	384	71.5
No	153	28.5

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Are you aware that a healthy immune system can help your body fight off HPV? (n=537)		
Yes	349	65
No	188	35

Source: Field Survey, 2023

Grading of knowledge on cervical cancer prevention

Fig 4.2 shows the knowledge of participants about cervical cancer prevention, it was assessed that 71% of the respondents had good knowledge about cervical cancer prevention.

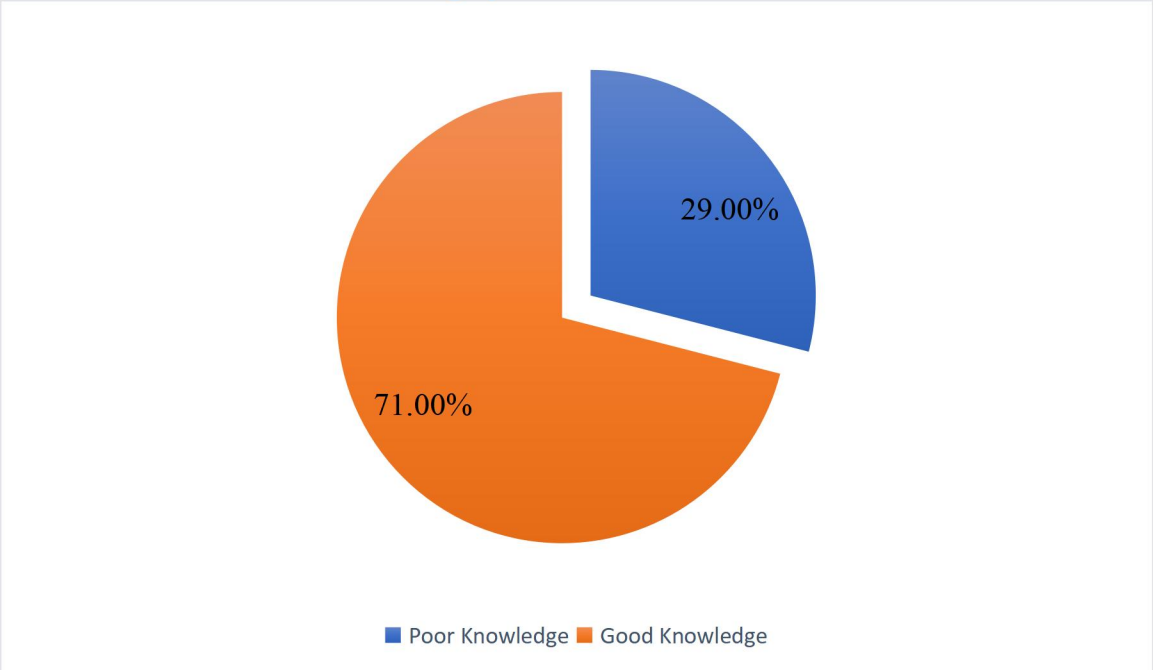

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Figure 4.2: showing the overall knowledge of Cervical Cancer Prevention among participant

Source: Field Survey, 2023

Factors Associated with Knowledge of Cervical Cancer Prevention

Table 4.1.1 shows a number of factors influencing the participant's knowledge of cervical cancer prevention. Following adjustment of the twelve significant associated variables in the logistic regression analysis (a significance value < 0.05), only eight risk factors made a statistically significant contribution to the knowledge of cervical cancer prevention, which are: age range (p=0.001), marital status (p=0.001), educational level (p=0.00,0.00), employment status (p = 0.00,0.029), monthly income (p = 0.003, 0.010, 0.00), Number of daughters (p=0.006), Age range of daughters under 9 (p=0.053), and 9-14 (0.051). The tables also show participants within the age range of 50 to 60 and above were significantly more likely to have good knowledge of cervical cancer prevention compared to those with younger age range with a COR of 0.369(95% CI: 0.207, 0.657). The table shows that participants with a bachelor's degree and master's degree or higher were significantly more likely to have good knowledge of cervical cancer prevention than those with secondary education, with a COR of 0.166 (95% CI: 0.090, 0.305) and 0.124 (95% CI: 0.063,0.245).

The Odds of having good knowledge of cervical cancer among those who were unemployed and retired is 3.609 and 3.922 times more likely than those employed full time, this means that participants that were unemployed (COR of 3.609{95% CI: 2.426,5.370}) and retired (COR of 3.922 {1.152,13.346}) were significantly more likely to have good knowledge of cervical cancer compared to those that were employed. The table also shows that participant's monthly income

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also contributes to having good knowledge of cervical cancer prevention with table showing that those earning 51,000 – 80,000, 81,000 – 110,000 naira, and more than 110,000 are 0.187, 0.304 and 0.123 times more likely to have good knowledge of cervical cancer prevention respectively. Using the COR of 0.338 (95% CI: 0.155,0.735), number of daughters, is significantly associated with having a good knowledge of cervical cancer, showing that those who have two children are 0.338 times more likely to have good knowledge of cervical cancer prevention compared to those who have one or none. Age range of their daughters is also a contributing factor to having good knowledge.

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Table 4.1.1: Factors Associated with Knowledge of Cervical Cancer Prevention

Variable	**COR (95%CI)**	**P-Value**	**AOR (95%CI)**	**P-Value**
Age Range				
Under 20 -29	Ref		Ref	
30-49	1.243(0.768,2.011)	0.376	2.550(1.078,6.034)	0.033
50 and above	0.369(0.207,0.657)	0.001*	1.056(0.372,3.001)	0.918
Marital Status				

Single	Ref		Ref	
Married	0.520(0.347,0.777)	0.001*	0.776(0.324,1.855)	0.568
Previously Married	0.612(0.265,1.410)	0.249	0.848(0.305,2.358)	0.753
Educational Level				
Secondary education	Ref		Ref	
Bachelor's degree	0.166(0.090,0.305)	0.000*	0.272(0.136,0.541)	0.000*
Master's degree or higher	0.124(0.063,0.245)	0.000*	0.274(0.119,0.631)	0.002*
Employment Status				
Employed full time	Ref		Ref	
Unemployed	3.609(2.426,5.370)	0.000*	2.218(1.216,4.046)	0.009*
Retired	3.922(1.152,13.346)	0.029*	5.105(0.915,28.498)	0.063*
Monthly Income (Naira)				
< 20000	Ref		Ref	
20000 - 50000	0.746(0.347,1.605)	0.454	0.787(0.335,1.851)	0.583
51000 - 80000	0.187(0.062,0.564)	0.003*	0.311(0.091,1.064)	0.063
81000 - 110000	0.304(0.124,0.749)	0.010*	0.548(0.190,1.579)	0.265
>110000	0.123(0.054,0.283)	0.000*	0.196(0.072,0.537)	0.002*
Prefer not to say	0.746(0.349,1.597)	0.451	0.718(0.301,1.713)	0.455
Where do you live				
Rural area	0.739(0.437,1.252)	0.261	0.794(0.426,1.482)	0.469
Urban area	0.999(0.000,0.000)	1	0.999(0.000,0.000)	1

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Number of Daughters				
None	Ref		Ref	
One	0.885(0.533,1.471)	0.638	3.294(0.734,14.797)	0.120
Two	0.338(0.155,0.735)	0.006*	0.942(0.145,6.136)	0.951
Three	0.739(0.304,1.796)	0.504	3.414(0.429,27.155)	0.246
Age range of Daughters				
Under 9				
Yes	0.517(0.265,1.009)	0.053*	Ref	
No	0.738(0.458,1.188)	0.211	0.284(0.074,1.088)	0.066
9-14				
Yes	0.595(0.353,1.003)	0.051*	Ref	
No	0.743(0.421,1.310)	0.304	0.605(0.193,1.898)	0.389
15-20				
Yes	0.704(0.422,1.174)	0.178	Ref	
No	0.598(0.334,1.070)	0.083	0.781(0.218,2.800)	0.705
21 and above				
Yes	0.690(0.383,1.245)	0.218	Ref	
No	0.633(0.382,1.051)	0.077	1.186(0.395,3.567)	0.761

Source: Field Survey, 2023

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Knowledge of HPV Vaccine

Table shows that a substantial majority of respondents, 379 (70.6%), correctly believed that the HPV vaccine can prevent most cases of cervical cancer, while 158 (29.4%) were not aware of this fact. 331 (61.6%) of the respondents, were aware of the recommended age for girls to receive the HPV vaccine, indicating reasonably good knowledge in this area. However, 206 (38.4%) were not aware of the recommended age.

A little over two-fifths of the respondents, 230 (42.8%), reported being aware of potential side effects associated with the HPV vaccine, while 307 (57.2%) did not have this awareness. When asked about the number of doses required for the HPV vaccine to be effective, only 85 (15.8%) correctly identified that it requires three doses. A larger proportion, 319 (59.4%), thought it required two doses, and 123 (22.9%) were unsure. This suggests some confusion or lack of knowledge about the dosing schedule. A slight majority of respondents, 281 (52.3%), were aware that boys can also receive the HPV vaccine, while 256 (47.7%) did not have this awareness.

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A minority of respondents, 164 (30.5%), believed that the HPV vaccine can protect against other cancers besides cervical cancer, while 373 (69.5%) did not share this belief. A relatively small number of respondents, 155 (28.9%), were aware that the HPV vaccine is more effective if received before becoming sexually active, while 382 (71.1%) did not have this knowledge. A little over half of the respondents, 292 (54.4%), were aware that the HPV vaccine requires a booster shot, while 245 (45.6%) were not aware of this requirement.

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Table 4.4: Knowledge of HPV Vaccine

Variables	**Frequencies**	**Percent (%)**
Can the HPV vaccine prevent most cases of cervical cancer? (n=537)		
Yes	379	70.6
No	158	29.4
Do you know the recommended age for girls to receive the HPV vaccine? (n=537)		
Yes	331	61.6
No	206	38.4

Are you aware of any potential side effects of the HPV vaccine? (n=537)		
Yes	230	42.8
No	307	57.2
How many doses of the HPV vaccine are required to be effective? (n=537)		
One	85	15.8
Two	319	59.4
Three	123	22.9
Not sure	10	1.9
Can boys also receive the HPV vaccine? (n=537)		
Yes	281	52.3
No	256	47.7
Do you believe the HPV vaccine can protect against other cancers besides cervical cancer? (n=537)		
Yes	164	30.5
No	373	69.5

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Are you aware the HPV vaccine is more effective if received before becoming sexually active? (n=537)		
Yes	155	28.9
No	382	71.1
Do you know if the HPV vaccine requires a booster shot? (n=537)		
Yes	292	54.4
No	245	45.6

Source: Field Survey, 2023

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Overall Grading of HPV Vaccine Knowledge

Fig 4.3 shows the knowledge of participants about HPV vaccine, it was assessed that 90.7% of the respondents had poor knowledge about HPV Vaccine.

