

**Effectiveness of Reproductive Educational intervention on Knowledge and
Attitude of Cervical Cancer Screening among Childbearing Women in
Ibadan South-East Local Government, Oyo State.**

**Rebecca Opeolu APATA
LCU/PG/005996**

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Basic Medical and Health Sciences, Lead City University, Ibadan, Oyo
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Certification

This is to certify that Rebecca Opeolu APATA with matriculation number LCU/PG/ 005996 carried out this research work titled Effectiveness of Reproductive Health Education on Knowledge and Attitude of Cervical Cancer Screening among Childbearing Women in Ibadan South East Local Government Area in the Department of Nursing Science, Faculty of Basic Medical and Health Sciences, Lead City University, Ibadan, Oyo State, for the award of Master of Nursing Science Degree (MNSc) and that this has not been previously submitted.

Dr Adenike Kadri
(Supervisor)

Date

Dr. Taiwo Adenike Otufale
(Head of the Department)

Date

Dedication

This research is dedicated to God Almighty for His endless mercy, grace and protection throughout the period of the Study.

Lead City University Ibadan DO NOT COPY

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Lastly to the Beginning and the End of everything, I'm nothing without my maker.

“Even though the above-mentioned institutions and persons have assisted in the process of this research work, I stand responsible for the errors, if any, found in the work.”

Abstract

Although an educational intervention successfully increased knowledge and improved attitudes towards cervical cancer screening among childbearing women in Ibadan South-East Local Government Area, Oyo State, Nigeria. The study found that this did not translate into a significant increase in the actual uptake of screening tests. A quasi-experimental design was employed, involving 121 participants divided into experimental and control groups. Baseline data of both groups revealed low awareness, with only 48.7% having heard of cervical cancer and 27.83% aware of screening methods. Post-intervention, significant improvements ($p < 0.001$) were observed in the experimental group: awareness rose to 82.61%, knowledge of HPV as a cause increased from 41.74% to 71.30%, and understanding of screening methods reached 80.87%. Despite these gains, the uptake of screening (Pap/HPV test) remained stagnant at 15.66%, indicating a persistent knowledge practice gap. The findings also highlighted the influence of socio-demographic factors, such as education, marital status, and reproductive history, on baseline knowledge and post-intervention outcomes. Women with at least secondary education demonstrated significantly better improvements in knowledge and attitudes. The intervention led to marked positive shifts in attitudes, including increased willingness to undergo screening and better understanding of the need for screening despite vaccination status. However, persistent barriers such as stigma, fear, limited access, and cultural beliefs continue to hinder screening uptake. These findings underscore the need for multi-faceted strategies that integrate education with enhanced service accessibility, cultural sensitivity, and supportive policies to improve cervical cancer screening uptake in low-resource settings. In conclusion, while educational interventions effectively improved knowledge and attitudes, they were insufficient alone to drive behavioural change.

Keywords: Cervical cancer, Cervical cancer screening, reproductive health education, Knowledge, Attitudes.

Word Count: 276

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List of Acronyms	
Abbreviation	Meaning
HPV	Human Papillomavirus
hrHPV	High-Risk Human Papillomavirus
HIV	Human Immunodeficiency Virus
AI	Artificial Intelligence
VIA	Visual Inspection with Acetic Acid
VILI	Visual Inspection with Lugol's Iodine
LMICs	Low- and Middle-Income Countries

SDGs	Sustainable Development Goals
WHO	World Health Organization
WHO	World Health Organization
HPV	Human Papillomavirus
STI	Sexually Transmitted Infection
SCC	Squamous Cell Carcinoma
DES	Diethylstilbestrol
CIN	Cervical Intraepithelial Neoplasia
SIL	Squamous Intraepithelial Lesions
OC(s)	Oral Contraceptives
HIV	Human Immunodeficiency Virus
STIs	Sexually Transmitted Infections
TNM	Tumour, Node, Metastasis
WHO	World Health Organization
HPV	Human Papillomavirus
STI	Sexually Transmitted Infection
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DES	Diethylstilbestrol
CIN	Cervical Intraepithelial Neoplasia
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OC(s)	Oral Contraceptives
HIV	Human Immunodeficiency Virus
STIs	Sexually Transmitted Infections
TNM	Tumour, Node, Metastasis

Chapter One

Introduction

1.1 Background to the Study

Cervical cancer is one of the most preventable and treatable forms of cancer, especially when it is identified early. Despite this, it remains the second most common cancer affecting women worldwide and continues to be a major cause of cancer-related deaths among women in low and middle-income countries¹. The elevated death rates from cervical cancer in many developing regions are primarily the result of inadequate access to early detection services, including regular screening programs, as well as delays in receiving proper medical treatment. To effectively lower the global impact of this disease, it is crucial to raise public awareness, expand the availability of preventive tools such as the HPV vaccine, and enhance

healthcare systems to ensure timely diagnosis and care, with around 660000 new cases in 2022². In the same year, about 94% of the 350 000 deaths caused by cervical cancer occurred in low- and middle-income countries ¹, a woman dies of cervical cancer every two minutes worldwide⁴.

Cervical cancer remains a serious and life-threatening disease that continues to impact millions of women globally. Despite its severity, many women are still unaware of the risks associated with delaying or avoiding regular screening, It is the most prevalent cancer among women in 37 countries and poses a significant threat to women's health and lives⁵, particularly affecting younger women⁶. Alarming, approximately one in five children who lose their mothers to cancer experience this bereavement as a result of cervical cancer¹. The global burden of the disease is particularly severe in low-resource settings, with the highest rates of incidence and mortality concentrated in regions such as sub-Saharan Africa, Central America, and South-East Asia⁷. Among these, Africa carries a disproportionately large share, accounting for roughly 20% of the global cervical cancer burden, with an estimated 120,000 new cases each year equivalent to 24.6 cases per 100,000 women⁸. Within sub-Saharan Africa also recognized as the global epicenter of the human immunodeficiency virus (HIV) pandemic cervical cancer poses a significant public health crisis^{3,9}.

Regional disparities in cervical cancer incidence and mortality are largely linked to inequities in access to preventive measures such as HPV vaccination, routine screening, and timely treatment, as well as underlying risk factors including high HIV prevalence. Social and economic determinants such as entrenched sex and gender inequalities, poverty, and healthcare infrastructure gaps further exacerbate the disease burden⁷. Although cervical cancer screening is widely recognized as an essential prevention strategy capable of enabling early detection and prompt treatment of precancerous lesions uptake in low- and middle-income countries (LMICs) remains dismally low. Globally, only about 44% of women report

ever having been screened¹⁰, with sub-Saharan Africa reporting an even lower average of just 17%, the lowest among all world regions⁷. This underutilization leads to a high proportion of late-stage diagnoses, which significantly worsens prognosis and survival outcomes, thereby compounding the already heavy disease burden¹¹.

Nigeria, in particular, contributes substantially to the global cervical cancer crisis. It has a female population of approximately 60.9 million aged 15 years and older who are at risk of developing the disease¹². Cervical cancer ranks as the second most common cancer among Nigerian women¹³, with an incidence rate of 18.4 per 100,000 women. Each year, an estimated 12,075 Nigerian women are diagnosed, and more than 8,000 deaths are recorded annually, placing the country among the eight nations with the highest number of new cervical cancer cases globally^{14,5}. Beyond the statistics, cervical cancer causes profound emotional, economic, and social losses for families, particularly as it disproportionately impacts women in their most productive years¹⁶ of the more than 200 known HPV types, around 40 infect the genital tract, and 13 are classified as high-risk (hrHPV) carcinogenic strains. These include HPV types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68, all of which are prevalent in Nigeria¹⁷. Among these, HPV-16 and HPV-18 alone account for approximately 66.9% of cervical cancer cases in the country¹⁷.

The pathogenesis of cervical cancer is typically a multi-stage process that develops over several years and almost always begins with a persistent infection by an oncogenic HPV type¹⁸. While it is estimated that virtually all sexually active individuals will contract HPV at some point in their lives, most infections are harmless and are cleared naturally in those with healthy immune systems³. However, persistent infection with approximately 15 high-risk HPV types is the principal cause of cervical cancer, with HPV-16 and HPV-18 together responsible for about 70% of global cases⁹. Furthermore, women living with HIV face a

dramatically higher risk, six times more likely of developing cervical cancer compared to HIV-negative women⁸.

Encouragingly, there are cost-effective and accessible screening methods that can identify precancerous lesions before they progress to invasive cancer. These include the Pap smear test, Visual Inspection with Acetic Acid (VIA), Visual Inspection with Lugol's Iodine (VILI), HPV DNA testing, the use of Artificial Intelligence (AI) based algorithms, colposcopy, biopsy, and endocervical curettage²¹. Equally important, there are effective, safe, and simple treatments for precancerous lesions such as cryotherapy and thermal ablation that, when deployed promptly, can prevent the development of cervical cancer in women⁷.

Knowledge and attitude play a crucial role in determining women's participation in cervical cancer screening programs. Knowledge is a fundamental precursor to behavioral change, playing a vital role in shaping health-seeking behaviors¹⁸. By acquiring accurate information, individuals can experience a significant shift in their attitudes, dispelling misconceptions and myths that may have previously hindered their ability to make informed decisions. Moreover, knowledge has the potential to enhance screening behaviors, ultimately contributing to better health outcomes. A lack of understanding about HPV and its vaccination has been shown to hinder women's participation in cervical cancer screening²². Attitude towards cervical cancer screening is another critical factor influencing women's participation. A positive attitude towards screening, characterized by a sense of self-efficacy and perceived benefits, can motivate women to undergo screening. On the other hand, a negative attitude, fueled by fear, embarrassment, or misconceptions, can discourage women from participating in screening programs¹³.

Several factors that can influence women's knowledge and attitude towards cervical cancer screening including education, cultural and social norms, access to healthcare and healthcare provider-patient communication²⁴. Improving women's knowledge about cervical cancer and

its screening methods, as well as promoting a positive attitude towards screening, can increase participation rates and ultimately reduce the burden of cervical cancer. Healthcare providers, policymakers, and community leaders must work together to address the knowledge and attitude gaps among women, ensuring that they have access to accurate information and supportive services to make informed decisions about their health³. Several studies have tested educational strategies to strengthen the knowledge⁴ and attitude of reproductive age women for cervical cancer screening as well as to reduce barriers to compliance with these programs which can lead to reduction in mortality rate and health care spending²⁵.

1.2 Statement of the Problem

The burden of cervical cancer remains alarmingly high in many parts of the world, and in most countries including Nigeria, both the incidence and mortality rates remain significantly above the threshold targets set by the WHO Global Initiative for Cervical Cancer Elimination²⁶. While several nations have achieved remarkable reductions in morbidity and mortality through widespread cervical cancer screening, public health education, and early treatment of precancerous lesions², the same progress has not been mirrored in Nigeria. Although both preventive interventions such as HPV vaccination and regular screening and curative measures are available in Nigeria, it is estimated that over 40 million women in the country remain at risk of developing cervical cancer²⁷. Even in locations where screening services are operational, a significant proportion of women are unaware of their existence, suggesting deep-rooted gaps in public awareness campaigns and health literacy.

In contrast, women in developed and high-income countries not only have greater access to comprehensive cervical cancer services including vaccination, screening, and treatment but also possess higher levels of knowledge about the disease and its prevention²². These disparities underline the fact that in Nigeria, such services remain grossly inadequate,

compounded by low awareness levels and poor knowledge of cervical cancer within the population². In 2018, cervical cancer accounted for 12.9% of all female cancer cases and 14.8% of all cancer-related deaths among Nigerian women, ranking as the second leading cause of cancer mortality in the country²⁹. Risk assessment models estimate that more than 50.33 million Nigerian women aged 15 years and older are at risk of developing cervical cancer²⁸. Furthermore, projections warn that over 53 million Nigerian girls and women above age 15 will face increased risk in the coming years if robust and deliberate prevention and control strategies are not urgently implemented^{23,30}. Alarming, the majority of cervical cancer cases in Nigeria are detected at intermediate or advanced stages, where treatment options are more invasive, expensive, and less effective. Many women who eventually present with the disease report never having undergone cervical cancer screening or even a routine gynecological examination, indicating systemic failures in early detection and preventive healthcare access.

In light of this gap, the present research sought to examine the effectiveness of a reproductive health educational intervention in improving both knowledge and attitudes toward cervical cancer screening among childbearing women in Ibadan South-East Local Government Area, Oyo State. The ultimate goal is to leverage educational strategies to increase screening participation among childbearing women, thereby contributing to a reduction in cervical cancer incidence and mortality in Nigeria.

1.3 Justification of the Study

Cervical cancer remains a significant public health concern globally and particularly in developing countries, where over 85% of cervical cancer-related deaths occur³⁰. In Nigeria, cervical cancer is the second most common cancer among women and a major contributor to cancer-related morbidity and mortality. Despite the availability of effective screening methods such as the Papanicolaou (Pap) smear and Visual Inspection with Acetic Acid

(VIA), uptake of cervical cancer screening services remains critically low, especially among childbearing women. Several studies have indicated that a major barrier to cervical cancer screening is insufficient knowledge and poor attitude towards the disease and its prevention²³. Women often lack awareness of the risk factors, early signs, screening methods, and the importance of early detection. Given that women of childbearing age frequently interact with the healthcare system through antenatal, postnatal, and family planning services, this population presents a critical entry point for cervical cancer education and prevention strategies. Integrating reproductive health education into existing health services provides an effective and sustainable approach to improving awareness and fostering positive attitudes toward cervical cancer screening³⁰.

This study was therefore justified by the need to assess the impact that a structured reproductive health educational intervention on the knowledge and attitude of women of childbearing age regarding cervical cancer screening in the local context of Ibadan South-East Local Government Area.

1.4 Aim and Objectives of the Study

The broad objective of this research is to determine the Effectiveness of Reproductive Educational Intervention on Knowledge and Attitude towards Cervical Cancer Screening Among Childbearing Women in Ibadan South-East Local Government Area Oyo State.

Specific objectives were to:

- i. assess the baseline knowledge of cervical cancer screening among childbearing women in Ibadan South-East Local Government Area, Oyo State;

- ii. assess the post-intervention knowledge of cervical cancer screening among childbearing women in Ibadan South-East Local Government Area, Oyo State;
- iii. to examine baseline attitudes toward cervical cancer screening among childbearing women in Ibadan South-East Local Government Area, Oyo State;
- iv. to assess post-intervention attitudes toward cervical cancer screening among childbearing women in Ibadan South-East Local Government Area, Oyo State;
- v. establish the relationships between knowledge and attitude of childbearing women towards cervical cancer screening in Ibadan South-East Local Government Area Oyo State;
- vi. examine the association between socio-demographic characteristics and knowledge of childbearing women towards cervical cancer screening in Ibadan South-East Local Government Area Oyo State;
- vii. Identify the difference between pre and post intervention mean scores of Knowledges of childbearing women;
- viii. determine the difference between pre and post intervention mean scores of Attitudes of childbearing women towards cervical cancer screening;

1.5 Research Questions

1. What is the baseline level of knowledge about cervical cancer and its screening among childbearing women in Ibadan South-East Local Government Area Oyo State?
2. Is there a significant difference in knowledge of cervical cancer and screening between the intervention and control groups after the educational intervention?
3. What are the baseline attitudes of childbearing women toward cervical cancer screening in Ibadan South-East Local Government Area Oyo State?

4. What is the post-intervention attitude of cervical cancer and its screening among childbearing women in Ibadan South-East Local Government Area, Oyo State?

1.6 Hypotheses

The following hypotheses was tested at 0.05 significant level

Ho1: There is no significant relationship between knowledge and attitude toward cervical cancer screening among childbearing women in Ibadan South-East Local Government Area, Oyo State.

Ho2: There is no significant association between socio-demographic characteristics and knowledge of childbearing women on cervical cancer screening.

1.7 Significance of the Study

The findings from this study may enhance understanding of cervical cancer risk factors, symptoms, and prevention methods among childbearing women. It will encourage women to undergo regular cervical cancer screening programs that support Sustainable Developmental Goals (SDGs) focused on health, well-being, and gender equality. Improving knowledge about cervical cancer thereby helps to detect precancerous cells and cancer at an early stage and improving treatment outcomes. With early detection and prevention, it reduces treatment costs and healthcare burden which will promotes women's health and well-being and empowering them to make informed reproductive choices and reduced cervical cancer mortality rates. The findings will provide informative data for policy development and resource allocation for cervical cancer screening in the local Government area.

1.8 Scope of the study

This study aims to investigate the Effectiveness of Reproductive Educational intervention on Knowledge and Attitude towards Cervical Cancer Screening Among Childbearing Women in Ibadan South-East Local Government Area Oyo State.

1.9 Limitation of the Study

This study was conducted solely within the Ibadan South-East Local Government Area of Oyo State. As such, the findings may not be generalizable to other local government areas, regions, or states with differing sociodemographic, cultural, or healthcare access characteristics. Data on knowledge and attitude were collected through self-administered questionnaires. This approach is subject to social desirability bias, where respondents may provide answers, they believe are expected or acceptable rather than their true opinions or practices. Some participants had limited literacy or were not fluent in English, requiring translation of materials or interpreter assistance. This may have influenced their understanding of the intervention content or survey questions, potentially affecting data accuracy.

1.10 Operational Definition of Terms

Attitude towards Cervical Cancer Screening: This refers to the individual's feelings, beliefs and predisposition to engage or not engage in cervical cancer screening practices.

Cervical Cancer: This refers to a diagnosed or clinically confirmed case of abnormal growth of cervical cells, verified through medical records, Pap smear results, or HPV testing.

Cervical Cancer Screening: This is defined as the practice or act of undergoing screening procedures such as a Pap smear or HPV test.

Childbearing Women: Women of reproductive age who are capable of becoming pregnant and giving birth to children (15-49 years old).

Knowledge of Cervical Cancer: This is defined as the level of accurate information a respondent possesses about cervical cancer.

Reproductive Education: This is defined as the respondent's exposure to and participation in learning activities or programs that provide information about reproductive health.

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Chapter Two

Literature Review

2.1 Conceptual Review

World Health Organization defined cancer as a collection of disorders characterized by abnormal cell proliferation and the ability to spread or harm other bodily parts¹. Cancer is a condition that arises when cells grow and multiply abnormally, ²disrupting the body's usual

orderly process and potentially spreading to other areas³. Unlike benign tumours, which remain localized and do not invade surrounding tissues, cancerous cells can migrate and affect different parts of the body⁴. Cells, the fundamental units of the body, form tissues and organs and are continuously produced to support growth, replace damaged tissues, and repair injuries. Under normal circumstances, cells follow a regulated cycle of growth, division, and death. However, when this cycle is disrupted, it can result in the formation of abnormal cells that proliferate uncontrollably, leading to the development of cancer⁵.

2.1.1 Definition of Cervical Cancer

Cervical cancer refers to a malignant tumour that originates in the cells lining the cervix. It typically begins in the epithelial cells and develops over time due to gradual changes in the uniformity and structure of these cells⁶. As the most prevalent cancer of the female reproductive system, cervical cancer can initially affect the cervix but may eventually extend to surrounding tissues, such as the vagina, or metastasize to distant parts of the body, including the lymph nodes, lungs, or liver.

2.1.2 Cervical pre-cancer

Cervical pre-cancer refers to abnormal changes in the epithelial cells of the cervix's transformation zone, often caused by long-term HPV infection. Unlike many other cancers, cervical cancer has a long-lasting pre-cancerous stage that can be detected and treated before it becomes invasive, offering a significant opportunity for prevention. However, despite being largely preventable, cervical cancer continues to claim the lives of many women, especially in low-resource settings. This is mainly due to limited access to preventive and treatment services, which can be affected by factors such as inconvenient clinic hours, long distances to healthcare facilities, lack of transportation, and cultural or gender-related barriers. Ultimately, poverty remains the most significant underlying factor that prevents women from receiving the care they need.