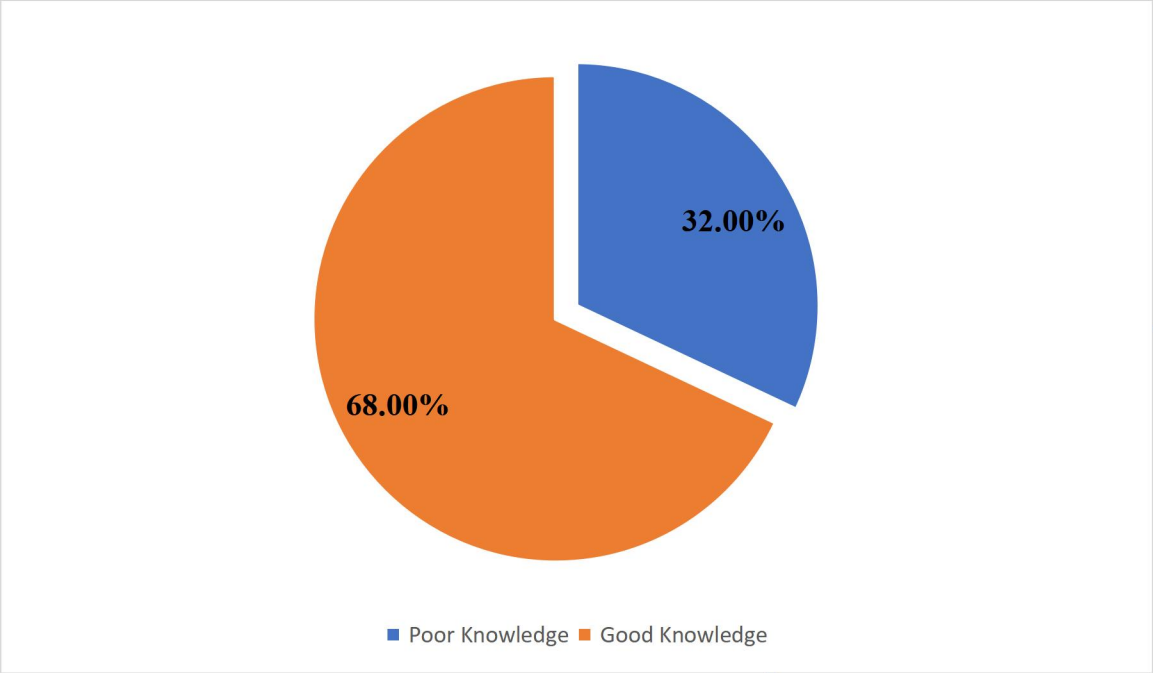

Figure 4.3: showing the overall knowledge of HPV Vaccine among participant

Source: Field Survey, 2023

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Factors Associated with Knowledge of HPV Vaccine

Table 4.4.1 shows a number of factors influencing the participant's knowledge of HPV vaccine. Following adjustment of the twelve significant associated variables in the logistic regression analysis (a significance value < 0.05), only eight risk factors made a statistically significant contribution to the knowledge of HPV vaccine, which are: Age range (p= 0.007), marital status (p=0.035), educational level (p=0.011,0.00), employment status (p = 0.00), monthly income (p = 0.036), place of residence (p = 0.001), age range of daughters 9-14 (0.057, 0.202), and 15-20 (0.048. The tables also show participants within the age range of 50 to 60 and above were significantly more likely to have good knowledge of HPV vaccine compared to those with younger age range with a COR of 0.497(95% CI: 0.300, 0.824). Also the odds of married participants having more knowledge of HPV vaccine is 0.661 times more likely than those that were single, with COR of 0.661(95% CI: 0.449,0.972). The table shows that participants with a bachelor's degree and master's degree or higher were significantly more likely to have good knowledge of HPV vaccine than those with secondary education, with a COR of 0.477 (95% CI: 0.271, 0.842) and 0.214 (95% CI: 0.111,0.414). The Odds of having good knowledge of HPV vaccine among those who were unemployed is 1.954 times more likely than those employed full time, this means that participants that were unemployed (COR of 1.954{95% CI: 1.350,2.829}) were significantly more likely to have good knowledge of HPV vaccine compared to those that were employed. The table also shows that participant's monthly income also contributes to having good knowledge of HPV vaccine with table showing that those who do not want to disclose their earnings are 0.036 times more likely to have good knowledge of HPV vaccine. Age range of daughters is also a contributing factor to having good knowledge

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Table 4.1.1: Factors Associated with Knowledge of HPV Vaccine

Variable	COR (95%CI)	P-Value	AOR (95%CI)	P-Value
Age Range				
20 -29	Ref		Ref	
30-49	0.685(0.414,1.136)	0.143	0.432(0.193(0.970)	0.042*
50 and above	0.497(0.300,0.824)	0.007*	0.581(0.246,1.372)	0.215
Marital Status				
Single	Ref		Ref	
Married	0.661(0.449,0.972)	0.035*	2.089(0.999,4.367)	0.050*
Previously Married	1.085(0.510,2.307)	0.833	1.715(0.706,4.165)	0.233
Educational Level				
Secondary education	Ref		Ref	
Bachelor's degree	0.477(0.271,0.842)	0.011*	0.655(0.3421.255)	0.202
Master's degree or higher	0.214(0.111,0.414)	0.000*	0.277(0.125,0.617)	0.002*
Employment Status				
Employed full time	Ref		Ref	
Unemployed	1.954(1.350,2.829)	0.000*	1.057(0.606,1.846)	0.844
Retired	1.080(0.279,4.177)	0.911	0.877(0.174,4.427)	0.873

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Monthly Income (Naira)				
< 20000	Ref		Ref	
20000 - 50000	1.791(0.786,4.081)	0.165	2.014(0.842,4.820)	0.116
51000 - 80000	0.640(0.219,1.872)	0.415	0.671(0.207,2.174)	0.505
81000 - 110000	0.730(0.283,1.888)	0.517	0.629(0.216,1.832)	0.395
>110000	0.516(0.223,1.194)	0.122	0.697(0.265,1.836)	0.465
Prefer not to say	2.400(1.060,5.435)	0.036*	2.378(0.986,5.735)	0.054*
Where do you live				
Rural area	0.435(0.262,0.722)	0.001*	0.379(0.209,0.687)	0.001*
Urban area	0.999(0.000,0.000)	1	0.999(0.000,0.000)	1
Number of Daughters				
None	Ref		Ref	
One	0.816(0.494,1.348)	0.427	0.733(0.186,2.889)	0.657
Two	0.432(0.216,0.861)	0.017	0.367(0.072,1.856)	0.225
Three	0.645(0.266,1.567)	0.333	0.524(0.077,3.547)	0.507
Age range of Daughters				
Under 9				
Yes	1.417(0.889,2.260)	0.143	Ref	
No	0.778(0.376,1.609)	0.499	1.089(0.318,3.736)	0.892

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9-14				
Yes	0.615(0.372,1.014)	0.057*	Ref	
No	0.696(0.398,1.215)	0.202*	1.441(0.495,4.196)	0.503
15-20				
Yes	0.721(0.440,1.183)	0.195	Ref	
No	0.563(0.318,0.995)	0.048*	1.373(0.432,4.368)	0.591
21 and above				
Yes	0.651(0.365,1.161)	0.146	Ref	
No	0.647(0.397,1.054)	0.080	1.465(0.533,4.022)	0.459

Source: Field Survey, 2023

Objective Two: To determine the level of attitude of women living in Ibadan, Oyo state towards HPV vaccination

Table 4.5 shows that more than half of the respondents, 313 (58.3%), believe that the HPV vaccine is safe for their daughters, while 224 (41.7%) have concerns about its safety. Majority of the participants, 502 (93.5%), trust the advice of healthcare professionals when it comes to vaccinating their daughters against HPV, while only 35 (6.5%) express doubt in this advice. Also significant proportion, 349 (65%), believe that vaccinating their daughters against HPV will not encourage promiscuity, while 188 (35%) are concerned that it might.

A little over half, 282 (52.5%), express worries about the potential side effects of the HPV vaccine on their daughters, while 255 (47.5%) do not have such concerns. A substantial majority,

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446 (83.1%), believe that the benefits of HPV vaccination outweigh the potential risks, while 91 (16.9%) are less convinced of this balance. A little over half, 316 (58.8%), express concerns about the long-term effects of the HPV vaccine on their daughters, while 221 (41.2%) do not share these concerns. A minority, 147 (27.4%), prefer their daughters to receive the HPV vaccine at school rather than at a doctor's office, while 390 (72.6%) favor the doctor's office. A strong majority, 450 (83.8%), believe that there is a societal responsibility to vaccinate against HPV to protect others, while 87 (16.2%) do not share this belief.

Table 4.5: Attitude of Participants towards HPV Vaccination

Variables	Frequencies	Percent (%)
The HPV vaccine is safe for my daughter (n=537)		
Yes	313	58.3
No	224	41.7
I trust the healthcare professionals' advice to vaccinate my daughter against HPV (n=537)		
Yes	502	93.5
No	35	6.5
Vaccinating my daughter against HPV will not encourage promiscuity (n=537)		
Yes	349	65
No	188	35

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I am worried about the side effects of the HPV vaccine on my daughter (n=537)		
Yes	282	52.5
No	255	47.5
The benefits of HPV vaccination outweigh the potential risks (n=537)		
Yes	446	83.1
No	91	16.9
I am concerned about the long-term effects of the HPV vaccine (n=537)		
Yes	316	58.8
No	221	41.2
I prefer my daughter to receive the HPV vaccine at school rather than at a doctor's office. (n=537)		
Yes	147	27.4
No	390	72.6
I believe there is a societal responsibility to vaccinate against HPV to protect others. (n=537)		
Yes	450	83.8
No	87	16.2

Source: Field Survey, 2023

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Overall Grading of HPV Vaccination Attitude

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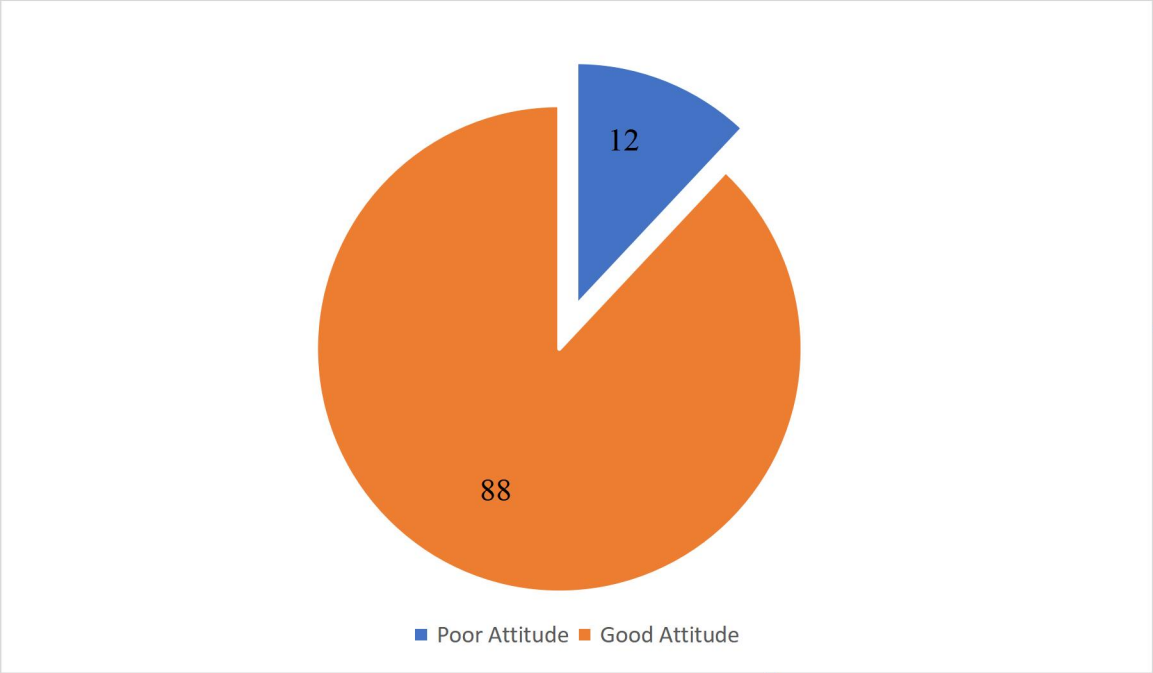

Fig 4 shows the attitude of participants about HPV vaccine, it was assessed that 88% of the respondents had good attitude towards HPV Vaccine.

Figure 4.4: showing the overall attitude to HPV Vaccine among participant

Source: Field Survey, 2023

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Factors Associated with Attitude towards HPV Vaccine

Table 4.5.1 shows a number of factors influencing the participant's attitude towards HPV vaccine. Following adjustment of the twelve significant associated variables in the logistic regression analysis (a significance value < 0.05), only 3 risk factors made a statistically significant contribution to the attitude of participants towards HPV Vaccine, which are: educational level (p=0.001), employment status (p = 0.049), and age range of daughters under 9 (p=0.043). The table shows that participants with a master's degree or higher were significantly more likely to have good attitude towards HPV vaccine than those with bachelor's degree or secondary education, with a COR of 0.173 (95% CI: 0.061, 0.494). The Odds of having good attitude towards HPV vaccine among those who were unemployed is 1.699 times more likely than those employed full time, this means that participants that were unemployed (COR of 1.699{95% CI: 1.003,2.878}) were significantly more likely to have good attitude towards HPV vaccine compared to those that were employed. Age range of daughters is also a contributing factor to having good knowledge.

Table 4.5.1: Factors Associated with Attitude towards HPV Vaccine

Variable	**COR (95%CI)**	**P-Value**	**AOR (95%CI)**	**P-Value**
Age Range				
20 -29	Ref		Ref	
30-49	0.722(0.339,1.540)	0.399	1.711(0.560,5.233)	0.346
50 and above	0.911(0.471,1.764)	0.783	2.934(0.882,9.756)	0.079
Marital Status				

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Single	Ref		Ref	
Married	0.583(0.329,1.034)	0.065	0.770(0.266,2.232)	0.630
Previously Married	1.102(0.402,3.022)	0.850	0.940(0.282,3.135)	0.920
Educational Level				
Secondary education	Ref		Ref	
Bachelor's degree	0.732(0.355,1.510)	0.398	0.877(0.390,1.973)	
Master's degree or higher	0.173(0.061,0.494)	0.001*	0.133(0.038,0.471)	
Employment Status				
Employed full time	Ref		Ref	
Unemployed	1.699(1.003,2.878)	0.049*	1.398(0.632,3.094)	0.408
Retired	2.087(0.430,10.143)	0.362	0.606(0.076,4.850)	0.637
Monthly Income (Naira)				
< 20000	Ref		Ref	
20000 - 50000	0.686(0.244,1.932)	0.476	.806(0.275,2.364)	0.694
51000 - 80000	0.998(0.000,0.000)	1	.998(0.000,0.000)	1
81000 - 110000	0.519(0.153,1.757)	0.291	.665(0.169,2.613)	0.559
>110000	0.505(0.182,1.401)	0.189	1.109(0.336,3.665)	0.865
Prefer not to say	1.063(0.394,2.863)	0.904	1.470(0.512,4.220)	0.474
Where do you live				

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Rural area	1.332 .583,3.044)	0.497	1.646(0.680,3.984)	0.269
Urban area	0.999(0.000,0.000)	1	0.999(0.000,0.000)	1
Number of Daughters				
None	Ref		Ref	
One	0.643(0.293,1.412)	0.271	0.856(0.078,9.422)	0.899
Two	0.882(0.379,2.055)	0.772	1.676(0.110,25.516)	0.710
Three	0.514(0.118,2.240)	0.376	1.199(0.045,31.784)	0.914
Age range of Daughters				
Under 9				
Yes	1.261(0.600,2.646)	0.541	Ref	
No	0.429(0.188,0.975)	0.043*	2.994(0.367,24.455)	0.306
9-14				
Yes	0.338(0.131,0.873)	0.025*	Ref	
No	1.265(0.635,2.517)	0.504	0.272(0.050,1.473)	0.131
15-20				
Yes	0.506(0.221,1.155)	0.106	Ref	
No	0.959(0.463,1.990)	0.912	1.035(0.118,9.111)	0.975
21 and above				
Yes	0.843(0.380,1.869)	0.674	Ref	
No	0.609(0.289,1.285)	0.193	0.544(0.100,2.955)	0.481

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Source: Field Survey, 2023

Objective Three: To assess the practice of HPV vaccination and cervical cancer screening among women living in Ibadan, Oyo state

In table 4.6, it is shown that 63.5% of the respondents (341 out of 537) reported that they have heard about the HPV vaccine from a healthcare provider, indicating that a significant portion of the surveyed individuals have received information about the vaccine from medical professionals. Among the respondents with daughters (n=173), only 13.9% (24) indicated that their daughters have received the HPV vaccine. This suggests a relatively low vaccination rate among this group. Among the 24 respondents whose daughters received the HPV vaccine, 25% (6 out of 24) did so when their daughters were under 9 years old, 54.2% (13 out of 24) between ages 9 and 14, and 20.8% (5 out of 24) between ages 15 and 20. Among those whose daughters had not been vaccinated (n=149), the main reasons cited were concerns about side effects (52.3%), the cost of the vaccine (53.7%), the belief that their daughters are too young (49%), and religious/cultural reasons (46.3%).

A substantial majority (68.3%) of the respondents would allow their daughters to receive the HPV vaccine if it were available at their school. 78.4% of the respondents indicated that they would recommend the HPV vaccine to other parents for their daughters, suggesting a favorable opinion of the vaccine. 53.8% of the respondents believed that the HPV vaccine should be mandatory in schools, while 46.2% disagreed with this idea. 38.5% of the respondents reported

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that they had received informational materials about the HPV vaccine. This suggests that there is room for increased educational outreach.

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Table 4.6: HPV Vaccination Practices Among Participants

Variables	Frequencies	Percent (%)
Have you ever heard about the HPV vaccine from a healthcare provider? (n=537)		

Yes	341	63.5
No	196	36.5
Has your daughter received the HPV vaccine? (n=173)		
Yes	24	13.9
No	149	86.1
If yes, at what age did your daughter receive the HPV vaccine? (n=24)		
Under 9	6	25
9-14	13	54.2
15-20	5	20.8
If no, what are the main reasons your daughter has not been vaccinated against HPV? "Concerns about side effects" (n=149)		
Yes	78	52.3
No	71	47.7
"The cost of the vaccine" (n=149)		
Yes	80	53.7
No	69	46.3
"My daughter is too young" (n=149)		
Yes	73	49
No	76	51
"Religious/Cultural reasons" (n=149)		

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Yes	69	46.3
No	80	53.7
If the HPV vaccine were available at your daughter's school, would you allow her to receive it? (n=537)		
Yes	367	68.3
No	170	31.7
Would you recommend the HPV vaccine to other parents for their daughters? (n=537)		
Yes	421	78.4
No	116	21.6
Do you believe that the HPV vaccine should be mandatory in schools? (n=537)		
Yes	289	53.8
No	248	46.2
Have you received any informational materials about the HPV vaccine? (n=537)		
Yes	207	38.5
No	330	61.5

Source: Field Survey, 2023

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Factors Associated with HPV Vaccination Practices

Table 4.6.1 shows a number of factors influencing the participant's HPV vaccination practices. Following adjustment of the twelve significant associated variables in the logistic regression analysis (a significance value < 0.05), only nine risk factors made a statistically significant contribution to the HPV vaccination practices, which are: age range (p=0.00), marital status (p=0.002), employment status (p = 0.035), monthly income (p = 0.009, 0.018), Number of daughters (p=0.008), Age range of daughters under 9 (p=0.001,0.005), 9-14 (p=0.004,0.002), 15-20 (p=0.038,0.00), and 21 and above (p=0.00). The tables show participants daughters within the age range of 50 to 60 and above were significantly more likely to have received HPV vaccine

compared to those with younger age range with a COR of 0.249(95% CI: 0.122, 0.508). Also, the odds of married participant's daughters to have received HPV vaccine is 0.335 times more likely than those that were single, with COR of 0.335(95% CI: 0.168,0.669). The Odds of receiving HPV vaccine among the daughters those who were unemployed is 2.168 times more likely than those employed full time, this means that participants daughters that were unemployed (COR of 2.168{95% CI: 1.055,4.453}) were significantly more likely to have received HPV vaccine compared to those that were employed. The table also shows that participant's monthly income also contributes to their daughters receiving HPV vaccine with table showing that daughters of those earning 20,000 – 50,000 naira, and 81,000 – 110,000 naira, are 22.813 and 37.659 times more likely to have received HPV vaccine respectively. Using the AOR of 0.009 (95% CI: 0.00,0.297), number of daughters, is significantly associated with receiving HPV vaccine, showing that those who have two children are 0.009 times more likely to have received HPV vaccine compared to those who have one or none. Age range of their daughters is also a contributing factor to having good knowledge.