2.1.3 Types of Cervical Cancer

Cervical cancer can be classified into two primary types, distinguished by the specific cervical cells in which they originate. The most prevalent form is squamous cell carcinoma (SCC), which arises from the squamous epithelial cells that line the outer part of the cervix. This type accounts for approximately 6 out of every 10 cases of cervical cancer⁷. SCC typically develops in the transformation zone the area where the squamous and glandular cells meet and is often easier to detect through routine screening methods such as the Pap smear, as abnormal squamous cells tend to shed into the cervical canal. The second major type is adenocarcinoma, which originates in the glandular cells of the cervix. These cells are located higher up in the endocervical canal, making adenocarcinoma less common occurring in about 3 out of every 10 cases but also more challenging to diagnose⁷. This difficulty arises because abnormal glandular cells are not as readily accessible during standard cervical screening procedures, and the lesions may be located further from the visible surface of the cervix. As a result, adenocarcinoma can sometimes be detected at a more advanced stage compared to SCC.

A smaller subset of cervical cancers, less than 1 in 20 cases, contain both squamous and glandular components. These are referred to as adenosquamous carcinomas or mixed carcinomas. They exhibit characteristics of both cell types and may require more complex diagnostic evaluation and treatment planning. In addition to these main categories, there are rarer and more aggressive forms of cervical cancer. These include small cell carcinoma, a type of neuroendocrine tumor that is known for its rapid progression; clear cell adenocarcinoma, which may be associated with prenatal exposure to diethylstilbestrol (DES) in some cases; and cervical sarcoma, a malignant tumor arising from the connective tissues of the cervix⁸. Although these rare variants represent only a small proportion of cervical

cancer cases, they often carry a poorer prognosis and may require specialized management strategies.

2.1.4 Causes of Cervical Cancer

Human papillomavirus (HPV) is a sexually transmitted infection (STI) and remains the most widespread STI globally, affecting millions of people each year across diverse age groups. It is particularly prevalent among adolescent girls and young adult women aged between 20 and 30 years⁹. The public health significance of HPV is profound, as nearly all cases of cervical cancer can be traced back to infection with certain high-risk HPV types¹⁰. In fact, it is estimated that most sexually active women and men will be infected with at least one genital HPV type at some point in their lives, often without showing any symptoms.

HPV is not a single virus but rather a large group of over 200 closely related viral strains. Many types are harmless, but a subset is transmitted through sexual contact, including vaginal, anal, and oral sex. These sexually transmitted strains are categorized into two main groups: Low-risk HPV types, which rarely lead to cancer but may cause benign lesions such as genital warts. A few low-risk types can also result in warts on or around the anus, mouth, or throat³. High-risk HPV types, which have the potential to cause a variety of cancers, including cervical, anal, vulvar, vaginal, penile, and certain head and neck cancers⁵. There are 12 high-risk HPV types recognized for their carcinogenic potential: HPV 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, and 59. Of these, HPV 16 and HPV 18 are the most dangerous, together being responsible for the majority of HPV-related cancers worldwide.

HPV spreads easily between sexual partners through intimate skin-to-skin contact, and infection can occur even without penetrative intercourse. Transmission routes include vaginal penile sex, penile anal sex, penile oral sex, and vaginal–oral sex. While the correct and consistent use of condoms can significantly reduce the likelihood of HPV transmission, it does not provide complete protection, since HPV can infect areas not covered by a

condom¹¹. Given its widespread nature, HPV prevention strategies, including vaccination, education, and regular cervical screening, remain essential for reducing both transmission rates and the global burden of HPV-related cancers.

2.1.5 Symptoms of Cervical Cancer

Most individuals infected with human papillomavirus (HPV) will remain completely unaware of their infection, as the virus often produces no obvious symptoms. In the majority of cases, the body's immune system is capable of clearing the infection naturally within a relatively short period, and no medical treatment is required¹². However, when the infection persists for an extended time, the risk increases for the development of abnormal changes in the cells of the cervix, which can progress toward precancerous or cancerous stages if left undetected.

These cellular changes usually occur gradually over several years and, in their early stages, present no visible or physical symptoms. This is why regular cervical screening such as a Pap smear or HPV DNA test is essential. Screening remains the only reliable way to detect abnormal cervical cells before they advance to cervical cancer. If cervical cancer does develop, symptoms may eventually appear. Common warning signs include: vaginal bleeding between menstrual periods, postmenopausal bleeding, bleeding during or after sexual intercourse, pelvic pain, pain during sexual intercourse, and changes to the normal vaginal discharge for example, an increase in volume, a stronger or unusual odor, or a change in color¹². While these symptoms may be caused by other medical conditions, it is important to rule out cervical cancer through medical evaluation.

At the cellular level, the transformation from normal cells to cancer cells typically begins with abnormal changes known as hyperplasia (an increase in the number of cells) and dysplasia (abnormal cell appearance). Hyperplasia and dysplasia do not always progress to cancer, but they can be precursors to malignancy if left unchecked¹². Although cervical

cancer can often be diagnosed at an early stage through routine Pap smear testing, many women remain symptom-free until the disease has progressed. Once symptoms emerge in the later stages, they may include persistent vaginal discharge, irregular bleeding, and postcoital bleeding all of which can indicate advanced disease¹³. As the cancer advances further, vaginal discharge often increases in volume, becomes watery, and eventually turns dark and foul-smelling due to tumor necrosis and secondary infection. Bleeding patterns may also worsen, beginning as light and irregular often triggered by minor trauma or pressure but becoming more frequent, heavier, and persistent as the disease progresses. In the most advanced stages, the cancer can cause severe pelvic pain, leg pain, painful urination (dysuria), rectal bleeding, and swelling (oedema) of the legs symptoms that typically indicate extensive local invasion or metastasis.

2.1.6 Pathophysiology of Cervical Cancer

Once a high-risk human papillomavirus (HPV) strain infects the epithelial cells of the cervix, it disrupts the normal cellular regulatory mechanisms that control replication, division, and intercellular communication¹⁴. This disruption forces the infected cells to replicate abnormally and multiply in an uncontrolled, unregulated manner. In most cases, the immune system is able to detect and eliminate these abnormal cells before they cause significant damage. However, in some cases, the infected cells escape immune surveillance and persist, continuing to grow and evolve into precancerous lesions. Without intervention, these precancerous cells may progress into invasive cervical cancer. Although most studies have focused on the mechanisms by which high-risk HPV induces carcinogenesis in the cervix, evidence suggests that HPV associated cancers in other anatomical sites such as the oropharynx, anus, vulva, penis, and vagina likely develop through similar biological pathways. Research has shown that the transformation from HPV infection to cervical

precancer can take 5 to 10 years, while the progression from infection to invasive cancer may take up to 20 years.

Cervical cancer is classified into different histological types based on the area of origin within the cervix. The most common type is squamous cell carcinoma (SCC), which originates in the ectocervix and accounts for approximately 90% of all cervical cancer cases¹⁵. Adenocarcinoma, which develops in the glandular cells of the endocervix, is less common. In rare instances, adenosquamous carcinoma also known as mixed carcinoma can occur, displaying characteristics of both SCC and adenocarcinoma¹⁶. Importantly, cells in the transformation zone the area where squamous and glandular cells meet do not become cancerous overnight. Instead, they first undergo abnormal precancerous changes. These are often described using terms such as cervical intraepithelial neoplasia (CIN) or squamous intraepithelial lesions (SIL).

CIN 1 (mild dysplasia or low-grade SIL) involves minimal abnormality and is considered a low-risk precancerous stage. CIN 2 and CIN 3 (moderate to severe dysplasia or high-grade SIL) indicate more significant cellular changes, with CIN 3 representing the most severe form of precancer before invasive disease. A Pap smear test remains one of the most effective tools for detecting these abnormalities early, before cancer develops. Like other cancers, cervical cancer is staged based on its extent and spread¹⁷. In carcinoma in situ (pre-cancer), abnormal cells are confined to the inner lining of the cervix. Once invasion begins, the following stages are recognized:

Stage I: Cancer is confined to the cervix.

Stage IA (subdivided into IA1 and IA2) represents microscopic invasion detectable only under a microscope.

Stage IB (subdivided into IB1 and IB2) includes larger tumors that are still confined to the cervix¹⁸.

Stage II: Cancer extends beyond the cervix but not to the pelvic wall.

Stage IIA: involves spread to the upper two-thirds of the vagina without parametrial invasion.

Stage IIB: includes parametrial invasion.

Stage III: Cancer spreads to the lower third of the vagina and/or the pelvic wall and may cause kidney problems.

Stage IIIA: is confined to the lower third of the vagina.

Stage IIIB: extends to the pelvic wall and/or causes hydronephrosis.

Stage IV: The most advanced stage, indicating spread beyond the pelvis¹⁹.

Stage IVA: involves invasion into the bladder or rectum.

Stage IVB: indicates distant metastases to organs such as the bones, liver, lungs, or distant lymph nodes.

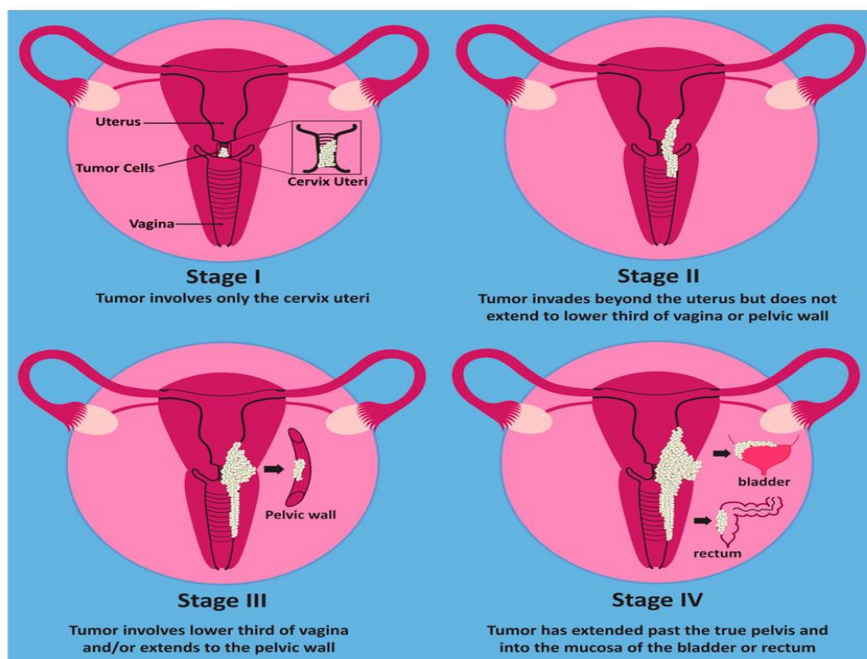


Fig 2.1 Stages of Cervical Cancer²⁰

2.1.7 Risk factors of Cervical Cancer

A number of risk factors have been identified for cervical cancer, many of which are linked to sexual behavior and HPV infection. One significant factor is the early debut of first sexual intercourse. The age at which a woman first engages in sexual activity is crucial because an immature cervix may be more susceptible to injury and subsequent infection²¹. Women who initiate sexual activity before the age of 20 have been found to have a significantly higher risk of developing cervical cancer²². This is likely because the transformation zone of the cervix is still developing during adolescence, making it more vulnerable to the effects of oncogenic HPV types.

The number of sexual partners is another important determinant. The more sexual partners a woman has, the greater her likelihood of encountering HPV and thus increasing her risk of cervical cancer. This risk also extends to women who have sexual partners with a history of multiple previous partners, as this indirectly raises the probability of HPV exposure²³. Reproductive history has also been implicated in cervical cancer risk. Women who have experienced three or more full-term pregnancies are at increased risk of developing the disease. This association has been partly attributed to hormonal changes during pregnancy, which may promote HPV persistence or facilitate cancer cell proliferation²⁴. Another possible explanation is that pregnancy can temporarily suppress immune function, giving HPV more opportunity to establish a chronic infection. Furthermore, age at first full-term labour plays a role women who give birth before the age of 20 have been found to be at higher risk of cervical cancer²⁵.

Smoking is a significant behavioural risk factor. Research has detected tobacco by-products within the cervical mucus of women who smoke, indicating that carcinogenic compounds reach the cervical tissue directly. These substances can damage the DNA of cervical epithelial cells, contributing to malignant transformation. Additionally, smoking weakens

immune function, making it less effective in clearing HPV infections. The use of oral contraceptives (OCs) over long durations particularly periods of five years or more has also been linked to an elevated risk of cervical cancer²⁶. Evidence suggests that the risk increases with the duration of use, but importantly, the risk decreases after discontinuation, returning to baseline levels approximately 10 years after stopping OCs. However, it is worth noting that OCs also confer protective benefits against other cancers, including ovarian and endometrial cancers. A healthy immune system plays a central role in controlling HPV infection. In most individuals with normal immune function, HPV infections clear spontaneously within 12 to 18 months²⁷. However, in immunosuppressed women such as those with HIV or those taking long-term immunosuppressive medications following organ transplant HPV infections are more likely to persist and progress to cancer more rapidly²⁸. Coinfection with other sexually transmitted infections (STIs) can further increase cervical cancer risk. Chronic inflammation caused by STIs may facilitate the persistence and oncogenic potential of HPV. Research has documented a link between cervical cancer and infections such as Chlamydia trachomatis and Herpes simplex virus, suggesting that the inflammatory response may create an environment conducive to cancer development²⁹. Finally, socio-economic status is a well-recognized determinant of cervical cancer risk. Women from lower socio-economic backgrounds face higher rates of the disease, primarily because of reduced access to preventive screening such as Pap smears, limited awareness of reproductive health, and barriers to healthcare services. In addition, some studies have found higher prevalence of HPV DNA among socio-economically disadvantaged groups, likely due to higher rates of high-risk sexual behaviours³⁰.

2.1.8 Staging of Cervical Cancer

Staging is a way of describing the size of a cancer and how far it has grown. The size or extent of cervical cancer can generally be determined using either TNM staging system or Number staging systems” and the bigger the size³¹.

Tumour, Node, Metastasis (TNM) staging system

The TNM classification system an internationally standardized method for describing the extent and severity of cancer categorizes the disease based on three key criteria: Tumour (T), Node (N), and Metastasis (M). This system provides a structured way to record how large the primary tumour is, whether it has reached nearby lymph nodes, and whether it has spread to distant parts of the body. The T category refers to the primary tumour, specifically its size and the extent of its growth into surrounding tissues. Tumours are assigned a numerical value ranging from T1 to T4, where T1 indicates a small and localized tumour, and T4 represents a large tumour that has invaded nearby organs or structures. This scale offers important insights into the aggressiveness and local advancement of the cancer, helping guide treatment decisions³².

The N category reflects whether the cancer has spread to regional lymph nodes small glands involved in immune response. Nodal involvement is graded from N0 to N3, with N0 meaning no cancer cells are detected in any nearby lymph nodes, and N3 indicating extensive lymph node spread, often involving multiple or distant regional nodes. The degree of lymph node involvement is a critical factor in predicting disease progression and recurrence³³. The M category determines whether the cancer has undergone metastasis, meaning it has spread from the cervix to distant organs or tissues through the bloodstream or lymphatic system. This stage is recorded as either M0 (no distant spread) or M1 (cancer present in other parts of the body). Metastatic spread is generally associated with more

advanced disease and often requires systemic therapies, such as chemotherapy, targeted therapy, or immunotherapy³⁴. By combining the T, N, and M scores, clinicians can determine an overall cancer stage, which is essential for treatment planning, prognostic assessment, and consistent communication between healthcare providers. This classification system also allows for comparison of patient outcomes across different studies and treatment centers³⁵.

Number staging systems

The number staging system is often used alongside the TNM classification to simplify the description of how far cancer has progressed. This approach divides cancers into four main stages, numbered 1 through 4, which are most commonly written in Roman numerals (I to IV)⁴. Each stage represents a different level of cancer development, from early, localized disease to advanced, widely spread cancer.

Stage I generally indicates that the cancer is small and confined to the organ where it began. In cervical cancer, this means the tumour is entirely within the neck of the womb (cervix) and has not spread beyond it. Stage I is further divided into Stage IA and Stage IB. In Stage IA, the cancerous growth is so small that it can only be detected using a microscope or colposcope; this is considered the earliest form of invasive cervical cancer. In Stage IB, the tumour is large enough to be visible without magnification, yet it remains contained within the cervix. Although the cancerous area is larger than in Stage IA, there is still no evidence of spread to surrounding tissues or lymph nodes.

Stage II cervical cancer is characterized by the tumour growing beyond the cervix into nearby tissues, but not yet reaching the pelvic wall or the lower third of the vagina. At this stage, the cancer is still considered locally advanced, and it may or may not have spread to nearby lymph nodes. Stage II is divided into Stage IIA and Stage IIB. In Stage IIA, the tumour has extended beyond the cervix into the upper two-thirds of the vagina but has not

invaded deeper tissues such as the parametrium (the connective tissue surrounding the cervix). In Stage IIB, the cancer has spread into the parametrium but has not yet reached the pelvic wall³⁶.

Stage III usually indicates a larger and more invasive tumour that has extended beyond the cervix and into more distant pelvic structures. This stage may also involve cancer cells in nearby lymph nodes. In cervical cancer, Stage III can include spread into the lower third of the vagina, the pelvic wall, or obstruction of one or both ureters the tubes that carry urine from the kidneys to the bladder. Stage III is classified into Stage IIIA and Stage IIIB. In Stage IIIA, the cancer has spread to the lower third of the vagina but not to the pelvic wall. In Stage IIIB, the tumour has invaded the pelvic wall or caused ureter blockage, which may lead to kidney problems³⁷.

Stage IV represents the most advanced stage of cervical cancer, where the disease has spread to distant organs a process known as metastasis. This stage is divided into Stage IVA and Stage IVB. Stage IVA means the tumour has spread to nearby pelvic organs, such as the bladder or rectum (back passage), while Stage IVB indicates that the cancer has travelled to distant sites, such as the lungs, liver, or bones. At this point, the cancer is considered secondary or metastatic, and treatment focuses on managing symptoms and prolonging life rather than curing the disease. By combining TNM details with the number staging system, healthcare providers can more accurately assess the severity of the disease, plan appropriate treatment strategies, and provide patients with a clearer understanding of their condition.

Bethesda Reporting System

Abnormal cell changes in the cervix are classified in several ways, depending on their severity, appearance under the microscope, and potential to progress to cancer. Low-Grade Squamous Intraepithelial Lesion (LSIL) refers to mild abnormal changes in the squamous cells lining the surface of the cervix. These changes are most commonly caused by human

papillomavirus (HPV) infection, particularly low-risk types. LSIL often represents an early, transient stage of HPV-related cell change and may resolve spontaneously without treatment. However, follow-up testing is needed to ensure the abnormality does not progress. High-Grade Squamous Intraepithelial Lesion (HSIL) describes more severe changes in the squamous cells. These alterations indicate a higher risk of progression to precancerous or invasive cervical cancer if left untreated.

HSIL is more likely to be associated with persistent infection by high-risk HPV types and usually requires prompt investigation and management. Adenocarcinoma In Situ (AIS) is a precancerous condition affecting the glandular cells of the cervix rather than the squamous cells. These abnormal glandular cells are confined to the lining of the cervical canal and have not yet invaded deeper tissues. AIS is considered a serious finding because it can develop into invasive adenocarcinoma if not treated. One commonly used system to grade precancerous changes in squamous cells is the Cervical Intraepithelial Neoplasia (CIN) system:

CIN 1: Mild dysplasia, where only the lower third of the cervical lining contains abnormal cells. This stage often resolves naturally without intervention.

CIN 2: Moderate dysplasia, with abnormal cells affecting up to two thirds of the thickness of the cervical lining. This is more likely to require treatment to prevent progression.

CIN 3: Severe dysplasia or carcinoma in situ, where abnormal cells extend through the full thickness of the surface layer. Although not yet invasive cancer, CIN 3 carries the highest risk of becoming cancerous if untreated.

In broader terms, these changes are described as cervical dysplasia: Mild dysplasia involves early abnormal growth of cervical cells that is often reversible and may resolve without treatment. Moderate dysplasia represents more pronounced cell changes with a greater likelihood of progressing if untreated. Severe dysplasia involves high-grade abnormalities

that carry a significant risk of developing into invasive cervical cancer, making timely diagnosis and treatment critical³⁸.

2.1.9 Prevention of cervical cancer

Cervical cancer can as well be prevented through primary and secondary preventive measures. The primary prevention is aimed at protecting uninfected women from being exposed to human papilloma virus while secondary prevention is aimed at increasing the health seeking behaviour of those at risk for early detection and management to achieve better prognosis of the disease ³⁹. Cervical cancer can be prevented through a combination of vaccination against high-risk HPV types, safe sex practices, including the use of condoms, regular screenings, and a healthy lifestyle. HPV vaccination is an effective way to prevent cervical cancer. The vaccines Gardasil and Cervarix are available for both males and females. These vaccines protect against the most common cancer-causing HPV strains HPV 16 and HPV 18⁴⁰. Practicing safe sex by using condoms can reduce the risk of HPV and other sexually transmitted infections. However, condoms may not be entirely effective in preventing HPV, as the virus can infect areas not covered or protected by the condom. Regular cervical cancer screenings, such as Pap smears tests, HPV DNA testing and visual inspection with acetic acid (VIA), are essential for early detection and prevention. Pap tests can detect precancerous changes in the cervix, allowing for prompt treatment. In some cases, HPV testing may be recommended in addition to Pap tests, especially for women over 30years. This can help identify high-risk HPV strains and assess the risk of developing cervical cancer.

In addition, reducing the number of sexual partners may lower the risk of HPV exposure and cervical cancer as well as maintaining good personal hygiene, washing the genital area regularly can help reduce the risk of infection⁴¹. It is known that a healthy lifestyle which includes a well-balanced diet, regular exercise, and maintaining a healthy weight, smoking

cessation can contribute to overall health and may reduce the risk of cervical cancer. After HPV vaccination, it is important to undergo regular or periodic cervical cancer screenings, as the vaccines do not provide protection against all HPV strains that can cause cancer. When an abnormal pap test result or a positive HPV test is obtained, advice for further evaluation, treatment, and monitoring should be considered⁴².

HPV vaccines

There are currently three vaccines approved for the prevention of infection with disease-causing human papillomavirus (HPV): Gardasil (quadrivalent), Gardasil 9 (nonavalent), and Cervarix (bivalent). All three are designed to prevent new HPV infections and reduce the risk of developing HPV-associated cancers and other related diseases. Gardasil 9, the nonavalent vaccine, offers the broadest protection. It safeguards against nine HPV types: seven high-risk oncogenic types (16, 18, 31, 33, 45, 52, and 58) responsible for the majority of HPV-related cancers, and two low-risk types (6 and 11) that cause most cases of genital warts¹⁷. Cervarix, the bivalent vaccine, is targeted at types 16 and 18, the two most common high-risk strains linked to cervical cancer. Gardasil (quadrivalent) protects against four types 6, 11, 16, and 18 covering both cancer-causing and wart-causing strains. The HPV vaccine series is routinely recommended for both girls and boys at ages 11 or 12, though it can be initiated as early as age 9.

This recommendation is important because HPV related cancers can affect anyone, regardless of gender, and early vaccination provides protection before potential exposure to the virus⁸. Vaccination also plays a role in reducing community transmission, helping to protect others from cancer-causing strains of HPV. For those starting the vaccine series before age 15, two doses are sufficient. However, individuals who begin the series at age 15 or older require three doses for optimal protection. For unvaccinated young adults, catch-up vaccination is recommended up to age 26. While the HPV vaccine is licensed for use in

adults aged 27 through 45 years, routine vaccination is not recommended for everyone in this age group. This is because the benefit is generally smaller, as many individuals may have already been exposed to one or more HPV types by this age⁴³.

Cervical Cancer screening

Screening tests identify diseases or conditions before symptoms appear, enabling early treatment when its more effective, improved outcomes and reduced cervical cancer incidence and mortality. Cervical cancer screening is the only FDA approved test for HPV related cancers which is an important part of routine health care ⁴⁴. Cervical cancer screening involves several methods designed to detect early signs of the disease before symptoms develop. One of these is the HPV test, which examines cervical cells for the presence of high-risk human papillomavirus types known to increase the likelihood of cervical cancer. Another is the Pap smear (or Pap test), which looks for abnormal changes in cervical cells that may result from infection with high-risk HPV strains. A third approach is the HPV/Pap co-test, which combines both methods screening simultaneously for the presence of high-risk HPV and for any abnormal or precancerous changes in cervical cells thereby offering a more comprehensive evaluation of cervical health⁴⁵.

Screening Procedures:

Visual Inspection with Acetic Acid (VIA)

Visual inspection with acetic acid (VIA) is a low-cost, effective method for identifying early precancerous or cancerous changes in the cervix through direct visual examination. In this technique, a health-care provider uses a speculum to expose the cervix and then inspects it with the naked eye after applying a dilute solution of acetic acid (3–5%)⁴⁶. This approach is most suitable for women whose squamocolumnar junction (SCJ) the area where the squamous and columnar epithelial cells meet is clearly visible. This visibility is typically found in women under the age of 50, as hormonal changes during menopause cause the SCJ

to gradually migrate into the endocervical canal, making it more challenging to detect lesions through visual means⁴⁷. The VIA procedure requires three main elements: a speculum, a light source, and a trained health-care provider⁴⁸.

The provider begins by performing a speculum examination to locate the SCJ and then carefully examines the cervix for any suspicious visual signs of pre-cancer or cancer. A solution of 3–5% acetic acid is generously applied to the cervix using a large cotton swab. After application, the swab is removed, and the provider waits for at least one minute. During this waiting period, temporary whitening caused by inflammation or physiological changes (such as metaplasia) typically fades away⁴⁹. However, if acetowhite changes persist beyond the one-minute mark especially when located in the transformation zone and showing distinct, well-defined borders, they are more likely to indicate pre-cancerous or cancerous lesions, resulting in a positive VIA result. In contrast, the absence of persistent acetowhite changes after the waiting period is recorded as a negative VIA result⁵⁰.

Visual Inspection with Lugol's Iodine (VILI)

Visual Inspection with Lugol's Iodine (VILI), also referred to as Schiller's test, is a simple visual screening method for cervical abnormalities, typically carried out immediately after a Visual Inspection with Acetic Acid (VIA) test. The procedure involves applying a 5% solution of Lugol's iodine to the cervix. Lugol's iodine reacts chemically with glycogen, a substance normally present in healthy, mature squamous epithelial cells. When the iodine comes into contact with glycogen-rich tissue, the area stains a dark brown or black color. In contrast, precancerous or cancerous cervical tissues contain little or no glycogen. As a result, when Lugol's iodine is applied to these abnormal areas, they do not take on the dark stain and instead remain distinctly yellow. This yellow staining pattern is interpreted as a VILI positive result, indicating possible pre-cancer or cancer that warrants further investigation⁵¹.

Cytology-based screening methods

Cytology-based screening is a laboratory-based method for detecting early cellular changes in the cervix that could signal precancerous or cancerous conditions. This process involves obtaining a sample of cells from the entire transformation zone, the area where the squamous and columnar epithelium meet and where most cervical abnormalities develop. Two main techniques are used for sample preparation. In the conventional Pap smear, the collected cells are immediately fixed onto a glass slide at the health facility. In liquid-based cytology (LBC), the cells are instead placed into a vial containing a special transport medium, which is then sent to the laboratory for processing⁵². Once at the laboratory, trained cytotechnologists or pathologists examine the cells under a microscope. If abnormal changes are detected, the severity and type of abnormality are categorized using the Bethesda System, a standardized reporting framework for cervical cytology results⁵³.

The Pap smear's main purpose is to detect early signs of cervical cancer or precancerous changes so that timely intervention and treatment can be provided. Beyond cancer detection, cytology can also help identify infections, inflammation, and other pathological conditions affecting the cervix⁵⁴. To collect a cytology sample, a speculum is inserted to visualize the cervix under adequate lighting. The provider uses a spatula, brush, or both to obtain cells from the surface of the cervix and the endocervical canal. The collected specimen is either smeared directly onto a slide for Pap testing or placed into a preservative solution for LBC. Each sample must be properly labelled, stored, and transported to the laboratory without compromising its quality⁵⁵.

When cytology-based screening programmes are well-organized and effectively implemented, they can significantly reduce the incidence and mortality of cervical cancer. However, these programmes involve multiple steps and face logistical challenges, especially

in low-resource settings⁵⁶. For a screening programme to be successful, the specimen must be correctly collected, adequately fixed or preserved, safely transported to the laboratory, processed with precision, and accurately interpreted. The results then need to be reliably communicated back to the healthcare provider, and the patient must receive them promptly, along with the necessary follow-up or treatment. Any breakdown at these points can reduce the programme's effectiveness⁵⁷.

Liquid-based cytology offers certain advantages over conventional Pap smears. Because the sample is suspended in liquid, the material collected is often more representative of the transformation zone, and there is a lower rate of unsatisfactory specimens. The liquid preparation also minimizes the likelihood that blood, mucus, or inflammatory cells will obscure the epithelial cells that need to be evaluated. Moreover, LBC slides typically require less time to interpret, and the same sample can be used for additional tests, such as HPV DNA detection and screening for other sexually transmitted infections (STIs)⁵⁷. Despite these advantages, LBC is a costly method that depends on advanced laboratory infrastructure and highly skilled personnel⁵⁸. Current evidence does not show that LBC is more effective than conventional cytology in reducing cervical cancer morbidity and mortality⁵⁸.

The use of artificial intelligence (AI)

The application of artificial intelligence (AI) in medical diagnosis particularly in the field of pathology has demonstrated significant potential for reducing diagnostic errors and enhancing accuracy. In cytology, AI-assisted slide interpretation can greatly improve the detection of abnormal cells, reducing both false-positive and false-negative results. In some studies, AI systems have achieved diagnostic accuracy rates as high as 99.8%, coupled with 100% sensitivity in identifying abnormal or malignant cells⁵⁹. The integration of AI and machine learning algorithms into clinical decision-making processes also offers valuable

benefits beyond detection. These technologies can assist in patient stratification identifying individuals at higher risk who may require more intensive follow-up and in guiding treatment selection by analyzing complex datasets and patterns that may not be immediately apparent to the human eye⁵⁹.

Despite these advancements, several limitations must be acknowledged. The quality of input images is crucial; suboptimal image resolution or improper sample preparation can negatively affect AI performance. Additionally, the potential for algorithmic bias arising from training datasets that are not fully representative of the population remains a concern⁶⁰. While AI tools can significantly support cytologists, enhancing efficiency and consistency in slide evaluation, they are not a replacement for human expertise. The nuanced judgment, contextual interpretation, and clinical experience of trained professionals remain indispensable for ensuring accurate and reliable diagnoses⁶¹.

2.1.10 Diagnostic tools, training and facilities

Colposcopy, biopsy, and endocervical curettage (ECC) are among the most widely used diagnostic procedures for confirming the presence of cervical pre-cancerous lesions. These methods are more advanced than basic screening techniques and require both substantial medical resources and a high degree of professional training to be performed accurately and safely. When the necessary equipment such as a colposcope for magnified visualization of the cervix, biopsy forceps for obtaining tissue samples, and an endocervical curette for scraping cells from the endocervical canal is available, these procedures can, in some cases, be carried out at the primary health care level. However, this is only advisable when health-care providers have undergone competency-based training and are supported by appropriate supervision and quality assurance systems to ensure the safety and accuracy of the procedures.

Colposcopy

Colposcopy is a diagnostic procedure used to closely examine the cervix, vagina, and vulva with the aid of an instrument that provides intense illumination and magnification. This enhanced view allows health care providers to carefully assess the epithelial (surface) layer and the surrounding blood vessels, enabling the identification of specific patterns that may indicate abnormal or precancerous changes. The technique was first introduced in 1925 by Hans Hinselmann in Germany as an innovative screening method for cervical cancer⁶².

In modern practice, colposcopy can also be performed using specially designed video or digital cameras, making the process more accessible for documentation, teaching, and telemedicine consultations. It is commonly recommended for patients with abnormal Papanicolaou (Pap) test results, a positive test for high-risk human papillomavirus (HPV) DNA, or a cervix that appears suspicious upon visual inspection even when routine dysplasia screening results are negative.

Colposcopy serves several important purposes: Verifying the extent and type of pre-cancer or cancer detected during screening, Guiding targeted biopsies of any areas that appear abnormal under magnification, assisting in treatment planning, including determining whether procedures such as cryotherapy or loop electrosurgical excision procedure (LEEP) are the most suitable options. In addition to its diagnostic role, colposcopy is also performed as part of post-treatment follow-up for patients who have undergone therapy for cervical intraepithelial neoplasia (CIN) or invasive carcinoma, ensuring that no residual or recurrent disease is present.

Biopsy

A biopsy is a medical procedure in which small samples of abnormal tissue are removed and examined under a microscope to establish a definitive diagnosis. In the context of cervical cancer prevention and diagnosis, biopsies are often obtained from areas of the cervix that

test positive on visual inspection with acetic acid (VIA) or from regions that appear suspicious for cancer during a visual or clinical examination. When a lesion or other abnormality is not visible to the naked eye, colposcopy can be used to precisely locate the most appropriate site or multiple sites for biopsy collection ⁶³. In standard practice, a biopsy is taken from each area that appears abnormal. However, in certain circumstances, random biopsies may also be performed to increase the likelihood of detecting hidden disease. The procedure requires the use of specialized biopsy forceps and must be performed by a provider with appropriate training to ensure both safety and accuracy. While the primary purpose of a biopsy is diagnostic, some biopsy techniques can also serve a therapeutic function by removing abnormal tissue or lesions entirely, thereby contributing to both diagnosis and treatment in a single procedure⁶³.

Biopsy findings: Cervical intraepithelial neoplasia (CIN)

Biopsy specimens are examined by a pathologist to determine the presence and severity of cervical intraepithelial neoplasia (CIN) a term used to describe abnormal cells detected on the surface of the cervix following a biopsy. CIN is graded on a scale from 1 to 3, based on the degree of cellular abnormality observed under a microscope and the proportion of cervical tissue involved⁶⁴.

CIN 1 represents mild or low-grade changes, often corresponding to low-grade squamous intraepithelial lesion (LSIL) findings on a Pap test. These abnormalities usually resolve spontaneously without treatment.

CIN 2 indicates moderate abnormalities and may be associated with high-grade squamous intraepithelial lesion (HSIL) results on a Pap test. While CIN 2 often requires treatment typically involving the removal of the abnormal tissue it can sometimes regress without intervention. In such cases, careful monitoring under the guidance of a health-care provider

is essential. If CIN 2 persists for one to two years or progresses to CIN 3, treatment becomes necessary. CIN 3 represents severe abnormalities, also classified as HSIL, and involves a greater portion of the cervical tissue. Although CIN 3 is not cancer, it has a high potential to progress to invasive cancer if left untreated. As such, prompt treatment is required. However, certain treatment methods are contraindicated during pregnancy, necessitating careful clinical decision-making.

Cone biopsy

A cone biopsy involves the removal of a cone-shaped section of tissue from the cervix to determine whether abnormal cells are present beneath the surface layer. This procedure can be performed in two main ways: using a loop electrosurgical excision procedure (LEEP) cone, which is typically carried out under local anaesthesia, or through a cold knife cone biopsy, performed in an operating room under either local or general anaesthesia. Both methods allow for thorough examination of the excised tissue to aid in accurate diagnosis and treatment planning⁶⁵.

Endocervical curettage

Endocervical curettage (ECC) is a straightforward diagnostic procedure in which surface cells are gently scraped from the endocervical canal using a slender, specialized instrument or spatula. The collected tissue is then placed into a container with a fixative solution and sent to a laboratory for microscopic examination⁶⁶. ECC is typically performed in specific circumstances, including: When screening results suggest a possible pre-cancer or cancer that is not visible during colposcopy, raising suspicion that the abnormality may be located deeper within the cervical canal. When the squamocolumnar junction (SCJ) cannot be completely visualized in a patient with a suspected lesion. When a Pap smear indicates the presence of a glandular lesion, which most often originates from the columnar epithelium inside the cervical canal. When screening and/or colposcopy are incomplete or inconclusive

for example, if the transformation zone is not fully seen and there is clinical suspicion of cancer. This procedure provides valuable diagnostic information in cases where abnormalities may be hidden from standard visual inspection, ensuring that potentially serious lesions are not overlooked.

Special situations related to colposcopy, biopsy and endocervical curettage

If the entire transformation zone of the cervix cannot be fully visualized during examination, it is recommended to perform endocervical curettage (ECC) to ensure that hidden abnormalities within the *cervical* canal are not missed⁶⁶. However, if ECC is not feasible and the screening results indicate the possibility of a high-grade lesion, the woman should be referred for a more advanced excisional procedure, such as a loop electrosurgical excision procedure (LEEP) or cold knife conization (CKC)⁶⁶. In postmenopausal women, the transformation zone often recedes into the endocervical canal, making complete visualization difficult and increasing the importance of ECC or excisional diagnostic procedures when abnormalities are suspected⁶⁷.

Pregnancy presents unique considerations for cervical screening. While it is generally not ideal to perform screening during pregnancy, if such a test is conducted and returns abnormal results or if a visible lesion is detected during speculum examination the patient should be referred promptly for colposcopy⁶⁸. Biopsies during pregnancy carry a higher risk of significant bleeding; therefore, if colposcopy findings do not raise suspicion for invasive cancer, the preferred approach is to schedule the patient for a follow-up colposcopy at 6 to 12 weeks postpartum. At that time, further evaluation, including biopsy if necessary, can be performed safely⁶⁸.

If invasive cancer is suspected at any stage during pregnancy, the patient should be referred immediately to a specialist at a tertiary care hospital for appropriate management. Importantly, the management of cervical abnormalities including colposcopy and biopsy

should not be altered on the basis of a woman's HIV status⁶⁹. However, it is worth noting that women living with HIV may experience increased viral shedding during the healing period after a cervical procedure³. As part of pre- and post-procedure counselling, health-care providers should emphasize the importance of discussing this risk with sexual partner(s) and advise abstaining from sexual intercourse until complete healing has occurred⁶⁹.

Recommendations for cervical screening

Cervical cancer screening recommendations vary based on age group and screening history, with the goal of balancing early detection with the avoidance of unnecessary procedures⁶⁹. Women younger than 21 years do not require cervical cancer screening, regardless of the age of onset of sexual activity. This is because cervical cancer is extremely rare in this age group, and most HPV infections resolve spontaneously without intervention⁷⁰. Women aged 21 to 29 years are advised to have a Pap test (cytology) alone every 3 years. Although HPV testing alone may be considered for women between 25 and 29 years, the Pap test remains the preferred screening method due to the high prevalence of transient HPV infections in younger women, which may lead to unnecessary anxiety and procedures if detected without cytological changes⁷¹.