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Table 4.6.1: Factors Associated with HPV Vaccination Practices

Variable	**COR (95%CI)**	**P-Value**	**AOR (95%CI)**	**P-Value**
Age Range				

20 -29	Ref		Ref	
30-49	.605(0.241,1.518)	0.285	0.909(0.176,4.703)	0.909
50 and above	.249(0.122,0.508)	0.000*	0.255(0.050,1.292)	0.099
Marital Status				
Single	Ref		Ref	
Married	0.335(0.168,0.669)	0.002*	0.663(0.124,3.545)	0.631
Previously Married	0.699(0.150,3.246)	0.648	2.742(0.220,34.117)	0.433
Educational Level				
Secondary education	Ref		Ref	
Bachelor's degree	2.463(0.913,6.641)	0.075	2.879(0.879,9.432)	0.081
Master's degree or higher	0.771(0.293,2.029)	0.598	1.217(0.311,4.760)	0.778
Employment Status				
Employed full time	Ref		Ref	
Unemployed	2.168(1.055,4.453)	0.035*	1.061(0.283,3.983)	0.930
Retired	0.479(0.099,2.328)	0.362	0.786(0.076,8.135)	0.840
Monthly Income (Naira)				

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< 20000	Ref		Ref	
20000 - 50000	5.565(0.890,34.780)	0.066	22.813(2.204,236.116)	0.009*
51000 - 80000	3.581(0.354,36.179)	0.280	3.068(0.244,38.546)	0.385
81000 - 110000	5.710(0.570,57.209)	0.138	37.659(1.880,754.470)	0.018*
>110000	0.697(0.195,2.491)	0.578	4.652(0.711,30.436)	0.109
Prefer not to say	0.760(0.205,2.815)	0.682	1.285(0.293,5.638)	0.740
Where do you live				
Rural area	1.383(0.588,3.252)	0.457	1.321(0.434,4.018)	0.624
Urban area	176692563.306(0.000)	1	20983931.333(0.000)	0.999
Number of Daughters				
None	Ref		Ref	
One	0.670(0.256,1.751)	0.413	0.390(0.013,11.518)	0.586
Two	0.118(0.056,0.249)	0.000	0.009(0.000,0.297)	0.008*
Three	1.274(0.163,9.952)	0.818	0.127(0.002,7.132)	0.315
Age range of Daughters				
Under 9				
Yes	0.250(0.108,0.576)	0.001*	Ref	
No	0.343(0.163,0.720)	0.005*	0.028(0.001,0.851)	0.040*

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9-14				
Yes	0.328(0.153,0.701)	0.004*	Ref	
No	0.276(0.123,0.618)	0.002*	2.572(0.140,47.329)	0.525
15-20				
Yes	0.421(0.186,0.953)	0.038*	Ref	
No	0.220(0.103,0.470)	0.000*	9.499(1.668,54.095)	0.011*
21 and above				0.000*
Yes	0.514(0.195,1.355)	0.179	Ref	
No	0.234(0.116,0.473)	0.000*	605.137(30.442,12028.967)	

Source: Field Survey, 2023

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Cervical Cancer Screening Practices Among Participants

Table 4.7 shows that approximately 67% of the respondents (360 out of 537) reported that they had heard about the Pap smear test from a healthcare provider, indicating a significant level of awareness about this screening method. Among the respondents (n=537), 36.5% (196 out of 537)

indicated that they or their wives have had a Pap smear test at some point. Among those who have had a Pap smear test (n=196), the frequency varied. Approximately 24.0% reported having it every year, 33.7% every 2-3 years, and 33.2% only once. Among those who had not had a Pap smear test (n=341), reasons for not taking the test include fear of the procedure (50.4%), the cost of the test (40.5%), lack of information about the test (39.3%), the absence of symptoms or health issues (76%), and religious/cultural reasons (41.6%). Among those who had a Pap smear test (n=196), 38.3% (75 out of 196) received results that required further follow-up or treatment, highlighting the importance of regular screenings.

A significant majority (71.7%) of the respondents would recommend the Pap smear test to other women, indicating a positive view of the screening method. When asked whether regular cervical cancer screening should be a part of routine health checks for women, 39.3% agreed with the idea, while 60.7% did not. The participants were also asked if they had received any informational materials about the pap smear test before, 211 out of the 537 surveyed participants (39.3%) reported that they had received informational materials about the Pap smear test, while 326 (60.7%) indicated that they have not received such materials.

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Table 4.7: Cervical Cancer Screening Practices Among Participants

Variable	Frequencies	Percent (%)

Have you ever heard about the Pap smear test from a healthcare provider (n=537)		
Yes	360	67
No	177	33
Have you/your wife ever had a Pap smear test? (n=537)		
Yes	196	36.5
No	341	63.5
If yes, how often do you/your wife have Pap smear tests? (n=196)		
Every year	47	24.0
Every 2-3 years	66	33.7
Only once	65	33.2
I don't know	18	9.2
If no, what are the main reasons you/your wife have not had a Pap smear test? "Fear of the procedure" (n=341)		
Yes	172	50.4
No	169	49.6

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"The cost of the test" (n=347)		
Yes	138	40.5
No	203	59.5
"Lack of information about the test" (n=341)		
Yes	134	39.3
No	207	60.7
"No symptoms or health issues" (n=341)		
Yes	259	76
No	82	24
"Religious/Cultural reasons" (n=341)		
Yes	142	41.6
No	199	58.4
Have you/your wife received any results from a Pap smear test that required further follow-up or treatment? (n=196)		
Yes	75	38.3
No	121	61.7

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Would you recommend the Pap smear test to other women? (n=537)		
Yes	385	71.7
No	152	28.3
Do you believe regular cervical cancer screening should be a part of routine health checks for women?		
Yes	211	39.3
No	326	60.7
Have you received any informational materials about the Pap smear test?		
Yes	211	39.3
No	326	60.7

Source: Field Survey, 2023

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Factors Associated with Cervical Cancer Screening Practices

Table 4.7.1 shows a number of factors influencing the participant's cervical cancer screening practices. Following adjustment of the twelve significant associated variables in the logistic regression analysis (a significance value < 0.05), all the risk factors made a statistically

significant contribution to the cervical cancer screening practices, which are:age range (p=0.007), marital status (p=0.00, 0.276), educational level (p=0.00), employment status (p = 0.00,0.0120), monthly income (p= 0.009, 0.008, 0.009, 0.009), Place of residence (p= 0.033), Number of daughters (p=0.002), Age range of daughters under 9 (p=0.010), 9-14 (0.006), 15-20 (0.014), and 21 and above (p= 0.028, 0.036). The tables also show participants within the age range of 30 to 49 were significantly more likely to practice cervical cancer screening compared to those with younger age range with a AOR of 6.120(95% CI: 1.637, 22.872). Also, the odds of married and not married participant to practice cervical cancer screening is 0.090 and 0.576 times more likely than those that were single, with COR of 0.090(95% CI: 0.038,0.212) and COR of 0.576(95% CI: 0.214,1.553) respectively. The table shows that participants with a bachelor's degree and master's degree or higher were significantly more likely to practice cervical cancer screening than those with secondary education, with a COR of 0.306 (95% CI: 0.166, 0.562) and 0.077 (95% CI: 0.031,0.195). The Odds of practicing cervical cancer screening among those who were unemployed and retired is 5.904 and 3.582 times more likely than those employed full time, this means that participants that were unemployed (COR of 5.904{95% CI: 3.343,10.424}) and retired (COR of 3.582 {0.717,17.893}) were significantly more likely to practice cervical cancer screening compared to those that were employed. The table also shows that participant's monthly income also contributes to having good knowledge of cervical cancer prevention with table showing that those earning 20,000, - 50,000 naira, 51,000 – 80,000, 81,000 – 110,000 naira, and more than 110,000 are 0.312, 0.157, 0.242 and 0.171 times more likely to practice cervical cancer screening respectively. Also, place of resisence is significantly associated to the practice of cervical screening. Using the COR of 0.103 (95% CI: 0.025,0.429), number of daughters, is significantly associated with practicing cervical cancer screening, showing that those who have

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one child are 0.103 times more likely to practice cervical cancer screening compared to those who have none. Age range of their daughters is also a contributing factor to having good knowledge.

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Table 4.7.1: Factors Associated with Cervical Cancer Screening Practices

Variable	**COR (95%CI)**	**P-Value**	**AOR (95%CI)**	**P-Value**
Age Range				
20 -29	Ref		Ref	
30-49	0.501(0.246,1.018)	0.501	6.120(1.637,22.872)	0.007*
50 and above	0.242(0.102,0.574)	0.242	1.147(0.166,7.937)	0.890
Marital Status				
Single	Ref		Ref	
Married	0.090(0.038,0.212)	0.000*	0.003(0.000,0.046)	0.000*
Previously Married	0.576(0.214,1.553)	0.276*	0.112(0.015,0.845)	0.034*

Educational Level				
Secondary education	Ref		Ref	
Bachelor's degree	0.306(0.166,0.562)	0.000*	0.494(0.234,1.041)	0.064
Master's degree or higher	0.077(0.031,0.195)	0.000*	0.176(0.054,0.577)	0.004*
Employment Status				
Employed full time	Ref		Ref	
Unemployed	5.904(3.343,10.424)	0.000*	1.948(0.857,4.425)	0.111
Retired	3.582(0.717,17.893)	0.120*	42.579(1.507,1203.081)	0.028*
Monthly Income (Naira)				
< 20000	Ref		Ref	
20000 - 50000	0.312(0.130,0.745)	0.009*	0.535(0.202,1.416)	0.208
51000 - 80000	0.157(0.040,0.620)	0.008*	0.541(0.112,2.625)	0.446
81000 - 110000	0.242(0.084,0.696)	0.009*	0.536(0.138,2.081)	0.368
>110000	0.171(0.070,0.417	0.000*	0.752(0.233,2.427)	0.634
Prefer not to say	0.560(0.247,1.267)	0.164	1.203(0.466,3.107)	0.702
Where do you live				
Rural area	0.517(0.283,0.947	0.033*	0.796(0.368,1.722)	1
Urban area	0.999(0.000,0.000)	1	0.999(0.000,0.000)	0.000*
Number of Daughters				

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None	Ref		Ref	
One	0.103(0.025,0.429)	0.002	.751(0.020,28.954)	0.878
Two	0.608(0.264,1.400)	0.243	2.780(0.042,183.179)	0.632
Three	1.267(0.492,3.259)	0.624	26.798(0.517,1388.980)	0.103
Age range of Daughters				
Under 9				
Yes	0.150(0.036,0.630)	0.010*	Ref	
No	0.582(0.308,1.100)	0.095	0.015(0.000,1.192)	0.060
9-14				
Yes	0.604(0.313,1.168)	0.134	Ref	
No	0.190(0.058,0.622)	0.006*	13.657(0.670,278.502)	0.089
15-20				
Yes	0.515(0.254,1.045)	0.066	Ref	
No	0.308(0.120,0.792)	0.014*	0.437(0.029,6.628)	0.550
21 and above				
Yes	0.346(0.134,0.894)	0.028*	Ref	
No	0.472(0.233,0.953)	0.036*	4.0450.367,44.541)	0.254

Source: Field Survey, 2023

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Objective Four: To assess the intention to vaccinate and willingness to vaccinate among women living in Ibadan, Oyo state

Table 4.8 shows that 87.3% of the participants expressed their intention to vaccinate their daughters against HPV if given the opportunity, while 12.7% did not intend to do so. Nearly half, 48%, reported that they have already made plans for their daughters to receive the HPV vaccine, while 52% have not made such plans. The majority of the participants, 89.6%, would recommend other parents to vaccinate their daughters against HPV, indicating their belief in the importance of the vaccine. A substantial majority, 90.1%, consider it their responsibility as parents to have their daughters vaccinated against HPV, highlighting their commitment to their daughters' health. 72.1% indicated that their religious or cultural beliefs do not prevent them from vaccinating their daughters against HPV, while 27.9% indicated otherwise. A significant majority, 80.4%, would allow their daughters to receive the HPV vaccine if it were offered at school, indicating a favorable attitude toward school-based vaccination programs. A majority, 77.1%, would feel more comfortable vaccinating their daughters against HPV if they knew other parents who had done so, suggesting the potential impact of social networks on vaccination decisions. 89% of respondents stated that they are more likely to vaccinate their daughters against HPV if their doctor recommends the vaccine, highlighting the influence of healthcare professionals on vaccination decisions.