Women aged 30 to 65 years have three equally acceptable screening options⁷². Co-testing with a Pap test and an HPV test every 5 years. A Pap test alone every 3 years. HPV testing alone every 5 years. The choice among these options should be guided by patient preference, availability of testing, and clinical context. Co-testing offers the advantage of combining cytological assessment with detection of high-risk HPV types, thereby enhancing sensitivity for detecting pre-cancer. Women aged 65 years or older generally do not need to continue screening if they have no history of cervical precancer or cancer and meet one of the following criteria^{8,69}. Three consecutive negative Pap tests within the past 10 years. Two consecutive negative HPV tests within the past 10 years. Two consecutive negative co-test

results within the past 10 years. In all cases, the most recent test must have been performed within the previous 3 years for cytology alone or 5 years for HPV testing or co-testing⁷². These guidelines ensure that screening is performed frequently enough to detect significant cervical abnormalities early, while avoiding over-screening that may lead to unnecessary interventions.

2.1.11 Screening methods for cervical pre-cancer

HPV testing method

Human papillomavirus (HPV) testing methods are designed to detect the DNA of high-risk HPV types present in vaginal and/or cervical samples. These tests are valuable in identifying women who may be at risk for developing cervical cancer; however, their use in women younger than 30 years old is generally not recommended. The main reason for this is that HPV infection is very common in younger women, yet the majority of these infections are transient and are naturally cleared by the immune system before a woman reaches the age of 30. Conducting HPV tests in this younger age group often leads to the detection of temporary infections that would have resolved on their own. This, in turn, can result in unnecessary medical procedures, overtreatment, and the associated risks such as physical harm, anxiety, emotional distress, discomfort, and additional financial costs.

As women get older, the clinical implications of a positive HPV test become more significant. If high-risk HPV is detected in a woman over the age of 30, it is more likely to indicate a persistent infection rather than a short-term one. Persistent HPV infection is a well-established cause of almost all cases of cervical cancer. Therefore, a positive HPV result in this age group suggests that the woman may already have a precancerous lesion or is at an increased risk of developing pre-cancer and, eventually, invasive cancer in the future. Prompt identification and appropriate management of such women can greatly reduce their

chances of progressing to cervical cancer. Treating women who test positive for high-risk HPV in this age group is therefore a crucial preventive measure⁷³.

In many high-resource settings, HPV testing is being integrated into cervical cancer prevention programs as a primary screening method. This represents a shift from the traditional approach of using Pap smears alone, as HPV testing has shown high sensitivity in detecting potential precancerous changes. Currently, however, most available HPV tests require that collected samples be transported to and processed in a specialized laboratory before results can be provided. This means that timely and reliable transportation systems for specimens are essential for the success of such screening programs.

It is also important to note that while the presence of high-risk HPV is a necessary step in the development of cervical cancer, a positive HPV test does not, by itself, confirm that a woman has precancer or cancer. Instead, it simply confirms that an HPV infection is present. Additional diagnostic evaluation, such as colposcopy and biopsy, is often necessary to determine whether abnormal cell changes have already occurred. Sample collection for HPV testing can be performed in a variety of health care settings, including hospitals, clinics, and even community outreach sites, provided there is access to an adequately equipped laboratory within a reasonable distance and a dependable transport system for the samples. This flexibility in sample collection can improve access to screening, particularly in rural or underserved areas, thereby expanding the reach and effectiveness of cervical cancer prevention efforts⁷⁴.

HPV Tests

HPV testing is designed to detect the presence of high risk types of the human papillomavirus (HPV) that are most strongly linked to the development of cervical cancer. These high risk strains can persist in the body for many years, and if left untreated, they can

cause gradual changes in cervical cells that may progress to precancerous lesions or, eventually, invasive cervical cancer. Detecting these infections early allows for timely intervention, reducing the likelihood that cancer will ever develop⁷⁵. The test can be performed alongside a Pap test during a routine screening visit. Using a small, soft brush, a healthcare provider collects cells from the surface of the cervix. These cells are then sent to a laboratory for analysis to determine whether any high-risk HPV types are present. In some cases, the HPV test does not require a separate sample; instead, it can be conducted directly on the specimen collected for the Pap test.

Among the high-risk HPV types, HPV 16 and HPV 18 are the most aggressive and are together responsible for approximately 70% of cervical cancer cases worldwide. Identifying these specific types is particularly important because of their strong association with high-grade lesions and rapid progression to cancer if not managed appropriately. Early detection of HPV 16 or 18 can therefore prompt closer monitoring and early treatment, which are critical in preventing cervical cancer and improving long-term health outcomes⁷⁵.

2.1.12 Diagnostic tests for detection of cervical pre-cancer

The role of diagnostic tests

A diagnostic or confirmatory test is a medical examination performed to assist in identifying or confirming the presence of a specific disease. In the context of cervical cancer prevention, not all women who receive a positive result on an initial screening test actually have pre-cancer. Therefore, a follow-up diagnostic procedure may sometimes be necessary to make a definitive diagnosis or to confirm whether pre-cancer or cancer is present. While these tests can be essential for accurate diagnosis, they also carry significant implications for healthcare resources. They may present practical and financial barriers that limit women's ability to access timely care, potentially delaying necessary treatment. In some cases, these barriers

can lead to higher rates of loss to follow-up, meaning some women may never receive the treatment they need for pre-cancerous lesions.

Furthermore, diagnostic tests are not infallible. They can yield false-positive results incorrectly indicating the presence of disease or false-negative results failing to detect disease when it is present. Such inaccuracies can complicate, rather than clarify, decisions about patient management. For these reasons, in settings where healthcare resources are limited or where follow-up rates are poor, diagnostic testing should not be made a mandatory step before initiating treatment for pre-cancer. In such situations, prioritizing immediate treatment over confirmatory diagnostics can help ensure that more women receive timely and potentially life-saving care.

2.1.13 Advances in Disease Screening Methods

Despite the challenges in managing HPV infected lesions, effective screening and treatment can significantly reduce the risk of cervical cancer. The prolonged interval between HPV infection and cancer development allows for early detection and intervention, enabling highly effective treatments. Preventive measures, such as quitting smoking and using barrier contraception, can also help prevent HPV infection. Worldwide efforts to eradicate cervical cancer focus on improving access to HPV vaccines and cervical cancer screenings.

2.1.14 Treatment of Cervical Cancer

Pap test results

Pap test results show whether cervical cells are normal or abnormal. A Pap test may also come back as unsatisfactory.

Normal Pap test results: No abnormal cervical cells were found. A normal test result may also be called a negative Test result or negative for intraepithelial lesion (area of abnormal growth) or malignancy.

Unsatisfactory Pap test results: The lab sample may not have had enough cells, or the cells may have been clumped together or hidden by blood or mucus. The patient will have to come in for another Pap test in 2 to 4 months.

Abnormal Pap test results: An abnormal test result may also be called a positive test result. Some of the cells of the cervix look different from the normal cells. An abnormal test result does not mean that the patient has cancer. Further test will be recommended with monitoring or treatment.

Abnormal Pap test results include:

Atypical squamous cells of undetermined significance (ASC-US): This is the most common abnormal Pap test finding. It means that some cells don't look completely normal, but it's not clear if the changes are caused by HPV infection. Other things can cause cells to look abnormal, including irritation, some infections (such as a yeast infection), growths (such as polyps in the uterus), and changes in hormones that occur during pregnancy or menopause. Although these things may make cervical cells look abnormal, they are not related to cancer. an HPV test will be done to see if the changes may be caused by an HPV infection. If the HPV test is negative, estrogen cream may be prescribed to see if the cell changes are caused by low hormone levels. If the HPV test is positive, there may be need for additional follow-up tests.

Atypical glandular cells (AGC): Some glandular cells were found that do not look normal. This can be a sign of a more serious problem up inside the uterus, further test will be carried out e.g. colposcopy to detect the problem.

Low-grade squamous intraepithelial lesions (LSIL): There are low-grade changes that are usually caused by an HPV infection. Additional test will be carried out to make sure that there are not more serious (high-grade) changes.

Atypical squamous cells, cannot exclude high-grade squamous intraepithelial lesion (ASC-H): Some abnormal squamous cells were found that may be a high-grade squamous intraepithelial lesion (HSIL), although it's not certain. further test will be carried out e.g. colposcopy to detect the problem.

High-grade squamous intraepithelial lesions (HSIL): There are moderately or severely abnormal cervical cells that could become cancer in the future if not treated. The patient will require further test.

Adenocarcinoma in situ (AIS): An advanced lesion (area of abnormal growth) was found in the glandular tissue of the cervix. AIS lesions may be referred to as precancer and may become cancer (cervical adenocarcinoma) if not treated. The patient will require further test e.g. colposcopy

Cervical cancer cells (squamous cell carcinoma or adenocarcinoma): Cancer cells were found; this finding is very rare for people who have been screened at regular intervals. If a biopsy shows that cervical cancer is present, further test will be conducted to find out if the cancer cells have spread within the cervix or to other parts of the body.

2.1.15 Treatment options for cervical pre-cancer

Women diagnosed with pre-cancer require timely and effective treatment, which can often be delivered by trained primary care providers within primary care facilities, such as local health centres. This is in contrast to the management of suspected or confirmed invasive cervical cancer, which must be handled by specialist medical professionals in higher-level facilities, such as hospitals. In a screen-and-treat approach, treatment is initiated immediately after a positive screening result, without the need for diagnostic confirmation beforehand⁷¹.

The primary goal of treatment is to destroy or remove areas of the cervix identified as pre-cancerous, thereby preventing progression to invasive cancer. Treatment methods fall into

two main categories: ablative and excisional. Ablative methods work by destroying abnormal tissue, usually through burning or freezing, and do not produce a tissue sample for histopathological confirmation. Excisional methods involve surgically removing the affected tissue, which can then be examined under a microscope for further analysis. Common treatment options include cryotherapy, loop electrosurgical excision procedure (LEEP), and cold knife conization (CKC). Other techniques, such as laser excision or ablation, are available but tend to be less widely accessible. Hysterectomy is almost never an appropriate treatment for pre-cancer and should only be considered if there are other compelling medical reasons to remove the uterus.

The choice of treatment depends on several factors, including the potential benefits and risks of each method, the location, size, and severity of the lesion, the cost and resource requirements, and the training and expertise of the healthcare provider. Regardless of which method is recommended, it is essential that the patient be fully informed about the procedure, enabling her to make a confident and informed decision. Importantly, if a cervical abnormality appears suspicious for cancer, cryotherapy, LEEP, or CKC should not be used. Instead, the next appropriate step is to perform a cervical biopsy to confirm or rule out a diagnosis of cancer before proceeding with any further treatment⁷⁵.

Cryotherapy

Cryotherapy is an ablative treatment that removes precancerous areas on the cervix by freezing them. The procedure involves pressing a highly cooled metal disc, called a cryoprobe, directly onto the cervix, freezing both the abnormal tissue and the surrounding normal tissue, it covers. The cryoprobe is cooled using compressed carbon dioxide (CO₂) or nitrous oxide (N₂O) gas from a pressurized tank. The entire process takes about 15 minutes, is generally well tolerated, and typically causes only mild discomfort, allowing it to be

performed without anaesthesia. After cryotherapy, the frozen tissue naturally regenerates into normal cervical epithelium.

Eligibility criteria: Cryotherapy is suitable for screen-positive women (e.g., VIA-positive) or those with histologically confirmed CIN2+ lesions, provided the entire lesion and the squamocolumnar junction (SCJ) are fully visible, and the lesion covers no more than three-quarters of the ectocervix. It is not appropriate if the lesion extends beyond the cryoprobe's reach, involves the endocervical canal, or appears suspicious for invasive cancer.

Post-procedure care: Cervical tissue takes about a month to regenerate. During this period, patients may experience profuse, watery vaginal discharge. They should avoid sexual intercourse until the discharge resolves, or use a condom if abstinence is not possible⁷⁶.

Loop Electrosurgical Excision Procedure (LEEP) involves removing abnormal cervical tissue with a thin wire loop that is electrically charged. The loop cuts and coagulates the tissue simultaneously, and a ball electrode is often used afterward to ensure complete coagulation. LEEP removes both the lesion and the entire transformation zone, producing a tissue sample that can be sent for histopathological examination. This dual function treatment and diagnostic confirmation make LEEP an important tool in pre-cancer management.

The procedure is performed under local anaesthesia in an outpatient setting and generally takes less than 30 minutes. While relatively simple, LEEP should only be done by a trained healthcare provider experienced in the technique and in managing potential complications such as haemorrhage. Ideally, it should be performed in facilities where surgical backup is available, typically at least secondary-level centres.

Eligibility criteria: LEEP is suitable for screen-positive women (e.g., VIA-positive) or those with histologically confirmed CIN2+, as long as the lesion does not appear suspicious for invasive cancer.

Post-procedure care: Patients may experience mild cramping for a few days and vaginal discharge for up to a month. Initially, the discharge may be bloody for 7 to 10 days, followed by a yellowish discharge. As with cryotherapy, tissue healing takes about one month, during which sexual intercourse should be avoided or a condom should be used if intercourse occurs⁷⁷.

Cold knife conization (CKC)

Cold Knife Conization (CKC) is a surgical procedure in which a cone-shaped section of tissue is removed from the cervix. This excision includes parts of both the outer cervix (ectocervix) and the inner cervical canal (endocervix). The size of the removed tissue depends on the extent of the lesion and the likelihood of detecting invasive cancer. The excised tissue is always sent to a pathology laboratory for histopathological examination to confirm the diagnosis and to verify that all abnormal tissue has been completely removed.

CKC is typically performed in a hospital setting with appropriate infrastructure, surgical equipment, and supplies. It requires a skilled healthcare provider such as a gynaecologist or a surgeon who is trained in the procedure and competent in recognizing and managing potential complications, particularly bleeding. The surgery is carried out under general or regional anaesthesia (spinal or epidural) and usually takes less than an hour. Most patients can be discharged from the hospital either on the same day or the day following the procedure.

Eligibility criteria: CKC should be reserved for cases that cannot be resolved with cryotherapy or LEEP. It should be considered in the presence of glandular pre-cancer or microinvasive cancer lesions of the cervix.

Post procedure: Following CKC, patients may have mild cramping for a few days and a bloody vaginal discharge, transitioning into a yellow discharge for 7 to 14 days. It takes 4 to 6 weeks for the cervix to heal (depending on the extent of the procedure) and during this time the patient should avoid sexual intercourse or use a condom if intercourse cannot be avoided.

Possible complications and follow-up after treatment

All three treatment modalities may have similar complications in the days following the procedure. All of these complications may be indications of continuing bleeding from the cervix or vagina or an infection that needs to be treated. Patients should be advised that if they have any of the following symptoms after cryotherapy, LEEP or CKC, they should seek care at the closest facility without delay: Bleeding (more than menstrual flow), abdominal pain, Foul-smelling discharge, Fever⁷⁸.

Photodynamic therapy (PDT)

Photodynamic therapy (PDT) is effective in treating various grades of cervical intraepithelial neoplasia (CIN) with high success rates and low recurrence. Specifically, it has achieved impressive complete response rates, ranging from 82.4% to 93.9%, and sustained clearance rates over 12 months. This makes PDT a viable treatment option, particularly for women seeking minimally invasive procedures or those of childbearing age.

2.1.16 Therapeutic HPV vaccines

Therapeutic HPV vaccines aim to combat HPV-related cervical lesions by targeting the virus's proteins. VGX-3100, a DNA-based vaccine, has shown promise in eliminating HPV-related lesions and achieving long-term viral clearance. Another vaccine, PepCan, is currently under evaluation. While therapeutic vaccines hold potential as non-invasive treatments, their effectiveness relies on a healthy immune system, which may be a concern for immunosuppressed patients, such as those with HIV or organ transplant recipients⁷⁹.

Follow-up after Treatment

A follow-up visit that includes cervical cancer screening is recommended 12 months after treatment to assess the woman's post-treatment status and to detect any signs of recurrence. If this follow-up screening yields a negative result, the woman can be safely referred back to the routine screening programme. However, there is an important exception: if the histopathological examination of tissue obtained during treatment whether from a LEEP or CKC shows CIN3 or adenocarcinoma in situ (AIS), the follow-up protocol changes. In such cases, annual cervical cancer screening is recommended for the next three consecutive years. If all three annual rescreens are negative, the woman may then transition back to the routine screening schedule.

If the woman who was treated for pre-cancer has a positive screening result at her follow-up visit, indicating persistent or recurrent cervical pre-cancer, retreatment is necessary. When the initial treatment was cryotherapy, the preferred retreatment method if feasible is LEEP or CKC, as these provide both treatment and histopathological specimens for evaluation. In cases where histopathological results from a punch biopsy, LEEP, or CKC indicate cancer, it is vital that the patient be promptly contacted. She should be clearly advised that she must be seen at a tertiary care hospital without delay to ensure appropriate management and treatment planning⁸⁰.

2.1.17 Linking screening and treatment in practice according to WHO

For cervical cancer prevention programmes to be truly effective, a positive screening result must be promptly followed by appropriate treatment. The World Health Organization (WHO) has evaluated the evidence for two main strategies to connect screening with treatment of cervical pre-cancer: the screen, diagnose, and treat approach and the screen-and-treat approach. The screen, diagnose, and treat method begins with a screening test. If the result is positive, the woman undergoes further diagnostic procedures such as colposcopy and biopsy to obtain histological confirmation of the diagnosis and to determine the severity of the abnormality. Treatment decisions are then guided by these histology results. For example, if the biopsy confirms CIN2 or a more severe pre-cancerous lesion (CIN2+), the woman receives appropriate treatment. Conversely, if histology reveals invasive cervical cancer, she is referred without delay to a tertiary care hospital for specialist management⁸¹.

2.1.18 Health Limitations Associated with the Cervical Cancer

In this context, limitations refer to impairments that affect an individual's ability to carry out daily activities and bodily functions, including both physiological and psychosocial processes. These impairments can cause the affected person to become dependent on significant others for tasks they would normally be able to perform independently.

When it comes to treating cervical cancer, limitations often arise when the disease has progressed to an advanced stage, where it has extensively spread beyond the cervix. At this stage, curing the cancer becomes much more challenging. Additionally, the treatments themselves such as radiation therapy and chemotherapy can cause side effects that further contribute to these limitations.

These challenges can be categorized into four broad areas: physiological limitations, which include physical impairments and side effects impacting bodily functions; psychological

limitations, encompassing emotional distress, anxiety, and depression related to both the illness and its treatment; family limitations, where the patient's condition affects family dynamics, caregiving responsibilities, and emotional support; and social limitations, which involve difficulties in social participation, work, and community engagement. Together, these factors contribute to a reduced quality of life and increased dependency for women undergoing treatment for cervical cancer⁸².

The Family health limitation

Cervical cancer impacts six fundamental areas of family life: employment, income, household budget, education, access to healthcare, and childcare. This illustrates that the burden of the disease extends far beyond the individual patient, affecting the entire family unit.

Loss of family income: Because cervical cancer is often a chronic illness requiring ongoing treatment such as radiotherapy, chemotherapy, or surgery, families frequently face significant financial strain. Funds that would normally support family welfare and daily living expenses are instead redirected toward covering medical costs. In some cases, families may be forced to sell assets or exhaust savings to pay for treatment, leaving little or nothing to support other family members. This financial depletion can increase the risk of malnutrition and vulnerability for the entire household⁸³.

Reduction in household budget: The financial burden of the disease often leads to a tightened household budget, affecting basic necessities. Families might reduce the quantity or quality of food consumed daily and may also experience delays in paying for essential services such as school fees, security, electricity, and other utilities.

Limited access to healthcare: Financial constraints caused by the illness of one family member can drastically limit the ability of other family members to access healthcare

services. This can compound health risks across the family, especially for those who require medical attention themselves.

Childcare deficits: The physical and emotional demands of caring for a family member with cervical cancer often result in diminished attention to the needs of children in the household. This neglect can adversely affect the children's development and overall well-being, as both their physical care and psychological support may be compromised. Psychological health limitations are also a significant concern for women with cervical cancer. Depression is common, characterized by persistent feelings of sadness, hopelessness, and a loss of interest in activities that were previously enjoyable. Anxiety frequently stems from fear of the unknown about the disease's progression, treatment options, outcomes, and the prospect of death can overwhelm the patient. This intense fear can lead to withdrawal from social interactions and detachment from their surroundings. In such a state, the patient's ability to think positively and effectively cope with their illness may be severely impaired unless appropriate psychological support and care are provided. Together, these physiological, psychological, and socio-economic limitations demonstrate how cervical cancer profoundly disrupts not only the health of the patient but also the stability and functioning of their entire family⁸⁴.

Physiological limitations

Early menopause: can occur in women with advanced cervical cancer, particularly when the ovaries are surgically removed as part of treatment. This procedure leads to an abrupt cessation of estrogen and progesterone production, hormones essential for regulating menstrual cycles and various bodily functions. Additionally, radiation therapy targeting the pelvic area can also damage the ovaries, hastening the onset of menopause even without surgical removal.

Narrowing of the vagina: is another complication associated with cervical cancer. Normally, the vaginal walls contain folds called rugae that stretch during childbirth or sexual intercourse. However, cervical cancer and its treatments can reduce the elasticity and expansibility of the vaginal canal, causing it to narrow. This narrowing often results in dyspareunia, or painful sexual intercourse, and can also prevent vaginal delivery during childbirth.

Kidney failure: may develop if the cancerous tumor grows large enough to compress the ureters the tubes that carry urine from the kidneys to the bladder. This obstruction can cause urine to back up, leading to hydronephrosis, a condition in which the kidneys become swollen and stretched. Prolonged obstruction can result in scarring and permanent damage to the kidneys, potentially causing partial or complete loss of kidney function.

Vaginal discharge: is an uncommon but distressing symptom in advanced cervical cancer. This discharge is often foul-smelling and can arise for various reasons, such as tissue breakdown within the tumor, leakage of bladder or bowel contents into the vagina due to fistula formation, or secondary bacterial infections of the vaginal area.

Pain: is frequently severe in cervical cancer, especially when the disease spreads to involve nerve endings, bones, or muscles. This intense pain can significantly reduce the patient's comfort and ability to perform daily activities, often necessitating comprehensive pain management.

Social health limitations

Work productivity is often diminished in women with cervical cancer due to the debilitating effects of the illness and its treatment. Many patients require extended periods away from their jobs to rest and attend medical appointments, which can affect their income and job security.

Reduced ability to perform activities of daily living is common, especially after major surgeries such as a radical hysterectomy. Recovery from such operations can take six to twelve weeks, during which time patients are advised to avoid strenuous activities like heavy housework or lifting children to allow proper healing. Sexual health is frequently impacted by cervical cancer and its treatments. Side effects such as vaginal dryness and narrowing (stenosis) often contribute to painful intercourse, leading many women to find sexual activity difficult or impossible during and after treatment. These challenges can strain intimate relationships and may contribute to family instability.

Together, these physiological and social limitations highlight the profound and multifaceted ways cervical cancer affects women's health and well-being beyond the physical disease itself⁸⁵.

2.1.19 Infection prevention for cervical cancer screening programmer

Infection prevention is a critical aspect of cervical cancer screening and must be strictly observed to protect both patients and healthcare providers. During procedures such as speculum or bimanual examinations, specimen collection, and treatments like cryotherapy, providers should wear clean gloves to minimize the risk of transmitting infections. For more invasive procedures, including the loop electrosurgical excision procedure (LEEP), the use of sterile gloves is essential to maintain a higher level of asepsis⁹. Adhering to established guidelines on hand hygiene, proper handling of instruments, and safe disposal of used materials including gloves is vital in preventing the spread of pathogens such as HIV and other infectious agents. These standard infection prevention and control (IPC) precautions must be applied consistently with every patient, regardless of their apparent health status or known infection history. This universal approach safeguards both patients and healthcare workers by minimizing potential exposure to infections.

Moreover, making infection prevention measures visible during the screening process such as visibly washing hands and changing to new gloves can help alleviate any concerns or anxiety the woman undergoing screening may have about the cleanliness and safety of the procedure. This transparency builds trust and reassures patients about the quality of care they are receiving.

2.1.20 World Health Organization Response on Prevention of Cervical Cancer

The WHO Global Strategy for cervical cancer elimination defines the goal as reducing new cases to fewer than 4 per 100,000 women annually. To achieve this, it sets three ambitious targets for all countries to reach by 2030, laying the foundation for elimination in the coming decades: first, ensuring that 90% of girls receive the HPV vaccine by age 15; second, screening 70% of women with a high-quality test by ages 35 and 45; and third, guaranteeing that 90% of women diagnosed with cervical disease receive appropriate treatment. Modeling studies estimate that by meeting these targets, up to 74 million new cases of cervical cancer could be prevented, and 62 million deaths avoided worldwide by the year 2120. To support this global effort, resources and knowledge from WHO, UN agencies, and other partners are available through the Cervical Cancer Elimination Initiative, which serves as a comprehensive knowledge repository for stakeholders⁸⁶.

Preventing HPV-related precancer and cancer is also integral to WHO's broader Global Health Sector Strategy on HIV, hepatitis, and sexually transmitted infections (2022–2030). Furthermore, the World Health Assembly's resolution on oral health incorporates actions addressing mouth and throat cancers, recognizing the interconnectedness of cancer prevention efforts. In response to these global calls, key stakeholders including donors and national governments have increasingly prioritized cervical cancer within their public health

agendas and budgets. The elimination of cervical cancer depends heavily on effectively scaling up two critical prevention strategies: HPV vaccination as the primary prevention method, and regular screening and treatment of precancerous lesions as secondary prevention.

Importantly, even as HPV vaccination programs are rolled out, continued screening remains essential for all women both vaccinated and unvaccinated to detect and manage any lesions early. Achieving screening coverage of at least 70% of eligible women is necessary to drive a meaningful reduction in cervical cancer incidence⁸⁷. With concerted global commitment, every country has pledged to eliminate cervical cancer as a public health problem, marking a historic step toward safeguarding women's health worldwide.

2.1.21 Ethical considerations for Cervical Cancer Screening

Before implementing a cervical cancer screening program, several key elements must be considered to ensure it is ethical and equitable.⁸⁸ Screening, early treatment of precancerous conditions, and cervical cancer management must be accessible to all women within the target age group, including those who are poor, vulnerable, or hard to reach. It is essential that treatment services are both available and accessible. Any diagnostic or confirmatory tests included in the program must also be supported by appropriate follow-up care. Health education should be provided to patients, healthcare providers, and communities to support informed decisions about screening and treatment. Confidentiality must be maintained through effective patient record systems and quality care. Healthcare providers should be properly trained and equipped with clear protocols for managing and following up with women who receive positive screening results. Additionally, a strong referral system should be established for any health issues identified during screening. Comprehensive services, including treatment and palliative care for cervical cancer and care for other reproductive health conditions, should also be part of the program.

2.1.22 Informed choice and informed consent

Informed choice is a fundamental principle in healthcare, ensuring that a patient receives complete and understandable information before deciding whether to accept or decline a proposed test or treatment. In the context of cervical cancer prevention, this means that women must be fully informed about the implications of a positive test result, including the necessary follow-up steps and available treatment options along with their benefits and potential outcomes. They should also be made aware of the possible consequences of refusing screening or treatment. This information should be clearly communicated and reinforced immediately before any medical intervention, empowering the patient to make a well-informed and voluntary decision regarding her care.

Informed consent involves a patient's verbal or written agreement to undergo a medical test or procedure after receiving enough information to make an informed decision. Both informed consent and informed choice are grounded in the ethical principles of individual autonomy and respect for personal decision-making. However, in many cultural settings, consent may not be an individual act alone, but rather part of a collective process that includes input from family members, partners, or community leaders. Providing accurate and accessible information through health education and counselling helps women and their support networks understand important aspects of cervical cancer such as risk factors, the role of screening in prevention, and potential risks associated with screening or treatment. Ultimately, the patient has the right to make the final decision, ideally with support and advice from those she trusts. Healthcare providers must remain sensitive to the potential for coercion and take steps to ensure that each woman's choice is truly her own and made freely⁸⁹.

2.2 Theoretical Framework

The Health Belief Model (HBM) has been one of the most widely used theories in understanding health and illness behaviours. The HBM comprises several main constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy to engage in a behaviour and cues to action

2.2.1 The perceived susceptibility

Perceived susceptibility refers to an individual's belief about the chances of developing a particular disease or health condition. In other words, it reflects how likely a person feels they are to contract an illness. When it comes to cervical cancer, a woman's perception of her own risk plays a crucial role in her decision to participate in preventive measures like screening. According to the Health Belief Model (HBM), a widely used psychological framework for understanding health behaviors, a woman's sense of vulnerability to cervical cancer strongly influences whether she follows recommendations for screening. Research consistently demonstrates that women who recognize and acknowledge their risk of developing cervical cancer are more likely to take proactive steps, such as scheduling regular Pap smears or receiving the HPV vaccine. Conversely, the belief that one is not at risk can serve as a major obstacle to screening uptake. Many women who do not perceive themselves as susceptible to cervical cancer tend to delay or entirely avoid undergoing Pap tests, thereby missing opportunities for early detection and intervention. This gap in perceived risk highlights the importance of education and awareness efforts to ensure women understand their vulnerability, which can motivate them to engage in lifesaving screening practices⁸⁹.

2.2.2 The perceived severity

Perceived severity refers to an individual's assessment of how serious a health condition or disease is. This perception encompasses not only the medical or clinical implications of contracting the illness such as the risks of death, disability, or pain but also the broader

social consequences, including impacts on work, family responsibilities, and social relationships. In the context of cervical cancer, if a woman believes that the disease is severe and recognizes that developing cervical cancer could lead to significant medical complications as well as disrupt her social and economic life, she is more likely to take cervical cancer screening seriously. This heightened sense of the potential seriousness of the illness can motivate her to undergo regular screening tests, increasing the chances of early detection and treatment⁹⁰.

2.2.3 Perceived benefits

Health-related behaviors are greatly influenced by an individual's perceived benefits of taking preventive action. Perceived benefits refer to how much a person believes that engaging in a particular health-promoting behavior will effectively reduce their risk of developing a disease or lessen its severity. Importantly, this belief in the value or effectiveness of the action can motivate behavior, even if the objective evidence regarding the action's success is not fully known or understood by the individual. When a person feels personally vulnerable to a serious health threat (perceived threat), whether they actually change their behavior often depends on how strongly they believe that the available preventive measures will help reduce that threat. For instance, women need to believe that undertaking preventive actions such as cervical cancer screening or vaccination will meaningfully lower their chances of developing the disease. Thus, even if someone fully acknowledges their susceptibility to a health condition and understands its seriousness, they are unlikely to adopt any recommended health behaviors unless they also perceive those actions as beneficial and effective in reducing the threat. In other words, optimal beliefs about susceptibility and severity alone are not sufficient to drive action; a clear sense of the potential benefits of preventive measures is also essential for motivating positive health behavior changes.

2.2.4 Perceived barriers

Health related behaviors are also significantly influenced by perceived barriers to taking action. Perceived barriers refer to an individual's evaluation of the obstacles or challenges that might hinder them from adopting a health related behavior or making a behavioral change. Even when a person recognizes a health condition as a serious threat and believes that a certain preventive action can effectively reduce that risk, these barriers can discourage or prevent them from engaging in the recommended health behavior. In essence, for behavior change to occur, the perceived benefits of the action must outweigh the perceived barriers. These barriers can include a wide range of concerns, such as the inconvenience of undergoing a procedure, the financial costs involved, fears about potential dangers like side effects of medical treatments, physical discomfort or pain, emotional distress, and even social factors such as stigma or lack of support. When individuals perceive that the advantages of engaging in a particular health behavior exceed these obstacles, they are far more likely to adopt the behavior. For example, women are more inclined to participate in cervical cancer screening programs if they believe that the health benefits and early detection advantages are greater than the financial expense, possible discomfort, or inconvenience associated with the screening process.

2.2.5 Cues to action

Cues to action are the triggers or stimuli that initiate the decision-making process for adopting a recommended health behavior. These cues can originate from within the individual (internal cues) or from external sources such as the environment or social interactions. Internal cues include bodily sensations or symptoms that may signal illness, while external cues encompass health campaigns, reminders from family or healthcare providers, or exposure to relevant information. In the context of cervical cancer screening, cues to action may involve recognizing symptoms, hearing about the disease through public

awareness campaigns, or receiving encouragement from loved ones or medical professionals. Early formulations of the Health Belief Model emphasized the importance of these cues as essential factors that prompt readiness to act meaning that a woman's perceived susceptibility to cervical cancer and belief in the benefits of screening are often activated or strengthened by such triggers.

For example, women are more likely to participate in cervical cancer screening if they receive reminders from healthcare providers or family members. Written materials such as culturally sensitive brochures, community newspapers, and educational leaflets also serve as important cues, particularly when written in a language accessible to the target audience. Public health campaigns delivered through media platforms can be highly effective as cues, provided they are designed and implemented with cultural awareness and sensitivity. Examples of cues to action include receiving a reminder postcard from a healthcare provider, observing the illness of a friend or family member, or seeing health warning labels on products.

The Health Belief Model highlights that cues are necessary to prompt engagement in health-promoting behaviors, and these cues can be internal like experiencing pain or symptoms or external, such as information from healthcare professionals, media messages, or support from close contacts. The strength or intensity of the cues needed to motivate action varies among individuals depending on their perceived risk, seriousness of the condition, perceived benefits of the action, and perceived barriers. For instance, someone who feels highly susceptible to a serious illness and has a trusted relationship with a primary care physician may respond readily to a simple public service announcement and proceed to get screened. Conversely, a person who believes their risk is low and lacks easy access to healthcare may require stronger or repeated external cues to prompt screening behavior.

2.2.6 Perceived self-efficacy

Self-efficacy was incorporated into the Health Belief Model in 1988, adding an important dimension to understanding health behavior change. It is defined as the belief or confidence that an individual has the ability to successfully perform the behaviors necessary to achieve desired health outcomes⁴². For behavior change to be effective, individuals must first feel a threat from their current behavior (reflected in perceived susceptibility and perceived severity) and believe that adopting a new behavior will lead to a valuable outcome at an acceptable cost (perceived benefits). However, beyond these beliefs, individuals also need to feel capable self-efficacious enough to overcome any barriers or challenges that might hinder them from taking action.

For example, women should have confidence in their ability to undergo regular Pap smear screenings despite potential obstacles such as time constraints, fear, or lack of access. Self-efficacy, therefore, refers to the belief that a person can carry out the necessary actions to prevent a disease or condition even when facing difficulties. Research shows that women with higher self-efficacy are more likely to participate in cervical cancer screening programs. Furthermore, those who have previously undergone screening tend to have greater self-efficacy, as their past experience with the health behavior reinforces their confidence to continue engaging in it.

2.2.7 Modifying Variables

Individual characteristics such as demographic, psychosocial, and structural factors play a significant role in shaping a person's perceptions related to health behaviors, including perceived seriousness, susceptibility, benefits, and barriers. Demographic factors encompass attributes like age, sex, race, ethnicity, and education level. Psychosocial factors include elements such as personality traits, social class, and the influence of peers or reference groups. Structural factors involve knowledge about a particular disease and previous experiences or contact with the disease. According to the Health Belief Model, these

modifying variables do not directly determine health behaviors. Instead, they influence behaviors indirectly by shaping how individuals perceive the seriousness of a health issue, their susceptibility to it, the potential benefits of taking action, and the barriers they might face. In this way, demographic, psychosocial, and structural variables affect the likelihood of engaging in health-promoting behaviors by altering these core perceptions.

Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB), developed by Ajzen⁹¹, provides a systematic framework for understanding the psychological determinants of women's intentions to undergo cervical cancer screening. TPB extends the Theory of Reasoned Action by incorporating the construct of perceived behavioural control, which captures an individual's perception of the ease or difficulty of performing a behaviour. In this context, TPB posits that a woman's intention to participate in cervical cancer screening is the most immediate predictor of her actual screening behaviours. This intention is influenced by three primary constructs: attitude, subjective norm, and perceived behavioural control.

Attitude toward cervical cancer screening reflects a woman's overall evaluation of the behaviours. This includes beliefs about the benefits of early detection and prevention of cervical cancer, as well as perceptions of potential challenges, such as discomfort,

embarrassment, or fear associated with the screening procedure. A positive attitude toward screening, characterized by the recognition of its health benefits and minimal perceived drawbacks, strengthens a woman's intention to engage in the behaviours. Subjective norm refers to the perceived social pressure from significant others, such as family members, peers, or healthcare providers, to perform or refrain from cervical cancer screening. Women who perceive that important individuals in their lives endorse or encourage screening are more likely to develop a strong intention to undergo the procedure. This construct highlights the role of social influence in shaping health-related decisions, particularly in cultures or communities where collective approval strongly affects individual behaviour⁹².

Perceived behavioural control represents a woman's perception of her ability to access and complete cervical cancer screening. This encompasses practical considerations such as availability of healthcare services, financial resources, time constraints, transportation, and personal skills or confidence. High perceived behavioural control enhances both the intention to be screened and the likelihood of completing the screening, even when external barriers exist. TPB recognizes that perceived behavioural control can influence behaviours directly, especially when actual control is limited, making it a critical component in understanding preventive health behaviours. TPB posits that the principal predictor of behaviour is a person's intention to perform that behaviour, which in turn expresses how much effort and planning they commit to it. Typically, stronger intentions lead to higher likelihood of performance provided the individual has sufficient control over the behavior⁹³.

By integrating these constructs, the TPB provides a structured approach for understanding the cognitive and motivational processes that drive cervical cancer screening. It allows healthcare planners and policymakers to identify specific determinants attitudes, social influences, and control beliefs that can be targeted to design effective interventions. Strategies that foster positive attitudes, strengthen supportive social norms, and increase

women's perceived control over accessing screening services are expected to enhance intentions and ultimately improve uptake of cervical cancer screening.