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Table 4.8: Participants Intention to Vaccinate

Variable	Frequencies	Percent (%)

If given the opportunity, I intend to vaccinate my daughter against HPV (n=537)		
Yes	469	87.3
No	68	12.7
I have already made plans for my daughter to receive the HPV vaccine. (n=537)		
Yes	258	48
No	279	52
I would recommend other parents to vaccinate their daughters against HPV (n=537)		
Yes	481	89.6
No	56	10.4
It is my responsibility as a parent to have my daughter vaccinated against HPV (n=537)		
Yes	484	90.1
No	53	9.9

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My religious/cultural beliefs do not prevent me from vaccinating my daughter against HPV. (n=537)		
Yes	387	72.1
No	150	27.9
If my daughter's school offered the HPV vaccine, I would allow her to get it. (n=537)		
Yes	432	80.4
No	105	19.6
I would feel more comfortable vaccinating my daughter against HPV if I knew other parents who had done so. (n=537)		
Yes	414	77.1
No	123	22.9
I am more likely to vaccinate my daughter against HPV if her doctor recommends the vaccine (n=537)		

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Yes	478	89
No	59	11

Source: Field Survey, 2023

Intention to Vaccinate

Fig 4.5 shows the intention to get vaccinated by the participants, it was assessed that 86% of the respondents had high intention to get vaccinated.

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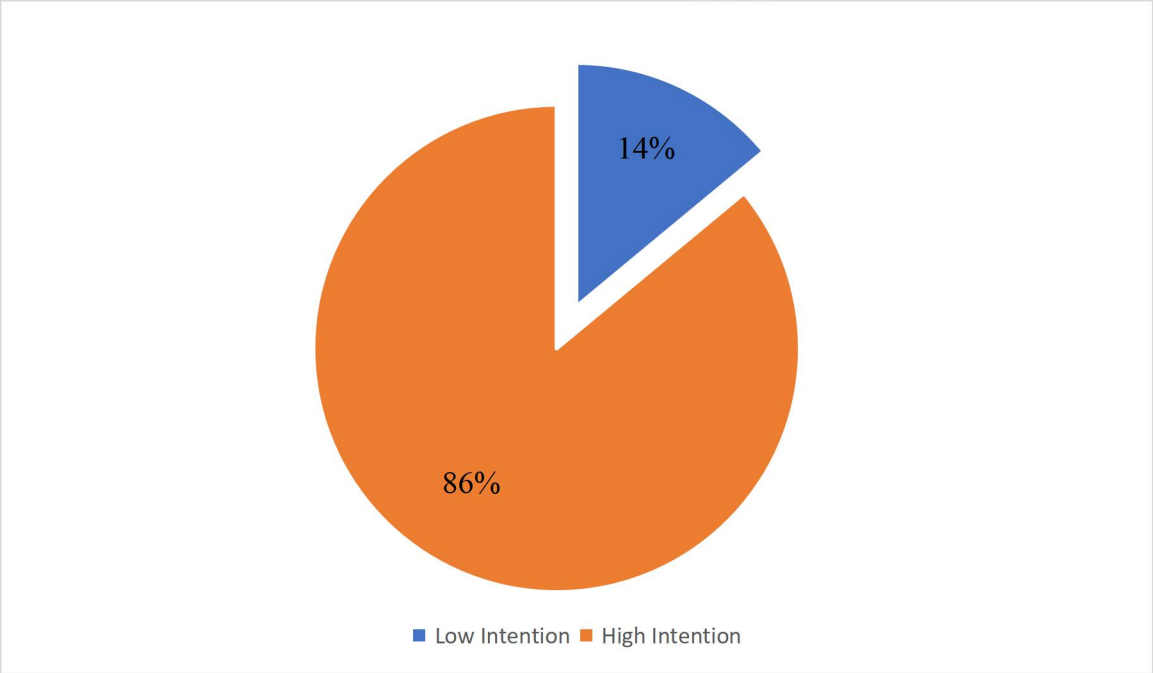

Figure 4.5: the intention to vaccinate

Source: Field Survey, 2023

Factors Associated with Intention to Vaccinate

Table 4.8.1 shows a number of factors influencing the participant's intention to vaccinate. Following adjustment of the twelve significant associated variables in the logistic regression analysis (a significance value < 0.05), only six risk factors made a statistically significant contribution to the intention to vaccinate, which are: age range (p=0.045, 0.043), educational level (p=0.001,0.00), employment status (p = 0.002), age range of daughters under 15-20 (p=0.038). The tables show participants within the age range of 30-49 and 50-60 and above have significant intention to vaccinate compared to those with younger age range with a AOR of 2.980(95% CI: 1.022, 8.685) and AOR of 3.352(95% CI: 1.038, 10.826). The table shows that participants with a bachelor's degree and master's degree or higher have significant intention to vaccinate than those with secondary education, with a COR of 0.333 (95% CI: 0.177, 0.627) and 0.157 (95% CI: 0.069,0.358). The Odds of having an intention to vaccinate among those who were unemployed is 2.199 more likely than those employed full time, this means that participants that were unemployed (COR of 2.199{95% CI: 1.332,3.629}) have significant intention to vaccinate compared to those that were employed. Also, place of residence is significantly associated to intention to vaccinate .Age range of their daughters is also a contributing factor to having good knowledge.

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Table 4.8.1: Factors Associated with Intention to Vaccinate

Variable	**COR (95%CI)**	**P-Value**	**AOR (95%CI)**	**P-Value**
Age Range				
20 -29	Ref		Ref	
30-49	0.945(0.489,1.826)	0.865	2.980(1.022,8.685)	0.045*
50 and above	0.855(0.452,1.616)	0.629	3.352(1.038,10.826)	0.043*
Marital Status				
Single	Ref		Ref	
Married	0.542(0.314,0.936)	.028*	0.484(0.166,1.415)	0.185
Previously Married	1.389(0.569,3.390)	.471	1.327(0.436,4.037)	0.619
Educational Level				
Secondary education	Ref		Ref	
Bachelor's degree	0.333(0.177,0.627)	0.001*	0.414(0.196,0.876)	0.021*
Master's degree or higher	0.157(0.069,0.358)	0.000*	0.145(0.052,0.402)	0.000*
Employment Status				

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Employed full time	Ref		Ref	
Unemployed	2.199(1.332,3.629)	0.002*	1.817(0.842,3.922)	0128
Retired	2.008(0.414,9.742)	0.387	1.956(0.252,15.166)	0.521
Monthly Income (Naira)				
< 20000	Ref		Ref	
20000 - 50000	0.542(.172,1.711)	0.296	.629(0.188,2.101	0.451
51000 - 80000	0.998(0.000,0.000)	1	.998(0.000,0.000)	1
81000 - 110000	0.644(0.181,2.294)	0.498	1.067(0.258,4.421)	0.928
>110000	0.994(0.350,2.822)	0.991	2.830(0.839,9.545)	0.094
Prefer not to say	2.017(0.720,5.655)	0.182	2.786(0.926,8.383)	0.068
Where do you live				
Rural area	0.520(0.280,0.966)	0.038*	0.766(0.380,1.547)	0.458
Urban area	0.999(0.000,0.000)	1	0.999(0.000,0.000)	`1
Number of Daughters				
None	Ref		Ref	
One	0.601(0.285,1.265)	0.180	0.380(0.041,3.531)	0.395
Two	0.609(0.250,1.483)	0.275	0.162(0.013,1.998)	0.156
Three	0.918(0.306,2.752)	0.878	0.280(0.017,4.726)	0.377
Age range of Daughters				

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Under 9				
Yes	0.471(0.181,1.226)	0.123	Ref	
No	0.754(0.403,1.410)	0.376	1.811(0.273,12.032)	
9-14				
Yes	0.719(0.370,1.399)	0.332	Ref	
No	0.560(0.244,1.281)	0.169	0.996(0.214,4.640)	0.996
15-20				
Yes	0.901(0.479,1.695)	0.746	Ref	
No	0.366(0.142,0.946)	0.038*	3.004(0.474,19.045)	0.243
21 and above				
Yes	.412(0.159,1.068)	0.068	Ref	0.817
No	.821(0.437,1.540)	0.538	0.820(0.154,4.374)	

Source: Field Survey, 2023

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Participant's Willingness to Pay for Vaccination

In table 4.9, 41% of participants believe that the HPV vaccine is affordable for their families, while 59% do not find it affordable. A majority, 68.3%, would be willing to pay out of pocket for the HPV vaccine for their child if their health insurance does not cover it, indicating a commitment to vaccination. When asked how much they would pay per dose for the HPV

vaccine in Naira, responses varied: 42.1% of the participants indicated they were willing to pay less than 5,000 Naira, 14.3% of them indicated they would pay between 5,000-10,000 Naira, 4.7% of them indicated they would pay between 10,000-15,000 Naira, 2.6% of them indicated they would pay between 15,000-20,000 Naira, 14.3% of them indicated they would pay between 5,000-10,000 Naira, 35.4% of them indicated they would pay more than 20,000 Naira, and 0.9% were not sure of the amount they would pay for the vaccination. A majority, 73.7%, would be willing to participate in a payment plan to cover the cost of the HPV vaccine for their child, showing their commitment to ensuring vaccination.

A significant majority, 81.8%, would like financial assistance programs if they cannot pay for the HPV vaccine, indicating a need for support to ensure vaccination. 84.4% of participants would be more likely to vaccinate their child against HPV if the vaccine were free of cost, underlining the importance of affordability in vaccination decisions. 82.9% believe that the government should cover the cost of the HPV vaccine, highlighting the role of public healthcare programs in ensuring access to vaccines.