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Fig 2.2.1 Theoretical Framework illustrating the health belief model⁹⁰

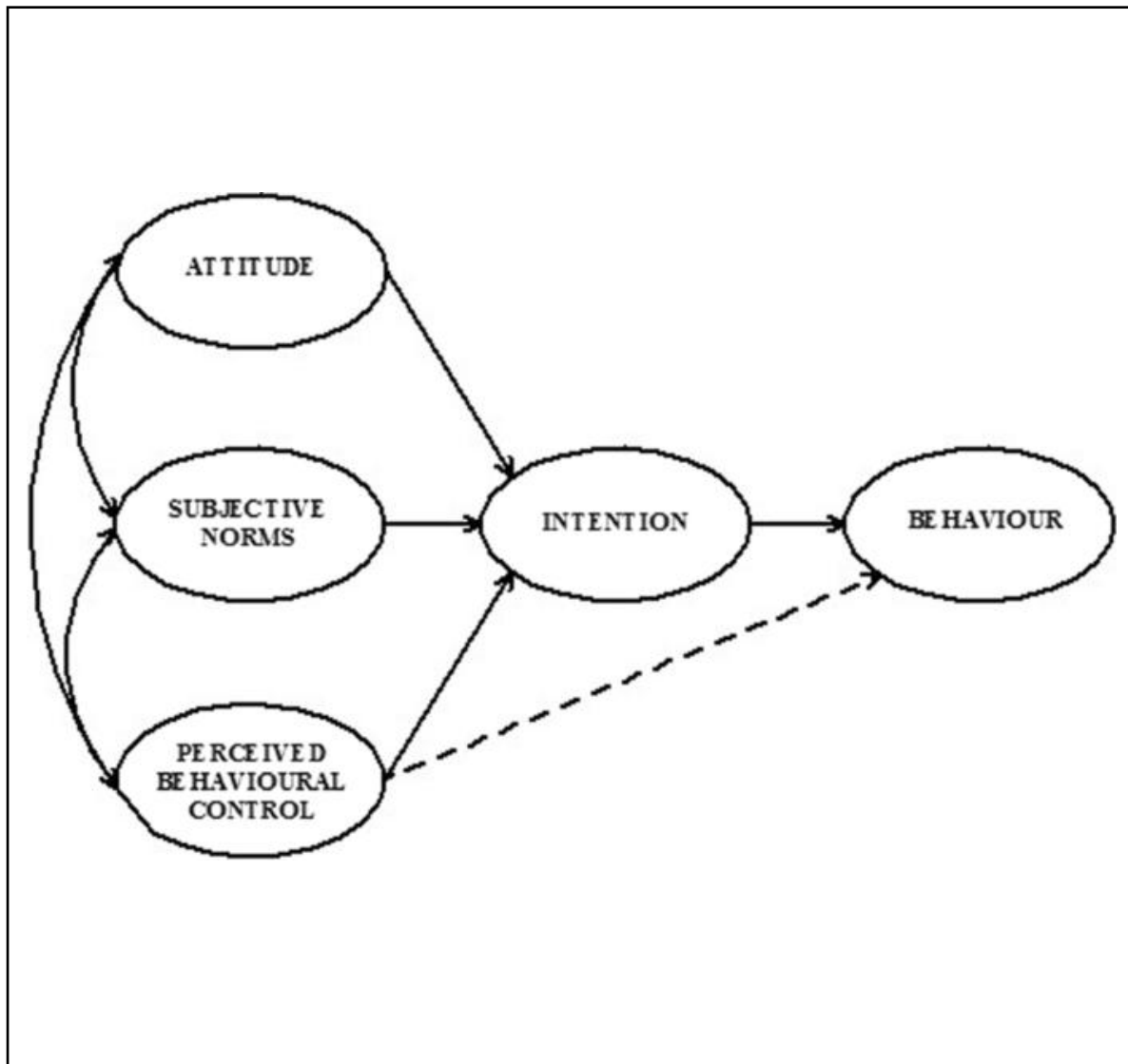


Fig 2.2.2 Theoretical Framework illustrating the theory of planned behavior⁹³

2.3 Review of Empirical Studies

Enhancing cervical cancer knowledge among women of reproductive age

A study conducted in rural Kisumu County, Kenya, found that cervical cancer screening rates remain critically low which is estimated at just 16% to 18% in many low- and middle-income countries, including Kenya. One of the primary factors contributing to this low uptake is the limited knowledge among women of reproductive age about cervical cancer and the available screening services. The research assessed the impact of a dialogue-based community health education intervention delivered by trained Community Health Volunteers (CHVs). Using a longitudinal pre- and post-intervention design with control and intervention groups, the study measured knowledge levels at baseline and after the intervention. Results showed a significant improvement in knowledge among women in the intervention group, confirming the effectiveness of CHV-led education sessions⁹⁴.

Impact of educational intervention on cervical cancer screening

A broader literature review, including sources from PubMed, Medline, and Google Scholar, confirmed that community-based educational interventions have been effective in increasing acceptance and uptake of cervical cancer screening across various settings. These interventions improve awareness and empower women to make informed decisions about their health⁹⁵.

Effectiveness of educational intervention program about cervical cancer

Effectiveness of educational intervention program about cervical cancer on working women's knowledge, attitude, and practice carried in out in 2024 which aimed to evaluate the effectiveness of an educational intervention program about cervical cancer on knowledge, attitude, and practice among working women at Beni-Suef University where 150 women's was picked by quasi-experimental design. Findings indicated a significant improvement in participants' knowledge, attitudes, and practices throughout the intervention period. The study also found strong positive correlations between knowledge and both attitude and

practice. The researchers concluded that educational interventions are effective in raising awareness and should be expanded to include broader public health campaigns targeting women of all age groups⁹⁶.

Effectiveness of health education intervention on knowledge regarding prevention of cervical cancer

Study carried out on effectiveness of health education intervention on knowledge regarding prevention of cervical cancer among women in a selected community of Kathmandu, Nepal in 2024. Health education was provided in an interactive lecture for women of reproductive age in various wards. The program targeted 126 women, they were interviewed based on a questionnaire consisting of 48 questions and comparing the level of knowledge before and four weeks after the intervention. The results shows that knowledge of cervical cancer and its prevention was poor among the community women, but significant improvements following the sessions. The study emphasized the urgent need to implement health education as a formal policy to help eliminate cervical cancer as a public health threat⁹⁷.

Knowledge, perception and uptake of cervical cancer screening

In north-east Nigeria, a cross-sectional study at Adama University Teaching Hospital surveyed 141 antenatal clinic attendees to understand their knowledge, perception, and use of cervical cancer screening. Findings showed that most women who underwent screening did so at the request of a health worker, while lack of awareness remained the main barrier for those who had not been screened. The study highlighted the need for improved health education to encourage screening uptake and address information gaps among women⁹⁸.

Knowledge, attitude and practice concerning cervical cancer screening

A 2024 study in Yenagoa, Bayelsa State, Nigeria, on knowledge, attitude and practice concerning cervical cancer screening among reproductive age group women revealed that cervical cancer remains a major health concern, with Nigeria having one of the highest rates of cervical cancer morbidity and mortality in Sub-Saharan Africa. The causes were lack of access to HPV vaccines, limited knowledge, low awareness, stigma, lack of spousal support, and poor decision-making autonomy among women. The study emphasized the need for continuous training of healthcare workers to improve community engagement and information dissemination. It also suggested that cervical cancer awareness should involve not just health professionals but all community members, with mass media and health workers playing leading roles in spreading accurate information⁹⁹.

Cervical cancer awareness, perception, and attitude

A study carried out cervical cancer awareness, perception, and attitude among female students in tertiary health institutions in Azare, northeastern Nigeria, showed that while awareness of cervical cancer was relatively high, actual knowledge and perception remained low. A structured self-administered questionnaire was administered to consented participants and covered questions on their socio-demographics, awareness, perception, and attitude about toward cervical cancer and its prevention. There was a disconnect between knowing about the disease and understanding its prevention. The study stressed the importance of educational efforts tailored to the perceptions and knowledge levels of young women, especially future healthcare providers, and called for broader vaccine availability and parental involvement in HPV vaccination programs¹⁰⁰.

Impact of Educational Programs on Knowledge and Attitudes

At Minia University Hospital in Egypt, a quasi-experimental study (pre-test, post-test) was used with purposive sample of 100 women which was conducted at the out-patient clinic for gynaecology to assess the effect of an educational program on women's knowledge and attitudes towards cervical cancer screening. Before the intervention, 21% of women had poor knowledge; after the program, all participants showed improvement, with 69% achieving a good level of knowledge. Positive attitudes also increased from 62% to 82%. The results demonstrated that targeted educational interventions can significantly improve women's knowledge and attitudes towards cervical cancer screening, and recommended periodic cervical cancer screening in reproductive health facilities¹⁰⁰.

The effect of multimodal interventions regarding early cervical cancer diagnosis on the women's knowledge, attitude and participation in cervical screening

The effect of multimodal interventions regarding early cervical cancer diagnosis on the women's knowledge, attitude and participation in cervical screening test program carried out study conducted in rural India used a variety of educational strategies to raise awareness about early cervical cancer detection. Among 300 women, quasi-experimental design was executed with a multi-stage sampling. Awareness rose to 99% post-intervention, and screening participation jumped from 3% to nearly 80% following the interventions. The findings highlighted the value of using multiple educational approaches to improve knowledge, influence attitudes, and increase screening uptake¹⁰¹.

Knowledge and acceptability of cervical cancer screening

A descriptive study among 345 female students on knowledge and acceptability of cervical cancer screening among female undergraduates in Babcock University Ilishan-Remo, Ogun

State, Nigeria. The study revealed high awareness and willingness to undergo cervical cancer screening. Nearly half were ready for screening, and over 76% said they would participate if a healthcare professional performed the procedure. However, nearly half of the respondents lacked accurate information about screening. The study recommended establishing screening services on campus and implementing regular educational campaigns¹⁰².

Knowledge of Cervical Cancer among Women of Reproductive Age

Knowledge of cervical cancer among women of reproductive age conducted in Ibadan North LGA, Oyo State, many women were aware of cervical cancer but unfamiliar with Pap smears, the primary screening method. Only 9.4% had undergone a Pap test, despite 41.3% having good knowledge about the disease and its risk factors. The study emphasized the need for healthcare workers to increase outreach, especially in clinics, and to focus on the benefits of early detection¹⁰³.

Knowledge, Attitudes, and Practices in Peru

A cross-sectional study on knowledge and attitudes toward cervical cancer screening among women in selected healthcare facilities carried out in Peru explored the reasons for the disconnect between knowledge and actual cervical cancer screening behaviours. Women who had been previously screened had better knowledge of cervical cancer symptoms, risk factors, and prevention. However, embarrassment, fear of a diagnosis, and lack of information remained significant barriers for those who had never been screened. Factors such as pregnancy, symptoms, or encouragement from peers acted as motivators. Misconceptions about screening procedures also hindered participation, pointing to the need for culturally sensitive education and counselling¹⁰⁴.

Barriers to uptake of cervical cancer screening among women in Nigeria: a systematic review.

A study conducted among 450 women aged 30 and above in selected healthcare facilities in Nigeria highlights the need for targeted interventions to improve cervical cancer screening uptake. The findings reveal that while awareness of certain risk factors, such as early sexual debut and smoking, is high, there are persistent misconceptions about other risk factors, including immunocompromised status. Moreover, despite high awareness of cervical cancer screening, barriers to screening persist, including perceived lack of necessity, uncertainty about screening locations, and underestimation of personal risk. These results underscore the importance of addressing knowledge gaps and attitudinal barriers to promote regular screening and improve early detection of cervical cancer in Nigerian women. By building on these insights, healthcare providers and policymakers can develop targeted interventions to reduce the burden of cervical cancer in this population ¹⁰⁵.

Knowledge and Attitudes Regarding Cervical Cancer Risk Factors and Screening

A study by carried out in the Department of Obstetrics and Gynaecology, Mata Gujari Hospital, MCD Delhi. Investigated the knowledge and attitudes regarding cervical cancer risk factors and screening among women. Their cross-sectional study highlights the importance of understanding the gaps in knowledge and attitudes towards cervical cancer, which can inform targeted interventions to improve screening uptake and prevention. The research emphasizes the need for awareness about cervical cancer risk factors, such as early sexual debut and smoking, as well as the benefits of screening. By exploring the knowledge

and attitudes of women towards cervical cancer, this study provides valuable insights for healthcare providers and policymakers to develop effective strategies for cervical cancer prevention and control¹⁰⁶.

Effect of Educational Program on Knowledge, Practice and Attitude of Women

Regarding Cervical Cancer

A quasi-experimental study involving 185 women at Suez Canal University's outpatient clinics evaluated the impact of an educational program on knowledge, practice, and attitudes regarding cervical cancer. The program led to significant improvements in knowledge, practice, and positive attitudes among participants, with lasting effects observed in follow-up phases. The study's findings suggest that targeted educational interventions can effectively enhance women's understanding and behaviours related to cervical cancer prevention. Recommendations include enhancing professional training for healthcare providers and providing targeted patient education to promote cervical cancer awareness and prevention¹⁰⁷.

Knowledge, Attitudes, and Health Beliefs: A Randomized Controlled Study.

A randomized controlled trial in Turkey investigated the impact of cervical cancer education on women's knowledge, attitudes, and health beliefs. The study involved 105 women, randomly assigned to either an experimental group (51) or a control group (54). The educational intervention significantly improved the experimental group's knowledge about human papillomavirus (HPV), including general information, screening tests, vaccines, and vaccine programs ($p < 0.001$). Additionally, the education led to increased scores in cervical cancer sensitivity, caring, health motivation, Pap smear utility, and motivation among women in the experimental group, while reducing their general perception of Pap smear barriers ($p < 0.05$). These findings suggest that targeted educational programs can effectively

enhance women's knowledge and promote positive health beliefs regarding cervical cancer prevention¹⁰⁸.

Effect of Preventive Educational Program on University Female Students'

Knowledge and Attitude Regarding Cervical Cancer

A recent study among 654 Port Said University students demonstrated the effectiveness of a preventive educational program in enhancing female students' knowledge and attitudes regarding cervical cancer. Prior to the program, only 16.2% of students had adequate knowledge, but this increased significantly to 70.6% immediately after the program and remained high at 66.1% three months later. Similarly, the proportion of students with positive attitudes toward cervical cancer prevention surged from 26.6% to 86.9% post-program and remained high at 83.2% after three months. These findings highlight the potential of targeted educational interventions to promote awareness and positive health beliefs about cervical cancer prevention among young women¹⁰⁹.

Effectiveness of Targeted Health Education in Promoting Cervical Cancer Awareness and Screening Among Women

A health education program significantly increased cervical cancer screening uptake among primary school teachers in Phnom Penh, Cambodia. The program resulted in higher screening registration 32.1% vs 18.8% and uptake 24.1% vs 12.7% compared to the control group. Additionally, the intervention group showed notable improvements in knowledge about cervical cancer causes, symptoms, prevention, and benefits of early detection. Specifically, awareness of human papillomavirus (HPV) as the cause of cervical cancer

increased from 23.7% to 57.5%. These findings highlight the effectiveness of targeted health education in promoting cervical cancer awareness and screening among women in Cambodia¹¹⁰.

Knowledge and Attitudes Regarding Human Papillomavirus Vaccination and Cervical Cancer Screening

Studies have consistently shown that knowledge and attitudes towards human papillomavirus (HPV) vaccination and cervical cancer screening vary among women, particularly pregnant women. A study in Hong Kong found that only 34.6% of pregnant women had sufficient knowledge about HPV, and 22.5% about cervical cancer, with ethnic differences observed. Similarly, research in other populations has highlighted the importance of education and awareness in promoting HPV vaccination and cervical screening uptake. Factors such as ethnicity, family history, and previous screening experiences have been associated with increased likelihood of HPV vaccination and cervical screening. Overall, enhancing knowledge and addressing misconceptions and stigma are crucial strategies to improve health-seeking behaviours among women¹¹¹.

Cues to Action and Attitude towards Cervical Cancer Screening Uptake Among Female Staff in Lead City University, Ibadan, Oyo State

The research carried out on Cues to action and Attitude towards Cervical cancer Screening uptake Among Female Staff in Lead City University, Ibadan. The study focused on exploring the cues to action and attitudes towards cervical cancer screening. A quantitative,

descriptive cross-sectional approach was adopted, the study included 184 women aged 18 and above, selected through a multi-stage sampling method to ensure a broad representation. The findings highlighted that cues to action played a significant role, with 98.3% of participants strongly agreeing that a family history of cervical cancer would motivate them to undergo screening. In contrast, social media and other information sources had limited influence, with only 27.2% acknowledging their impact. Attitudes toward Cervical Cancer Screening were varied, 64% of respondents exhibited a positive attitude toward screening. These results emphasize the need for focused interventions to overcome challenges such as cost, limited access, and low awareness. Enhancing family and cultural engagement, alongside effective health communication, could markedly boost Cervical Cancer Screening uptake among women¹¹².

2.4 Conceptual Model

A conceptual framework serves as a structured representation of how various concepts and variables are logically related within a study. It offers a visual or descriptive guide that helps to explain the pathways through which specific factors influence outcomes. For this study, the conceptual framework is grounded in the Health Belief Model (HBM), one of the most widely used theoretical models in public health for understanding health-related behaviours, particularly preventive health actions like cervical cancer screening. A conceptual framework serves as a blueprint for understanding how different factors and variables interact in a study. It illustrates the pathways through which independent variables (e.g., knowledge, attitude, demographics) influence dependent variables (e.g., health behavior, such as cervical cancer screening uptake)

The Health Belief Model suggests that individuals are more likely to engage in a health behaviour such as getting screened for cervical cancer when several key conditions are met:

Perceived Susceptibility: The individual believes they are at risk of developing cervical cancer. A higher perception of risk is likely to motivate screening behaviour.

Perceived Severity: The individual understands the serious consequences of cervical cancer, including potential death, infertility, and high treatment costs, increasing the urgency to act.

Perceived Benefits: The individual believes that cervical cancer screening is effective in detecting the disease early and preventing more severe outcomes.

Perceived Barriers: The individual evaluates the potential costs or negative aspects of screening (e.g., fear, stigma, cost, access issues). A person is more likely to take action if they believe that the benefits of screening outweigh these barriers.

Cues to Action: These are external or internal prompts that trigger the decision to engage in health behaviour. Examples include health campaigns, advice from a healthcare worker, media messages, or witnessing someone else's experience with cervical cancer.

Self-Efficacy: The individual's confidence in their ability to successfully take the recommended health action, such as scheduling and attending a screening appointment.