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Table 4.9: Participant's Willingness to Pay for Vaccination

Variables	Frequencies	Percent (%)
Do you think the HPV vaccine is affordable for your family? (n=537)		
Yes	220	41
No	317	59

Would you be willing to pay out of pocket for the HPV vaccine for your child if your health insurance does not cover it? (n=537)		
Yes	367	68.3
No	170	31.7
How much will you pay for the HPV vaccine per dose (in Naira)?		
<5000	226	42.1
5000-10000	77	14.3
10000-15000	25	4.7
15000-20000	14	2.6
>20000	190	35.4
Not sure	5	0.9
Would you be willing to participate in a payment plan to cover the cost of the HPV vaccine for your child? (n=537)		
Yes	396	73.7
No	141	26.3
If you cannot pay for the HPV vaccine, would you like financial assistance programs? (n=537)		
Yes	439	81.8
No	98	18.2

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Would you be more likely to vaccinate your child against HPV if the vaccine were free of cost? (n=537)		
Yes	453	84.4
No	84	15.6
Do you believe the government should cover the cost of the HPV vaccine? (n=537)		
Yes	445	82.9
No	92	17.1

Source: Field Survey, 2023

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Factors Associated with Willingness to Pay for Vaccination

Table 4.9.1 shows a number of factors influencing the participant's willingness to pay for vaccination. Following adjustment of the twelve significant associated variables in the logistic regression analysis (a significance value < 0.05), only seven risk factors made a statistically significant contribution to willingness to pay for vaccination of the participants, which are: age range (p=0.012), marital status (p=0.010), educational level (p=0.001,0.00), employment status (p = 0.00), monthly income (p = 0.046, 0.054), age range of daughters under 9 (p=0.015), and 15-20 (0.054, 0.005). The tables show participants within the age range of 50 to 60 and above were significantly more likely pay for vaccination compared to those with younger age range with a COR of 0.514(95% CI: 0.305, 0.865). Also, the odds of married participant to pay for vaccination is 0.599 times more likely than those that were single, with COR of 0.599(95% CI: 0.405,0.886). The table shows that participants with a bachelor's degree and master's degree or higher were significantly more likely to pay for vaccination than those with secondary education, with a COR of 0.393 (95% CI: 0.222, 0.695) and 0.324 (95% CI: 0.172,0.611). The Odds of paying for vaccination among those who were unemployed is 2.178 times more likely than those employed full time, this means that participants that were unemployed (COR of 2.178{95% CI: 1.500,3.162}) were significantly more likely to pay for vaccination compared to those that were employed. The table also shows that participant's monthly income also contributes to willingness to pay for vaccination with table showing that those earning 51,000 – 80,000 and those who

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prefer not to say are 0.0.230 and 2.356 times more likely to pay for vaccination respectively. Age range of their daughters is also a contributing factor to having good knowledge.

Table 4.9.1: **Factors Associated with Willingness to Pay for Vaccination**

Variable	**COR (95%CI)**	**P-Value**	**AOR (95%CI)**	**P-Value**
Age Range				
20 -29	Ref		Ref	
30-49	1.291(0.802,2.079)	0.292	1.892(0.836,4.281)	0.126
50 and above	0.514(0.305,0.865)	0.012*	0.768(0.299,1.971)	0.583
Marital Status				
Single	Ref		Ref	
Married	0.599(0.405,0.886)	0.010*	0.513(0.228,1.153)	0.106
Previously **Married**	1.237(0.587,2.605)	0.576	1.156(0.463,2.885)	0.757
Educational Level				
Secondary education	Ref		Ref	
Bachelor's degree	0.393(0.222,0.695)	0.001*	0.744(0.391,1.417)	0.369
Master's degree or higher	0.324(0.172,0.611)	0.000*	0.846(0.393,1.820)	0.668
Employment Status				

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Employed full time	Ref		Ref	
Unemployed	2.178(1.500,3.162)	0.000*	1.781(1.023,3.097)	0.041*
Retired	0.689(0.145,3.262)	0.638	0.389(0.046,3.262)	0.384
Monthly Income (Naira)				
< 20000	Ref		Ref	
20000 - 50000	1.611(0.706,3.678)	0.257	1.634(0.687,3.885)	0.266
51000 - 80000	0.282(0.079,1.007)	0.051	.230(0.054,0.977)	0.046*
81000 - 110000	0.949(0.375,2.398)	0.912	1.482(0.526,4.1760	0.457
>110000	0.651(0.285,1.489)	0.309	.832(0.317,2.181)	0.708
Prefer not to say	2.042(0.901,4.626)	0.087	2.356(0.986,5.632)	0.054*
Where do you live				
Rural area	0.719(0.428,1.207)	0.211	1.128(0.635,2.004)	0.681
Urban area	1.630(.098,27.147)	0.734	3.655(0.152,88.137)	0.425
Number of Daughters				
None	Ref		Ref	
One	0.838(0.502,1.399)	0.499	0.785(0.189,3.266)	0.740
Two	1.198(0.672,2.138)	0.540	1.408(0.271,7.314)	0.684
Three	0.739(0.304,1.796)	0.504	0.466(0.068,3.179)	0.435
Age range of Daughters				

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Under 9				
Yes	0.414(0.203,0.844)	0.015*	Ref	
No	1.316(0.848,2.042)	0.222	0.616(0.175,2.163)	0.449
9-14				
Yes	1.088(0.681,1.738)	0.726	Ref	
No	0.743(0.421,1.310)	0.304	0.773(0.261,2.295)	0.643
15-20				
Yes	1.574(0.993,2.494)	0.054*	Ref	
No	0.390(0.203,0.749)	0.005*	5.663(1.802,17.795)	0.003*
21 and above				
Yes	0.637(0.349,1.162)	0.142	Ref	
No	1.166(0.738,1.843)	0.511	1.365(0.461,4.041)	0.574

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4.3 Discussion of Findings

The study surveyed 537 participants, with majority of them being singles, with a high percentage holding bachelor's, master's, or doctorate degrees. The majority were employed full-time and most lived in urban areas (86.8%), with a smaller percentage in rural areas. The majority of participants had no daughters, with a diverse distribution of daughters aged 9-14, 15-20, and 21 years and above.

The study reveals that most of the respondents had heard of cervical cancer, with 45.8% identifying early signs and symptoms. 52% believed it was caused by a virus, while 48% did not. 62% could list risk factors associated with cervical cancer. Over half had received information from healthcare providers. 84.7% were aware that early detection increases treatment chances, while 15.3% were not. This finding is higher than that of a study done in Cameroon, where they indicated that only 58.7% of the participants had heard of cervical cancer in the past[1]. This finding is also slightly higher than a study carried out in South India, where less than 25% knew of symptoms, risk factors, or preventative measures for cervical cancer[2]. This study also revealed that 81% of respondents had good knowledge about cervical cancer. This is slightly higher compared to the Cameroon study that shows that Fifty eight percent (58%) of the participants had good knowledge of cervical cancer [1].

The study found that 77.3% of respondents believed regular Pap tests can detect cervical cancer in its early stages, while 22.7% were unaware. This finding aligns with a study done in Saudi Arabia, which shows that most respondents believed that Pap smear is a useful tool for early

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detection of cervical cancer[3]. A significant portion of respondents knew about the vaccine for cervical cancer prevention, while 57.4% acknowledged the use of condoms during sexual intercourse. Smoking and having multiple sexual partners also increased the risk of cervical cancer. A majority of respondents knew that certain types of HPV are high risk for developing cervical cancer. However, 71% had good knowledge about cervical cancer prevention. This is in contrast of a study done in Addis Ababa where the study found that the level of knowledge about cervical cancer screening was 27%[4].

The study found that a majority of respondents (70.6%) believed the HPV vaccine can prevent cervical cancer, while 29.4% were unaware. Most respondents were aware of the recommended age for girls to receive the vaccine, but 38.4% were not. Most respondents were aware of potential side effects and the number of doses required for effective use. Most respondents were aware that boys can also receive the vaccine. However, a minority (30.5%) believed the vaccine could protect against other cancers. Most respondents were unaware of the requirement for a booster shot. However, 90.7% of the respondents had poor knowledge about HPV vaccines. This is similar to a systematic review done where one of the reviewed studies stated that 62% of parents had poor knowledge regarding HPV and HPV vaccines[5]. However, 68% of the participants had good knowledge of the HPV vaccine. This finding is similar to a study done in Indonesia where 52% of the participants revealed excellent knowledge regarding HPV vaccination[6]. This finding is in contrast to a study that indicate significant lack of knowledge related to HPV, cervical cancer, and the HPV vaccine among the participants[20].

The study reveals that 58.3% of respondents believe the HPV vaccine is safe for daughters, with a majority trusting healthcare professionals' advice. This aligns with a study that shows that

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almost half (47%) of the participants stated that their daughters had been vaccinated because they believed that the HPV vaccine was safe and the main reason that drove their decision to have their daughters vaccinated was physician recommendation (50.8%)[7]. A significant proportion believe vaccination will not encourage promiscuity. However, 52.5% express concerns about potential side effects. The majority (83.1%) believe the benefits outweigh the risks, while 58.8% express concerns about long-term effects. A minority prefers school vaccination, while a majority (83.8%) believe there is a societal responsibility to protect others. This aligns with a study that stated participants who had not had their daughters vaccinated up to the time of the survey, the most common reasons were that they did not have enough information available to decide (40.5%) and that their daughters were too young to be vaccinated against HPV (35.4%). Some of the participants (20.7%) stated that they did not believe that the vaccine is safe as a reason for not vaccinating their daughters, 68.2% of those who had not vaccinated their daughters declared that they plan to do it in the future[7]. However, 88% of the participants had positive attitude towards the HPV vaccine. This finding is similar to a study done in Ethiopia where 77.4% of the participants had positive attitudes towards the HPV vaccine[8].

The study found that 63.5% of respondents have heard about the HPV vaccine from a healthcare provider, with only 13.9% of daughters receiving it. This aligns with a study that shows that 98.8% of the participants knew that there is a vaccine against HPV, with healthcare professionals being the most common source of information regarding the vaccine (88.7%)[5]. The main reasons for not getting the vaccine were side effects, cost, belief in their daughters being too young, and religious/cultural reasons. This aligns with a study that stated participants who had not had their daughters vaccinated up to the time of the survey, the most common reasons were that they did not have enough information available to decide (40.5%) and that their daughters were too young

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to be vaccinated against HPV (35.4%)[5]. A majority would allow their daughters to receive the vaccine if available at school, and 78.4% would recommend it to other parents. 53.8% believe the vaccine should be mandatory in schools, and 38.5% received informational materials about it. This is similar to a study that shows that the main source for mothers to gain knowledge about the HPV vaccine was the information sheet, written in English, which was sent from the schools through the students. Some parents reported that they did not receive the information sheet from schools, as some students forgot to give this to their parents[11].

The study found that 67% of respondents had heard about the Pap smear test from a healthcare provider, and 36.5% had had it at some point. This finding is higher than that of a study that stated that 29.8% of respondents have heard about Pap smear while only 5% (n=20) of them had gone through this screening test[9]. Frequency varied, with 24.0% having it every year, 33.7% every 2-3 years, and 33.2% only once. Reasons for not taking the test included fear, cost, lack of information, absence of symptoms, and religious/cultural reasons. This is similar to a study where the majority responded that neither they have proper information about the test nor they have heard about it, hence signifying an extreme lack of awareness in society[9]. 38.3% of those who had a test received results requiring further follow-up or treatment. A majority would recommend the test to other women. These findings are also similar to a study done in Nigeria where the majority of the respondents 95.5% stated that knowledge about Pap smear could be obtained through Health workers. The majority of the respondents 86% have submitted themselves for Pap smear test before, all the respondents who submitted themselves for Pap smear test never did a follow-up test[10].

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The study reveals that 87.3% of participants plan to vaccinate their daughters against HPV, with 48% already planning. 89.6% would recommend other parents, and 90.1% consider it their responsibility. This is similar to a study that stated that participants who had not vaccinated their daughters declared that they plan to do it in the future[5]. Religious or cultural beliefs don't affect vaccination decisions. 80.4% would allow their daughters to receive the vaccine at school, and 77.1% would feel more comfortable knowing other parents who have done so. This is in contrast to a study it was found that religious beliefs played an integral role in these parents' attitudes towards HPV vaccination uptake for their adolescents and were at times a barrier against approving HPV vaccination[11]. Healthcare professionals also influence vaccination decisions, with 89% of respondents agreeing. This is similar to a study that shows the HCW have remained a major influence for parents to allow their adolescents to have the HPV vaccine. The HCW also have this influence outside the clinic in their various social groups and they can leverage on their influence to recommend the vaccine as well[12].

The study shows that close to half of participants believe the HPV vaccine is affordable, while 59% find it unaffordable. Majority would pay out of pocket for their child if health insurance doesn't cover it. The majority, would participate in a payment plan to cover the cost. Most would like financial assistance programs if they cannot afford the vaccine. 84.4% would be more likely to vaccinate their child if the vaccine were free, emphasizing affordability. 82.9% believe the government should cover the vaccine cost. This is similar to a study that showed that respondents agreed that they would have screening done if it was free and caused no harm [3]. It also aligns with a study that states that most parents said they would accept the HPV vaccine for their daughters if it was free[7]. This finding is similar to a study that indicates that participants were

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willing to pay a meaningful amount of USD 7.46 ± USD 9.17 (NGN 3221.15 ± NGN 3963.95), which was significantly lower than the market cost[20].

The study discovered that gender, educational level, employment status, monthly income, place of residence, number of daughters, and the age range of the daughters are important factors that influence knowledge of cervical cancer. This study is in line with a study done in Ethiopia, where it shows that knowledge about cervical cancer was positively associated with better educational level and income. Women with primary education (Adjusted Odds Ratio (AOR): 3.4; 95% CI: 2.2–5.1) and those who had secondary and above education (AOR: 8.7; 95% CI: 5.5–13.7) were more likely to have sufficient knowledge about cervical cancer compared to those who had no formal education. Furthermore, women earning an average household monthly income above 1500 Ethiopian birr (ETB) (~75 U.S. dollars) were more likely to have sufficient knowledge (AOR: 2.3; 95% CI: 1.3–3.9) than women with an average household monthly income less than 500 ETB (~25 U.S. dollars) [13].

The study discovered that gender, age range, marital status, educational level, employment status, monthly income, place of residence, number of daughters, and the age range of the daughters are important factors that influence knowledge of cervical cancer prevention and HPV vaccine. This is in line with a study done in Russia, which shows that the level of knowledge about HPV and CC prevention was associated with education, parity, age of initiating of intercourse, and sources of information. After adjustment, women with university education were more likely to have higher knowledge about HPV and CC prevention compared to those with lower education[14].

The study discovered that educational level, employment status, and the age range of the daughters are important factors that influence attitudes to HPV vaccination. This is slightly

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similar to a study done in Kazakhstani, which shows that education, place of residence, level of income, and number of children were the factors that were found to be significantly associated with the level of attitude towards HPV vaccination practice. Women with high-income levels had the highest proportion of positive attitudes toward the HPV vaccine (62%). On the other hand, among women with high-school-level education and those who did not finish high school, 62% were neutral towards HPV vaccination. Thus, the level of education directly correlates with positive attitudes toward the HPV vaccine practices[15].

The study discovered that gender, age range, marital status, educational level, employment status, monthly income, place of residence, number of daughters, and the age range of the daughters are important factors that influence cervical cancer screening practices. This is similar to a study done in Ibadan, where factors influencing cervical cancer screening include educational level and income level[16]. The findings is also similar to a study which shows that lower level of education was associated with a decreased likelihood of cervical cancer screening practices while other factors include income, age, and cost, also state that several studies reported that the lower the income, the less likely a women would obtain a Pap smear test[17].

The study discovered that educational level, employment status, place of residence, and the age range of the daughters are important factors that influence the intention to vaccinate. This is slightly similar to a study done in Nigeria, which show that education has an influence on intention to vaccinate[18]. The findings are also similar to a study which state that mothers and parents who were employed were willing to vaccinate their child for HPV, essentially stating that employment status influences intention to vaccinate[19].

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The study discovered that age range, marital status, educational level, employment status, monthly incom, and the age range of the daughters are important factors that influence willingness to pay for vaccine. This finding is consistent with a study that shows that education level and income are associated with the willingness to pay for the HPV vaccine, and also that participants who had attended tertiary education were more willing to pay for the vaccine than those who had not. This study suggests that higher education levels may contribute to determining an individual's willingness to pay for the HPV vaccine[20].

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Conclusion

5.1. Summary of Findings

The study surveyed 537 participants, with a majority falling in the 20-29 age group. The sample was relatively well-educated, with a significant portion holding a bachelor's degree. A majority of participants were employed full-time, and a substantial number were students. The majority of participants resided in urban areas. The study found that a high percentage of participants had heard of cervical cancer before, but a significant portion were not well-informed about the early signs and symptoms. While a majority correctly believed that cervical cancer is caused by a virus, a substantial number did not have this knowledge. A significant portion of participants had received information about cervical cancer from healthcare providers, but a notable number were not aware of preventive measures.

The knowledge about cervical cancer and its prevention was generally poor among the participants, with a majority lacking awareness about various aspects such as the use of condoms to lower the risk of HPV infection, the link between smoking and cervical cancer, and the recommended age for girls to receive the HPV vaccine. The study also revealed that a significant number of participants had concerns about the safety and potential side effects of the HPV vaccine. However, a majority trusted the advice of healthcare professionals and believed that the benefits of HPV vaccination outweighed the potential risks. The vaccination rate among participants' daughters was relatively low, with only a small percentage indicating that their daughters had received the HPV vaccine. Concerns about side effects, cost, young age, and religious/cultural reasons were cited as the main reasons for not vaccinating their daughters.

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The study surveyed 537 participants and found that a majority of respondents had a favorable opinion of the HPV vaccine. 68.3% would allow their daughters to receive the vaccine if it were available at their school, and 78.4% would recommend it to other parents. However, opinions were divided on whether the vaccine should be mandatory in schools, with 53.8% in favor and 46.2% opposed. The study also revealed that there is room for increased educational outreach, as only 38.5% of respondents reported receiving informational materials about the vaccine.

Regarding cervical cancer screenings, the study found that a significant level of awareness exists about the Pap smear test, with 67% of respondents hearing about it from a healthcare provider. However, only 36.5% of respondents or their wives had actually undergone the test. Reasons for not taking the test included fear of the procedure, cost, lack of information, absence of symptoms, and religious/cultural reasons. Among those who had the test, 38.3% received results that required further follow-up or treatment. The study also explored factors influencing vaccination decisions. It found that respondents were more likely to vaccinate their daughters against HPV if their doctor recommended it if they knew other parents who had vaccinated their daughters, and if the vaccine was affordable or covered by the government. The majority of respondents expressed a willingness to pay for the vaccine and participate in a payment plan if necessary. However, 84.4% stated that they would be more likely to vaccinate their child if the vaccine were free of cost.

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5.2 Conclusion

In conclusion, this study provides valuable insights into the knowledge, attitudes, and intentions of women in Oyo state regarding cervical cancer, HPV vaccination, and Pap smear testing. The

findings indicate that while there is a relatively high level of awareness about cervical cancer, there are gaps in knowledge, particularly concerning preventive measures and the HPV vaccine. Despite these gaps, there is a generally positive attitude toward HPV vaccination, with a significant proportion of parents expressing their intention to vaccinate their daughters.

The study highlights the importance of healthcare professionals in educating women about cervical cancer and the HPV vaccine, as well as the need for accessible and affordable vaccination programs. Concerns about vaccine safety, affordability, and the influence of social networks should be addressed to increase vaccination rates. Additionally, efforts to dispel misconceptions and improve awareness of the benefits of regular Pap smear testing are essential to promote early detection and prevention of cervical cancer.

Overall, this research underscores the significance of comprehensive public health campaigns, healthcare provider education, and policy initiatives to enhance cervical cancer prevention and vaccination efforts in Oyo State. Addressing these issues can contribute to reducing the burden of cervical cancer and improving the health outcomes of Nigerian women.

5.3 Recommendations

Based on the findings of the study, the following recommendations were made:

1. Community Outreach: Implement community-based awareness programs to reach individuals in urban and rural areas. Use local leaders and influencers to convey the message effectively.

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2. Healthcare Provider Training: Provide training for healthcare professionals to improve their knowledge of cervical cancer and HPV. Encourage them to actively discuss vaccination and screening options with patients and provide accurate information.

3. Promote Physician Recommendations: Encourage healthcare providers to recommend the HPV vaccine to eligible patients during routine check-ups. Ensure that they are well-informed about the vaccine's safety and efficacy.

4. Peer Influence: Leverage peer networks and support groups to promote vaccination. Encourage parents who have vaccinated their children to share their positive experiences with others.

5. Regular Screening: Promote regular cervical cancer screening, such as Pap tests, by emphasizing its role in early detection and prevention. Encourage women of eligible age to undergo screenings and address their concerns.

5.4 Contribution to Knowledge

This study's key contributions to knowledge include shedding light on the demographic and sociodemographic characteristics of participants, identifying significant knowledge gaps and misconceptions about cervical cancer and the HPV vaccine, revealing barriers to vaccination, gauging parental attitudes towards the vaccine and preferences for mandatory vaccination in schools, highlighting the need for enhanced educational outreach, understanding factors influencing vaccination decisions, and the preference for free vaccination. These findings offer valuable

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insights for tailoring public health interventions, designing targeted education programs, and informing policy decisions aimed at increasing awareness, vaccination rates, and screening participation in the context of cervical cancer prevention.

5.5 Suggestions for Further Studies

Longitudinal Follow-Up Study: Conduct a longitudinal study to track the knowledge, attitudes, and behaviors of the same participants over an extended period to assess changes in awareness, vaccine uptake, and screening participation over time. This would provide insights into the effectiveness of ongoing awareness campaigns and interventions.

In-Depth Qualitative Research: Complement the quantitative findings with qualitative research to explore in depth the reasons behind the identified knowledge gaps, misconceptions, and barriers to vaccination and screening. This could involve interviews or focus groups to capture nuanced perspectives and experiences.