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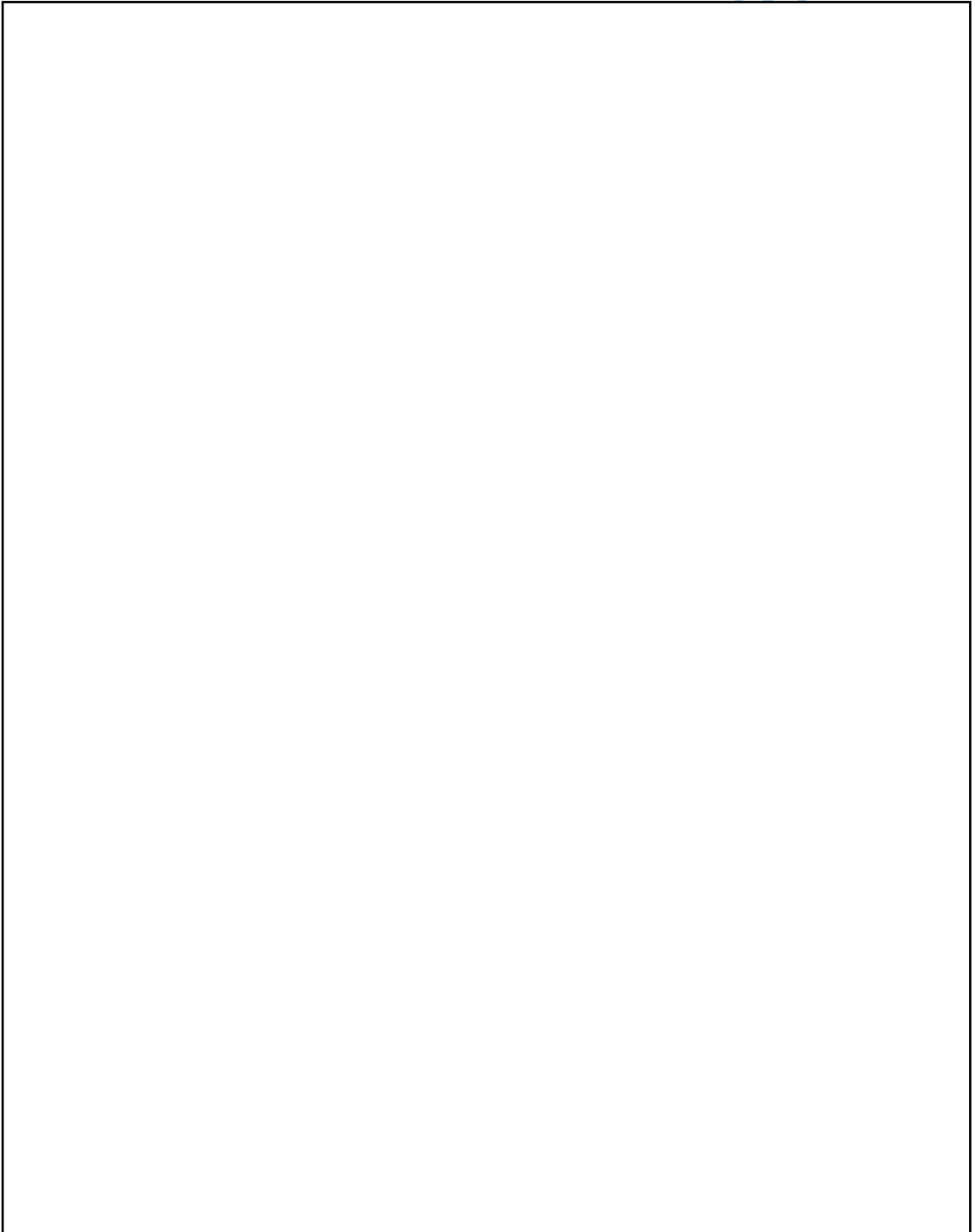


Fig 2.3 Conceptual Framework illustrating the health belief model ¹¹³

2.5 Summary of the Literature Reviewed

Cervical cancer originates from abnormal cell growth in the cervix, primarily due to HPV (human papillomavirus) infection. It is classified into two major types: squamous cell carcinoma (SCC), the most common, and adenocarcinoma, which is less common. HPV, especially high-risk types like HPV 16 and 18, is the leading cause, with sexual behaviours, multiple sexual partners, and early sexual activity as key risk factors. The cervix is the lower part of the uterus and consists of two cell types: squamous cells (outer cervix) and glandular cells (inner cervix). Cancer typically develops in the squamocolumnar junction where these two cells meet. Symptoms of cervical cancer are often absent in early stages, with abnormal bleeding and pelvic pain emerging later. Pap smears can detect precancerous changes, allowing for early intervention. The disease progresses through stages from localized to metastatic cancer, and the TNM staging system is used to assess tumour size, lymph node involvement, and metastasis. Prevention focuses on HPV vaccination and safe sex practices. The Gardasil and Cervarix vaccines protect against the most dangerous HPV types, and regular screening (e.g., Pap tests) is crucial for early detection. Additionally, smoking cessation, maintaining a healthy lifestyle, and reducing sexual partners can reduce risks.

In conclusion, cervical cancer is a preventable and treatable condition, with HPV infection being the primary cause. Early detection through regular screenings like Pap smears and HPV testing plays a critical role in identifying precancerous changes before they develop into full-blown cancer. Prevention strategies, such as vaccination against high-risk HPV strains, safe sex practices, and maintaining a healthy lifestyle, are essential in reducing the incidence of cervical cancer. By increasing awareness, promoting vaccination, and encouraging routine check-ups, the burden of cervical cancer can be significantly reduced, leading to improved health outcomes for women worldwide.

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Chapter Three

Methodology

This chapter described the research design, the study population, the setting of the study, the target population, the sampling technique, the instrument used for data collection, the reliability and validity of the instrument, the procedure for data collection, the methods employed in data analysis, and ethical considerations.

3.1 Research Design

This quasi-experimental study examined the effect of a Reproductive Education Intervention on women's knowledge and attitudes toward cervical cancer screening by comparing pre- and post-intervention outcomes in experimental and control groups

3.2 Population of the Study

Ibadan Southeast is a Local Government Area (LGA) located within the City of Ibadan in Oyo State, part of Nigeria's southwest geopolitical zone. Established in 1991, the LGA covers an area of 17 square kilometers and had a population of 266,046 according to the 2006 census. Its administrative headquarters are situated in the Mapo Hall district of Ibadan city. Ibadan Southeast shares boundaries with Ibadan Southwest, Ibadan Northeast, and Oluyole LGAs. The dominant ethnic group in the area is the Yoruba, with Yoruba and English being the primary languages spoken. Christianity and Islam are the main religions practiced by the residents.

The LGA is home to several industries, including manufacturing and agro-processing. It also boasts numerous banks, hotels, restaurants, recreational facilities, and educational institutions. Known for its vibrant commercial activities, Ibadan Southeast hosts several bustling markets such as Owode Academy, Oranyan, and Oja-Oba, where locals engage in buying and selling a wide variety of goods. Additionally, residents are involved in various economic pursuits including textile weaving and dyeing, woodworking, traditional medicine, trading, teaching, manufacturing, publishing, artisan crafts, and civil service¹.

Target population

The target population for this study comprises of women of reproductive age between 15 and 49 years of age attending ANC and FP Clinic in Oranyan and Agbongbon Primary Health Care Centres in Ibadan South East LGA Oyo State.

3.3 Sample and Sampling Techniques

A purposive sampling technique was adopted to choose Oranyan and Agbongbon Primary Health Care Centres in ward two (2). According to the registration office of Oranyan and Agbongbon Primary Health Care Centres, the total number of childbearing women attending the outpatient clinic monthly was 800. The sample size was determined using Cochran's statistical formula as follows^{2, 3, 4}.

Calculation

n = required sample size.

z = is the Z score at 95 % confidence level equal 1.96

p = Prevalence of Patients diagnosed with cervical cancer (0.5 if unknown)

e= Margin of error at 5 % (standard value of 0.05).

N= population size 800

$$n = \frac{\frac{Z^2 p(1-p)z}{e^2}}{\frac{1 + z^2 p(1-p)}{Ne^2}}$$
$$n = \frac{\frac{(1.96)^2 (1-0.5)(0.5)}{(0.05)^2}}{\frac{1 + (1.96)^2 (0.5)(0.5)}{(0.05)^2 800}}$$
$$n = 112$$

(Attrition value= 9)

$$n = 121$$

Inclusion criteria:

- Childbearing Women aged 15–49 years.
- Married women
- Women who registered and are attending the attending ANC and FP in clinic
- Women who consent to taking part in the study

Exclusion criteria:

- Women who had been screened for Cervical Cancer.
- Women with history of hysterectomy or surgical treatment on the cervix

Sampling technique

A multi-stage sampling technique was employed to recruit participants systematically. The process involved the following stages:

Stage One – Selection of Areas

Ibadan South East Local Government Area was purposively selected because it was located in the interior part of Ibadan and consisted of many communities. A Simple random sampling technique by flipping a coin head for yes and tail for no to select one political constituency (Ibadan South East constituency 1) out of the two constituency in Ibadan South East Local Government Area. Wards were selected using simple random sampling by balloting (each ward written on a separate piece of paper), and two out of the six political wards in Constituency One (1) in Ibadan South East Local Government Area were selected.

Stage Two – Selection of Health Facilities

A purposive sampling technique was used to select Oranyan and Agbongbon Primary Health Care Centre based on patient volume, accessibility, and willingness to participate.

Stage Three – Selection of Participants

Purposive sampling was used to assign respondents to the experimental and control groups, respectively. From each selected healthcare center, eligible women aged 25–49 years were listed, and participants were randomly selected using a systematic random sampling method (e.g., every 3rd eligible attendee) until the desired sample size for both the intervention and comparison groups was achieved.

3.4 Description of the Research Instrument

A validated and structured, interviewer-administered questionnaire was used for data collection. All questions were in the form of Multiple-Choice Questions (MCQs). Closed-ended questions (yes/no and Likert Scale, all adapted) were divided into three (3) parts:

Section A: Socio-demographic characteristics of respondents/participants. It consisted of six (6) items, such as age, marital status, religion, educational status, occupation, ethnicity, marital and reproductive history (11 items), including age at first sexual intercourse, multiple sexual partners, history of smoking, history of STDs, use and duration of modern family planning methods, cervical cancer history, age at menarche, number of pregnancies, number of parities, and family history of cervical cancer.

Section B: Knowledge about Cervical Cancer screening. This section assessed the knowledge level of reproductive-aged women about cervical cancer and screening. It consisted of thirteen (13) questions adapted from prior studies⁵ and ⁶.

Section C: Attitude of women toward cervical cancer screening. This section assessed attitudes using five (5) questions adapted from another study⁷.

3.5 Validity of the Research Instruments

The validity of the research instrument (questionnaire) was established using face and content validity criteria. The questionnaire was presented to the supervisor for necessary corrections. This process ensured the instrument's reliability and validity. The instrument was thoroughly reviewed for appropriateness in language, clarity, content adequacy, and its ability to elicit accurate data. It was translated into Yoruba by a certified translator for participants who could not read English.

3.6 Reliability of the Research Instruments

Reliability referred to the stability, consistency, accuracy, and dependability of the instrument. It indicated the degree to which the instrument yielded consistent results across similar groups, regardless of the administrator. To ensure reliability, the questionnaire was pretested among 11 participants at Odinjo Primary Health Care Centre, who shared similar characteristics with the study population. A test–retest method was employed to establish a reliability coefficient $\geq r = 0.7$, and Cronbach's alpha (α) was used to confirm internal consistency.

3.7 Method of Data Collection

The researcher visited Ibadan South East Local Government Area to present an introductory letter from the Department of Nursing, Lead City University, Ibadan, to the Medical Officer, who then introduced the researcher to the appropriate health centers. An application letter, along with the research proposal, was submitted to the Institutional Review Board (Ethical Committee) of the Oyo State Ministry of Health. Upon receiving ethical approval, the approval letter was returned to the Local Government Authority, and copies were presented to the heads of each Primary Health Care Centre.

Consultations were held with the PHC heads to determine appropriate days for conducting the study during ANC and FP clinic sessions. Participants were recruited using simple random sampling into intervention and control groups. The intervention group completed a pre-intervention questionnaire and received the educational package on the same day. A post-intervention questionnaire was administered two weeks later. Questionnaires were available in both English and Yoruba. They were collected on-site to ensure a high return rate. The purpose of the study was explained in simple language to each participant. Informed consent was obtained verbally, and participants were assured of confidentiality and informed that participation was voluntary and withdrawal was allowed without penalty.

Implementation Phase

An educational program was designed for women of reproductive age to improve their knowledge and attitudes towards cervical cancer. A total of 121 women (including a buffer for attrition) were randomly divided into control and experimental groups 61 participants in the experimental group and 60 in the control group. The program was implemented over eight weeks, with eight visits.

The intervention took place at Oranyan Primary Health Care Centre. Each session lasted approximately one hour and covered topics such as the definition of cervical cancer, prevalence, risk factors, symptoms, prevention, treatment, screening tests, and the importance of early detection and preventive practices. Post-test questionnaire were administered only to participants in the experimental group.

3.8 Method of Data Analysis

The data collected through the structured questionnaires were manually sorted for completeness. Descriptive statistics such as frequency counts, percentages, means, and standard deviations were used to analyze the research questions. Inferential statistics, specifically the t-test, were used to test the hypotheses. Charts and graphs were employed to present the data for ease of interpretation.

Endnotes

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Chapter Four

Result and Discussion of Findings

This chapter presents the result of data analyses of the study. A total of one hundred and twenty-one (121) questionnaires were distributed to both experimental and control group, sixty-one (61) questionnaires were distributed to experimental group before and after and sixty (60) questionnaires were also distributed to control group before and after the implementation of reproductive health education. One hundred and seventeen (117)

questionnaires were completed and returned before and one hundred and sixteen (116) questionnaires were returned after the implementation of the reproductive health education program, the remaining questionnaires were either not returned or returned uncompleted, giving a response rate of 117 (96.70%) before and 116 (95.04%) after the program. The Completed questionnaires were examined for coherence, consistency, and adequacy of responses, after which the information they contained was entered into an Excel spreadsheet and cleaned prior to analysis. The Statistical Package for Social Sciences (SPSS) software version 22 was used to analyses the data.

A summary statistical tool was used to determine proportions for categorical variables and presented as frequencies, percentages and Charts. A paired sample t-test was conducted to evaluate changes in participants' knowledge of cervical cancer and their attitude towards cervical cancer screening within the intervention group by comparing scores before and after the reproductive health education intervention. The same analysis was carried out for the control group. To assess the impact of the intervention, an independent sample t-test was employed to compare scores between the intervention and control groups on the same variables.

4.1 Demographic Data Analysis

Table 4.1a: Showing frequency distribution on Socio demographic characteristics of the studied women (116)

Variable	Category	Experimental Group (n=59)	Control Group (n=57)	p-value
Age	Less than 16	1 (1.69)	0 (0.00)	0.470
	16–18	3 (5.08)	5 (8.77)	
	19–21	18 (30.51)	12 (21.05)	
	22–24	25 (42.37)	31 (54.39)	
	25 and above	12 (20.34)	9 (15.79)	
	Mean Age	22.25	22.32	
Marital status	Single	7 (11.86)	4 (7.02)	0.210
		114		

Religion	Married	41 (69.49)	49 (85.96)	0.657
	Divorced	8 (13.56)	4 (7.02)	
	Others	3 (5.08)	0 (0.00)	
	Christian	19 (32.20)	16 (28.07)	
	Muslim	39 (66.10)	41 (71.93)	
Educational status	Others	1 (1.69)	0 (0.00)	0.412
	Illiterate	3 (5.08)	1 (1.75)	
	Basic	8 (13.56)	5 (8.77)	
	Secondary education	32 (54.24)	40 (70.18)	
	University	10 (16.95)	7 (12.28)	
Ethnicity	Postgraduate	6 (10.17)	4 (7.02)	0.127
	Yoruba	56 (94.92)	57 (100)	
	Hausa	1 (1.69)	0 (0.00)	
	Igbo	0 (0.00)	0 (0.00)	
	Others	2 (3.39)	0 (0.00)	
Occupation	Housewife	12 (20.34)	20 (33.90)	0.178
	Self-employed	28 (47.46)	15 (25.42)	
	Private employee	5 (8.48)	3 (5.09)	
	Government employee	14 (23.73)	19 (32.20)	

Source: Field Survey, 2025

Table (4.1a) Shows that the study involved 59 participants in the experimental group and 57 in the control group. The age distribution shows that the majority of participants in both groups were within the 22 to 24 years age bracket, accounting for (42.37%) in the experimental group and (54.39%) in the control group. The next largest age category was 19 to 21 years, representing (30.51%) and (21.05%) respectively. Very few participants were under 16 years, with only (1.69%) in the experimental group and none in the control group. The calculated mean age group was approximately 22.25 years for the experimental group and 22.32 years for the control group, indicating a similar age profile across groups. In terms of marital status, the majority of respondents in both groups were married (69.49%) in the

experimental group and a notably higher 85.96% in the control group. Single participants made up (11.86%) of the experimental group and (7.02%) of the control group. Divorced individuals were slightly more in the experimental group (13.56%) compared to the control group (7.02%), while (5.08%) of the experimental group identified as others, a category not represented in the control group. The table further show that a higher percentage were Muslim in both groups, with (66.10%) in the experimental group and (71.93%) in the control group. Christians accounted for (32.20%) and (28.07%) in the experimental and control groups respectively. A small proportion (1.69%) of the experimental group identified with other religions, while none did so in the control group. Regarding educational status, over half of the participants in both groups had attained secondary education (54.24%) in the experimental group and (70.18%) in the control group. University graduates made up 16.95% in the experimental group and (12.28%) in the control group, while those with postgraduate education accounted for (10.17%) and (7.02%) respectively. A small proportion were illiterate (5.08%) experimental (1.75%) control or had only basic education (13.56%) experimental (8.77%) control.

Ethnic distribution was overwhelmingly Yoruba in both groups, comprising (94.92%) of the experimental group and 100% of the control group. Other ethnic groups Hausa and Others were represented in the experimental group only, with (1.69%) being Hausa and (3.39%) categorized as others. No Igbo participants were recorded in either group. Occupationally, self-employment was the most common among experimental participants (47.46%), while government employment (33.33%) and housewifery (35.09%) were more frequent in the control group. Housewives accounted for (20.34%) of the experimental group and (35.09%) of the control group. Government employees comprised (23.73%) of the experimental group and (33.33%) of the control group, while private employment was less common across both groups.

Table 4.1b: Number and percentage distribution of marital and reproductive history of the studied women (N= 116)

Variable	Category	Experimental Group (n=59)	Control Group (n=57)	p-value
Age started sexual intercourse (years)	≤16	11 (18.6)	19 (33.3)	0.1109
	>16	48 (81.4)	38 (66.7)	
Multiple sexual partners	Yes	3 (5.3)	7 (12.3)	0.3212
	No	54 (94.7)	50 (87.7)	
History of smoking	Yes	2 (3.4)	0 (0.00)	0.4958
	No	57 (96.6)	57 (100)	
History of STD	Yes	36 (61.0)	42 (73.7)	0.2093
	No	23 (39.0)	15 (26.3)	
Ever used modern FP method	Yes	52 (88.1)	42 (73.7)	0.0805
	No	5 (11.9)	15 (26.3)	

Variable	Category	Experimental Group (n=59)	Control Group (n=57)	p-value
Duration of modern FP method	1–4 years	16 (27.1)	25 (43.9)	0.0908
	≥5 years	43 (72.9)	32 (56.1)	
Family history of cervical cancer	Yes	2 (3.4)	0 (0.00)	0.4958
	No	57 (96.6)	57 (100)	
Ever been pregnant	Yes	54 (91.5)	51 (89.5)	0.9521
	No	5 (8.5)	6 (10.5)	
Gravity	1–5	51 (94.4)	46 (90.2)	0.4803
	>5	3 (5.6)	5 (9.8)	
Parity	1–5	52 (96.3)	57 (100)	0.2344
	>5	2 (3.7)	0 (0.00)	

Source: Field Survey, 2025

Table (4.1b) Presents the comparison between the experimental and control groups which shows that both groups were quite similar in their background characteristics related to cervical cancer risk. Most women in both groups started engaging in sexual intercourse after age 16. Although more women in the control group (33.3%) started at age 16 or younger compared to the experimental group (18.6%). The data on multiple sexual partners shows that the majority of participants in both the experimental and control groups reported not having had multiple sexual partners. Specifically, in the experimental group, only 3 out of 59 women (5.3%) reported having multiple sexual partners, while 54 women (94.7%) said they

had not. In the control group, 7 out of 57 women (12.3%) reported having multiple sexual partners, with 50 women (87.7%) indicating they had not. Although the control group had a slightly higher percentage of women with multiple sexual partners compared to the experimental group, this difference was not statistically significant ($p = 0.3212$). Therefore, the presence of multiple sexual partners was relatively low in both groups and did not differ significantly prior to the intervention. Smoking history was rare in both groups, with only 3.4% of experimental participants having smoked, and none in the control group ($p = 0.4958$).