Comparative Studies across Regions: Investigate regional variations in knowledge and attitudes about cervical cancer and the HPV vaccine. Comparing data from different geographic areas can help identify regional disparities and tailor interventions to specific needs.

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Intervention Studies: Implement and evaluate educational interventions or campaigns designed to improve knowledge and promote vaccination and screening. Assess the impact of these interventions on awareness levels, vaccine uptake, and screening rates.

Accessibility and Affordability Studies: Investigate the accessibility and affordability of HPV vaccination and cervical cancer screening services in different regions. Identify barriers related to cost, healthcare infrastructure, and insurance coverage.

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Appendix I

Informed Consent

Cervical Cancer and HPV Vaccine Knowledge, Attitude, and Practices in Nigeria.

Investigator

Oladiran Dada Grace

Public Health Department, LeadCity University

LeadCity University, Toll Gate, Ibadan.

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Research Procedure

If you agree to be in this study, you will be asked to answer questions about yourself, your Cervical Cancer and HPV Vaccine Knowledge, Attitude, and Practices. These questions will be asked using a structured questionnaire. To fill the questionnaire will take about 5 to 10 minutes of your time.

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Risks and Benefits

There are minimum or no risks if you take part in this study. There are also no incentives but the information you provide will help you improve on your health and that of your loved ones.

Compensation

There is no monetary compensation or incentive for this study. Participation is voluntary.

Confidentiality

Like it is stated above, your comments will not be anonymous. Every effort will be made by the researcher to preserve your confidentiality. Only the research team will have access to the answered questionnaires. Confidentiality and privacy will be maintained by keeping all materials under lock and key. Your name will not be recorded.

Contact Information

If you have questions at any time about this study as the result of participating in this study, you may contact

Oladiran Dada Grace

Public Health Department, LeadCity University

LeadCity University, Toll Gate, Ibadan.

+2349033564099

VoluntaryParticipation

Your participation in this study is voluntary. It is up to you to decide whether or not to take part

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in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

Consent

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

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Questionnaire

Cervical Cancer and HPV Vaccine Knowledge, Attitude, and Practices in Nigeria.

Section A: Socio – Demographic Characteristics.

1. What is your gender?

   (a) Male (b) Female (c) Prefer not to say

2. What is your age range?

   (a) Under 20 (b) 20-29 (c) 30-39 (d) 40-49 (e) 50-59 (f) 60 and above

3. What is your marital status?

   (a) Single (b) Married (c) Divorced (d) Widowed (e) Separated (f) In a partnership (g) Prefer not to say

4. What is your highest level of education?

   (a) No formal education (b) Primary education (c) Secondary education (d) Bachelor's degree (e) Master's degree (f) Doctorate or higher

5. What is your employment status?

   (a) Employed full-time (b) Employed part-time (c) Unemployed and looking for work (d) Unemployed and not looking for work (e) Student (f) Retired.

6. What is your approximate monthly household income?

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(a) Under 20,000 NGN (b) 20,000 NGN – 50,000 NGN (c) 50,000 NGN – 80,000 NGN

(d) 80,000 NGN – 110,000 NGN (e) Over 110,000 NGN (f) Prefer not to say

7. Where do you live?

(a) Rural area (b) Urban area (c) Suburban area

8. How many daughters do you have?

(a) None (b) One (c) Two (d) Three (e) Four or more

9. If Q8, option is b-e, what is the age range of your daughter(s)? Select all that apply

Under 9	☐
9-14	☐
15-20	☐
21 and above	☐

Section B: Cervical Cancer Knowledge

1. Have you heard of cervical cancer before?

(a) Yes (b) No (c) Not sure

2. Can you identify any early signs and symptoms of cervical cancer?

(a) Yes (b) No (c) Not sure

3. Is cervical cancer most often caused by a virus?

(a) Yes (b) No (c) Not sure

4. Can you list any risk factors associated with cervical cancer?

(a) Yes (b) No (c) Not sure

5. Have you ever received information about cervical cancer from a healthcare provider?

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(a) Yes (b) No (c) Not sure

6. Are you aware that early detection of cervical cancer increases the chances of successful treatment?

   (a) Yes (b) No (c) Not sure

7. Do you believe that only sexually active women can develop cervical cancer?

   (a) Yes (b) No (c) Not sure

8. Are you aware that cervical cancer can be prevented?

   (a) Yes (b) No (c) Not sure

Section C: Cervical Cancer Prevention Knowledge:

1. Can regular Pap tests detect cervical cancer in its early stages?

   (a) Yes (b) No (c) Not sure

2. Is there a vaccine available to prevent cervical cancer?

   (a) Yes (b) No (c) Not sure

3. Can using condoms during sexual intercourse lower the risk of HPV infection?

   (a) Yes (b) No (c) Not sure

4. Does smoking increase the risk of cervical cancer?

   (a) Yes (b) No (c) Not sure

5. Do you know when girls/women should get their first cervical screening?

   (a) Yes (b) No (c) Not sure

6. Are you aware that multiple sexual partners increase the risk of HPV infection?

   (a) Yes (b) No (c) Not sure

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7. Do you know that certain types of HPV are high-risk for developing cervical cancer?

   (a) Yes (b) No (c) Not sure

8. Are you aware that a healthy immune system can help your body fight off HPV?

   (a) Yes (b) No (c) Not sure

Section D: HPV Vaccine Knowledge

1. Can the HPV vaccine prevent most cases of cervical cancer?

   (a) Yes (b) No (c) Not sure

2. Do you know the recommended age for girls to receive the HPV vaccine?

   (a) Yes (b) No (c) Not sure

3. Are you aware of any potential side effects of the HPV vaccine?

   (a) Yes (b) No (c) Not sure

4. How many doses of the HPV vaccine are required to be effective?

   (a) One (b) Two (C) Three (d) Not sure

5. Can boys also receive the HPV vaccine?

   (a) Yes (b) No (c) Not sure

6. Do you believe the HPV vaccine can protect against other cancers besides cervical cancer?

   (a) Yes (b) No (c) Not sure

7. Are you aware the HPV vaccine is more effective if received before becoming sexually active?

   (a) Yes (b) No (c) Not sure

8. Do you know if the HPV vaccine requires a booster shot?

   (a) Yes (b) No (c) Not sure

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Section E: HPV Vaccination Attitude (rate from 1-5 where 1 is strongly disagree and 5 is strongly agree):

		Yes	No
1.	The HPV vaccine is safe for my daughter.		
2.	I trust the healthcare professionals' advice to vaccinate my daughter against HPV.		
3.	Vaccinating my daughter against HPV will not encourage promiscuity.		
4.	I am worried about the side effects of the HPV vaccine on my daughter.		
5.	The benefits of HPV vaccination outweigh the potential risks.		
6.	I am concerned about the long-term effects of the HPV vaccine.		
7.	I prefer my daughter to receive the HPV vaccine at school rather than at a doctor's office.		
8.	I believe there is a societal responsibility to vaccinate against HPV to protect others.		

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Section F: HPV Vaccination Practices

1. Have you ever heard about the HPV vaccine from a healthcare provider?

   (a) Yes (b) No (c) Not sure

2. Has your daughter received the HPV vaccine?

   (a) Yes (b) No (c) Not sure

3. If yes, at what age did your daughter receive the HPV vaccine?

   (a) Under 9 (b) 9-14 (c) 15-20 (d) Over 20 (e) I don't know

4. If no, what are the main reasons your daughter has not been vaccinated against HPV? (Choose all that apply)

Concern about side effects	☐
The cost of the vaccine	☐
Lack of information about the vaccine	☐
My daughter is too young.	☐
Religious/cultural reasons	☐
Other (please specify)	☐

5. If the HPV vaccine were available at your daughter's school, would you allow her to receive it?

   (a) Yes (b) No (c) Not sure

6. Would you recommend the HPV vaccine to other parents for their daughters?

   (a) Yes (b) No (c) Not sure

7. Do you believe that the HPV vaccine should be mandatory in schools?

   (a) Yes (b) No (c) Not sure

8. Have you received any informational materials about the HPV vaccine?

   (a) Yes (b) No (c) Not sure

Section G: Cervical Cancer Screening Practices

1. Have you ever heard about the Pap smear test from a healthcare provider?

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(a) Yes (b) No (c) Not sure

2. Have you/your wife ever had a Pap smear test?

   (a) Yes (b) No (c) I don't know

3. If yes, how often do you/your wife have Pap smear tests?

   (a) Every year (b) Every 2-3 years (c) Only once (d) I don't remember

4. If no, what are the main reasons you/yourwife have not had a Pap smear test? (Choose all that apply)

Fear of the procedure	
The cost of the test	
Lack of information about the test	
No symptoms or health issues	
Religious/cultural reasons	
Other (please specify)	

5. Have you/your wife received any results from a Pap smear test that required further follow-up or treatment?

   (a) Yes (b) No (c) Not sure

6. Would you recommend the Pap smear test to other women?

   (a) Yes (b) No (c) Not sure

7. Do you believe regular cervical cancer screening should be a part of routine health checks for women?

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(a) Yes (b) No (c) Not sure

8. Have you received any informational materials about the Pap smear test?

(a) Yes (b) No (c) Not sure

Section H: Intention to Vaccinate (rate from 1-5 where 1 is strongly disagree and 5 is strongly agree):

		Yes	No
1.	If given the opportunity, I intend to vaccinate my daughter against HPV.		
2.	I have already made plans for my daughter to receive the HPV vaccine.		
3.	I would recommend other parents to vaccinate their daughters against HPV.		
4.	It is my responsibility as a parent to have my daughter vaccinated against HPV.		
5.	My religious/cultural beliefs do not prevent me from vaccinating my daughter against HPV.		
6.	If my daughter's school offered the HPV vaccine, I would allow her to get it.		
7.	I would feel more comfortable vaccinating my daughter against HPV if I knew other parents who had done so.		
8.	I am more likely to vaccinate my daughter against HPV if her doctor recommends the vaccine.		

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Section I: Willingness to Pay for Vaccination:

1. Do you think the HPV vaccine is affordable for your family?

(a) Yes (b) No (c) Not sure

2. Would you be willing to pay out of pocket for the HPV vaccine for your child if your health insurance does not cover it?

   (a) Yes (b) No (c) Not sure

3. How much will you pay for the HPV vaccine per dose (in Naira)?

   (a) Less than 5,000 (b) 5,000-10,000 (c) 10,000-15,000 (d) 15,000-20,000 (e) 20,000 and above (f) Not sure

4. Would you be willing to participate in a payment plan to cover the cost of the HPV vaccine for your child?

   (a) Yes (b) No (c) Not sure

5. If you cannot pay for the HPV vaccine, would you like financial assistance programs?

   (a) Yes (b) No (c) Not sure

6. Would you be more likely to vaccinate your child against HPV if the vaccine were free of cost?

   (a) Yes (b) No (c) Not sure

7. Do you believe the government should cover the cost of the HPV vaccine?

   (a) Yes (b) No (c) Not sure

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