More women in the control group (73.7%) had history of sexually transmitted diseases (STDs) than in the experimental group 61.0. Regarding the use of modern family planning methods, 88.1% of women in the experimental group had used them compared to (73.7%) in the control group. More women in the experimental group (72.9%) had used them for five years or more, compared to (56.1%) in the control group. Only two women in the experimental group reported having a family history of cervical cancer, while none in the control group did. Almost all women in both groups had been pregnant before, and most had between one to five pregnancies and children. These similarities mean that both groups were generally alike in terms of factors that could affect cervical cancer risk.

4.2 Presentation of Data

Table 4.2: Paired sample t-test on Pre and Post test reproductive health education on Cervical Cancer Screening for Participants in the intervention group

Variables	Pre n=59(%)	Post n=59(%)	Mean	Mean Difference	Std Dev	t	p- value
Ever heard about cervical cancer	29(48.70)	56(94.91)	71.81	46.21	7.11	6.50	0.000
The most common cause of cervical cancer is HPV	25(41.74)	52 (88.13)	64.94	46.39	7.68	6.04	0.000
Ever heard about cervical cancer screening	16 (27.83)	48 (81.35)	54.59	53.52	7.73	6.92	0.000

Development of cervical cancer takes years	32 (54.78)	54 (91.00)	72.89	36.22	7.47	4.85	0.000
Is cervical cancer preventable disease	27 (45.22)	49 (83.48)	64.35	38.26	8.08	4.73	0.000
Is cervical cancer curable disease	9 (15.66)	53 (89.83)	52.74	74.17	6.15	$\frac{12.0}{5}$	0.064
Cervical cancer is a killer disease	43 (72.17)	51 (86.09)	79.13	13.92	7.37	1.89	0.000
Bleeding during sexual intercourse may be a sign	25 (41.74)	49 (83.05)	62.40	41.31	8.07	5.12	0.000
Possible to have cervical cancer without symptoms	28 (47.83)	49 (83.05)	65.66	35.65	8.10	4.40	0.000
All eligible women can have cervical cancer screening	23 (39.13)	57 (96.61)	67.87	57.48	6.78	8.48	0.000
Heard of human papilloma virus vaccine?	35 (59.32)	55 (93.22)	58.26	60.87	7.14	8.52	0.000
Heard of pap test / HPV test?	24 (40.68)	52 (88.13)	57.54	61.17	7.15	8.56	0.000
Ever had a Pap/HPV test in lifetime	9 (15.66)	9 (15.66)	15.66	0.00	6.69	0.00	1.000

Source: Field Survey, 2025

Table 4.2: Presents the findings from the pre- and post-intervention assessment demonstrate a significant improvement in participants knowledge about cervical cancer following the reproductive health education program. Before the intervention, less than half of the women (48.7%) had ever heard of cervical cancer. However, after the intervention, this number rose sharply to (94.91%). Similarly, awareness that Human Papillomavirus (HPV) is the most common cause of cervical cancer increased from (41.74%) to (88.13%). Knowledge about

cervical cancer screening also improved substantially, with only (27.83%) of participants having heard about it before the intervention, compared to (81.35%) afterward. Understanding that cervical cancer develops over many years improved from (54.78%) to (91.52%), while awareness of its preventability rose from (45.22%) to (83.48%). The belief that cervical cancer is curable showed the largest change from just (15.66%) before to (89.83%) after the intervention though the associated p-value (0.064) suggests this change was not statistically significant. The perception of cervical cancer as a deadly disease also increased modestly from (72.17%) to (86.09%).

Additionally, recognition that bleeding during sexual intercourse could be a warning sign of cervical cancer improved from (41.74%) to (83.05%). Knowledge that cervical cancer can occur without obvious symptoms rose from (47.83%) to (83.05%). Notably, the belief that all eligible women can undergo cervical cancer screening without complications increased significantly from (39.13%) to (96.61%). Awareness of the HPV vaccine improved markedly from (59.32%) to (93.22%), and familiarity with Pap/HPV testing rose from (40.68%) to (88.13%). However, despite these gains in knowledge, the percentage of participants who had actually undergone a Pap or HPV test remained unchanged at (15.66%), indicating that increased awareness does not automatically lead to increased screening behaviours. The statistically significant p-values ($p < 0.001$ for most items) show that the educational intervention was highly effective in improving knowledge of Cervical Cancer Screening.

Table 4.3: Showing Paired samples t-test on Pre and Post test Cervical Cancer Screening for Participants in Control group

Variable	Control group n=58(%)	Intervention Group n=57(%)	Mean	Mean Difference	Std Dev	T	p-value
Ever heard about cervical cancer	24 (42.1)	29 (50.88)	6.06	-4.28	8.2	3.92	0.0003
The most common cause of cervical cancer is HPV	19 (33.3)	25 (43.86)	6.75	-6.71	10.1	3.39	0.0012
Ever heard about cervical cancer screening	38 (66.67)	32 (56.14)	3.07	-13.26	9.7	-3.56	0.0008
Development of cervical cancer takes years	29 (50.88)	16 (28.07)	2.49	-17.83	11.4	-6.43	0.0001
Is cervical cancer a preventable disease?	35 (61.40)	28 (49.12)	2.57	-13.86	9.5	-4.36	0.0001

Variable	Control group n=58(%)	Intervention Group n=57(%)	Mean	Mean Difference	Std Dev	T	p-value
Is cervical cancer a curable disease?	25 (43.86)	27 (47.37)	4.83	-6.95	8.3	1.35	0.1820
Cervical cancer is a killer disease	40 (70.18)	49 (85.96)	2.69	-16.22	10.8	-5.42	0.0001
Bleeding during intercourse may be a sign of cervical cancer	25 (43.86)	28 (49.12)	5.12	-4.96	7.6	2.64	0.0104
Possible to have cervical cancer without signs/symptoms	9 (15.66)	9 (15.66)	0.00	0.00	0.0	0.00	1.0000
All eligible women can have screening without complications	31 (54.39)	23 (40.35)	1.89	-14.43	9.1	-5.33	0.0001
Heard of human papillomavirus (HPV) vaccine	31 (54.39)	29 (50.88)	2.38	-8.25	6.5	-1.75	0.0859
Heard of Pap test / HPV test	40 (70.18)	43 (75.44)	5.36	-6.09	8.4	2.31	0.0243
Ever had a Pap / HPV test in your lifetime	18 (31.58)	16 (28.07)	4.04	-4.12	6.1	1.98	0.0526

Source: Field Survey, 2025

Table 4.3 shows results from a paired-samples *t*-test on women's knowledge of cervical cancer before and after a non-related health education session. Among 57 participants, some knowledge areas improved while others declined. Awareness that cervical cancer is a killer disease increased from 70.18% to 85.96% ($p < 0.0001$). Knowledge that bleeding during intercourse may be a symptom rose from 43.86% to 49.12% ($p = 0.0104$). Awareness of the Pap/HPV test slightly improved from 70.18% to 75.44% ($p = 0.0243$). However,

understanding that cervical cancer develops over years dropped from 50.88% to 28.07% ($p < 0.0001$). Belief that screening has no complications fell from 54.39% to 40.35% ($p < 0.0001$). Awareness of screening declined from 66.67% to 56.14%, and belief that cervical cancer is preventable decreased from 61.40% to 49.12%. Knowledge of the HPV vaccine and curability showed minor, non-significant changes. Understanding that cervical cancer can occur without symptoms remained low at 15.79%.

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Table 4.4 Showing Independent samples t-test on Pretest Scores on Cervical Cancer and Screening for the Intervention group and control group

Variable	Control Group n=58(%)	Intervention Group n=59(%)	Mean	Mean Difference	Std Dev	t	p-value
Ever heard about cervical cancer	24 (42.11)	29(50.88)	26.5	5	8.7	3.32	0.0013
The most common cause of cervical cancer is HPV	19 (33.33)	25(43.86)	22.0	6	9.9	4.05	0.0001
Ever heard about cervical cancer screening	38 (66.67)	16 (28.07)	27.0	-22	10.2	-13.01	0.0001
Development of cervical cancer takes years	29 (50.88)	32 (56.14)	30.5	3	9.3	1.86	0.0653
Is cervical cancer a preventable disease	35 (61.40)	27 (47.37)	31.0	-8	9.8	-5.29	0.001
Is cervical cancer a curable disease	25 (43.86)	9 (15.79)	17.0	-16	10.7	-10.47	0.0001
Cervical cancer is a killer disease	49 (84.48)	43 (72.88)	46.0	-6	9.1	-4.32	0.0001
Bleeding during intercourse may be a sign of cervical cancer	25 (41.74)	25 (41.74)	25.0	0	0.0	0.00	1.0000
Possible to have cervical cancer without signs/symptoms	9 (15.79)	28 (49.12)	18.5	19	10.6	11.98	0.001
All eligible women can be screened without complications	31 (54.39)	23 (40.35)	27.0	-8	9.2	-5.41	0.0001
Heard of human papillomavirus (HPV) vaccine	31 (54.39)	16 (28.07)	23.5	-15	10.0	-9.17	0.0001
Heard of Pap test / HPV test	40 (70.18)	16 (28.07)	27.5	-25	10.4	-14.57	0.0001
Have you ever had a Pap/HPV test in your lifetime	18(31.58)	9(15.79)	13.5	-9	8.3	6.75	0.0001

Source: Field Survey, 2025

Table 4.4 Presents the results of an independent samples t-test conducted on the pretest scores of the intervention and control groups to assess their baseline knowledge of cervical cancer and screening. The analysis aimed to determine whether there were initial differences in understanding between the two groups before any intervention took place. As shown in the table, the women in the intervention group demonstrated greater knowledge of cervical

cancer, compared to the control group. Additionally, an independent-samples t-test confirmed that the difference in cervical cancer knowledge between the two groups was statistically not significant, indicating that the intervention group began the study with a stronger understanding of the disease. In some areas, there were significant improvements. For instance, awareness that cervical cancer can occur without signs and symptoms rose sharply from (15.79%) in the control group to (49.12%) in the intervention group, showing a 33.33 percentage point increase, which was highly significant ($p < 0.001$). Similarly, knowledge that HPV is the most common cause increased from (33.33%) to (43.86%), and those who had ever heard about cervical cancer rose from (42.11%) to (50.88%), both showing moderate improvements.

However, several important indicators declined in the intervention group. For example, awareness of cervical cancer screening dropped drastically from (66.67%) control to (28.07%) intervention, reflecting a 38.6 percentage point decline. Similarly, knowledge of the Pap/HPV test fell from (70.18%) to (28.07%), and awareness of the HPV vaccine decreased from (54.39%) to (28.07%). These represent major declines in knowledge, possibly indicating confusion or ineffective messaging in those areas during the intervention. In terms of preventive understanding, the belief that cervical cancer is preventable dropped from (61.40%) to (47.37%) and belief that it is curable plummeted from (43.86%) to just (15.79%). These decreases are concerning, especially since they may discourage screening or treatment-seeking behaviour, there was no change in the proportion of participants who recognized that bleeding during intercourse could be a sign of cervical cancer both at (43.86%), and awareness that cervical cancer is a killer disease slightly declined from (85.96%) to (75.44%).

Table 4.5: Showing Independent samples t-test on Post test Scores on Cervical Cancer and Screening for the Intervention group and Control group

Variable	Control Group n=57(%)	Intervention Group n=59(%)	Mean	Mean Difference	Std Dev	T	df	p-value
Ever heard about cervical cancer	29 (50.88)	56 (94.91)	0.7289	0.4403	0.0721	6.10	76	0.0001

The most common cause of cervical cancer is HPV	25 (41.74)	52 (88.13)	0.6494	0.4639	0.0777	5.97	96	0.0001
Ever heard about cervical cancer screening	32 (54.78)	48 (81.35)	0.6807	0.2657	0.0832	3.19	106	0.0018
Development of cervical cancer takes years	16 (27.83)	54 (91.00)	0.5942	0.6317	0.0701	9.01	95	0.0001
Cervical cancer is a preventable disease	28 (49.12)	53 (83.48)	0.6630	0.3436	0.0820	4.19	103	0.0001
Cervical cancer is a curable disease	27 (45.22)	53 (89.83)	0.6753	0.4461	0.0768	5.81	92	0.0001
Cervical cancer is a killer disease	40 (69.57)	49 (86.09)	0.7783	0.1652	0.0758	2.18	104	0.0315
Bleeding during sexual intercourse may be a sign of cervical cancer	28 (47.83)	49 (83.05)	0.6544	0.3522	0.0822	4.28	104	0.0001
It is possible to have cervical cancer without signs and symptoms	9 (15.66)	49 (83.48)	0.4957	0.6782	0.0682	9.94	114	0.0001
All eligible women can have cervical cancer screening without complication	23 (39.13)	57 (96.61)	0.6787	0.5748	0.0688	8.35	71	0.0001
Have you heard of human papillomavirus (HPV) vaccine	29 (50.88)	52 (88.70)	0.6979	0.3782	0.0780	4.85	94	0.0001
Have you heard of pap test/HPV test?	43(75.44)	52(88.13)	0.8179	0.1269	0.0709	1.79	104	0.0763
Have you ever had a Pap/HPV test in your lifetime	16(27.08)	9(15.66)	0.3777	0.1939	0.0881	2.20	113	0.0298

Source: Field Survey, 2025

Table 4.5 shows that the intervention group had significantly higher knowledge of cervical cancer than the control group. Most participants in the intervention group (94.91%) had heard of cervical cancer compared to 50.88% in the control group. Awareness of HPV as the

main cause was also higher (88.13% vs. 41.74%), as was knowledge that screening is available and important (81.35% vs. 54.78%) and that the disease develops over several years (91% vs. 27.83%). The intervention group also showed greater understanding that cervical cancer is preventable, curable when detected early, and a killer disease. Recognition of bleeding during intercourse as a symptom increased from 47.83% to 83.05%, and awareness that cervical cancer can occur without symptoms rose sharply from 15.66% to 83.48%.

Table 4.6: Showing Independent sample t-test between the differences of the Pretest and Post-test of Intervention and Control groups

Variable	Mean Difference (Intervention)	Mean Difference (Control)	t	p- value
Ever heard about cervical cancer	33.91	-4.28	7.10	0.0001
The most common cause of cervical cancer is HPV	29.56	-6.71	6.55	0.0001
Ever heard about cervical cancer screening	53.04	-13.26	8.91	0.0001
Development of cervical cancer takes years	25.22	-17.83	7.88	0.0001
Is cervical cancer a preventable disease	23.91	-13.86	6.96	0.0001
Is cervical cancer a curable disease	17.39	-6.95	5.06	0.1200
Cervical cancer is a killer disease	17.39	-16.22	6.79	0.0001
Bleeding during sex may be a sign of cervical cancer	21.74	-4.96	5.74	0.0066
Possible to have cervical cancer without symptoms	21.74	0.00	4.97	1.0000
All eligible women can be screened without complications	23.91	-14.43	7.48	0.0001
Heard of human papilloma virus (HPV) vaccine	30.43	-8.25	6.29	0.1200
Heard of Pap test / HPV test	20.00	-6.09	5.15	0.0128

Source: Field Survey, 2025

Table 4.6 summarizes the independent sample *t*-test results comparing pre-test and post-test knowledge scores between the intervention and control groups. Women who received reproductive health education on cervical cancer and screening showed significant improvements across all thirteen knowledge variables ($p < 0.0001$). Awareness of cervical cancer increased by 33.91% in the intervention group but decreased by 4.28% in the control group. Knowledge of HPV as the main cause rose by 29.56% versus a 6.71% decline in controls, while understanding of screening procedures showed the greatest improvement. Knowledge of symptoms, asymptomatic cases, and the safety of screening improved notably, alongside awareness of the HPV vaccine and Pap/HPV testing. Overall, the findings demonstrate a significant positive effect of the educational intervention in enhancing women's knowledge of cervical cancer and screening compared with the control group.

SECTION C: Attitude of Women of Childbearing women towards Cervical Cancer Screening

Table 4.7: Showing Pretest Scores on Attitude of Cervical Cancer and Screening for the Control group

Variables	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
Every woman should be screened regularly for cervical cancer	20 (35.1)	14 (24.6)	10 (17.5)	13 (22.8)
I have been vaccinated against HPV and do not need to be screened for cervical cancer	10 (17.5)	12 (21.1)	18 (31.6)	17 (29.8)
I thought I was healthy enough that I did not need to be screened for cervical cancer	5 (8.8)	6 (10.5)	24 (42.1)	23 (40.4)
Regular cervical cancer screenings can give me peace of mind about my health	7 (12.3)	4 (7.0)	18 (31.6)	28 (49.1)
I am more likely to get a cervical cancer screening if the doctor is highly skilled	14 (24.6)	9 (15.8)	15 (26.3)	17 (29.8)

Source: Field Survey, 2025

Table 4.7 Shows that many women in the control group had limited knowledge and poor attitudes toward cervical cancer screening. Only 23(40.4%) believed that all women should go for screening regularly, which suggests that many did not understand its importance. A high number of women 35 (61.4%) thought that because they had taken the HPV vaccine, they didn't need screening anymore. This is a misunderstanding, as both vaccination and screening are important. Even more concerning, 47 (82.5%) believed they didn't need to be screened because they felt healthy, not realizing that cervical cancer can develop without showing signs. On the other hand, 46 (80.7%) agreed that regular screening helps them feel more secure about their health, and 32 (56.1%) said they would be more willing to get screened if the doctor was highly skilled. Overall, while there are some positive attitudes, many women still hold incorrect beliefs or are unaware of the importance of regular cervical cancer screening.

Table 4.8: Showing Post-test Scores on Attitude of Cervical Cancer and Screening for the Control group

Variables	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
Every woman should be screened regularly for cervical cancer	18 (31.6)	16 (28.1)	10 (17.5)	13 (22.8)
I have been vaccinated against HPV and do not need to be screened for cervical cancer	12 (21.1)	15 (26.3)	18 (31.6)	12 (21.1)
I thought I was healthy enough that I did not need to be screened for cervical cancer	7 (12.3)	10 (17.5)	20 (35.1)	20 (35.1)
Regular cervical cancer screenings can give me peace of mind about my health	7 (12.3)	9 (15.8)	18 (31.6)	23 (40.4)
I am more likely to get a cervical cancer screening if the doctor is highly skilled	10 (17.5)	11 (19.3)	13 (22.8)	20 (35.1)

Source: Field Survey, 2025

Table 4.8 presents the findings from the post-test attitude scores among women in the control group which indicated only slight improvements and still reflected poor attitude towards cervical cancer screening. While 23 (40.3%) agreed or strongly agreed that every woman should be screened regularly, the majority 34 (59.7%) still disagreed, suggesting that awareness of the importance of routine screening remained low. Furthermore, 30 respondents (52.6%) continued to believe that being vaccinated against HPV meant they no longer needed to undergo screening, reflecting a significant misunderstanding of preventive health practices. Alarming, 40 (70.2%) thought they were healthy enough and therefore didn't need screening, revealing a common misconception that cervical cancer only affects those with symptoms. On a more positive note, 41(71.9%) acknowledged that regular screening could provide peace of mind, and 33 (57.9%) said they were more likely to get screened if the doctor was highly skilled.

Table 4.9: Showing Pretest Scores on Attitude of Cervical Cancer and Screening for the Intervention group

Variables	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
Every woman should be screened regularly for cervical cancer	18 (30.5)	16 (27.1)	10 (16.9)	15 (25.4)
I have been vaccinated against HPV and do not need to be screened for cervical cancer	14 (23.7)	12 (20.3)	18 (30.5)	15 (25.4)
I thought I was healthy enough that I did not need to be screened for cervical cancer	7 (11.9)	8 (13.6)	24 (40.7)	20 (33.9)
Regular cervical cancer screenings can give me peace of mind about my health	9 (15.3)	7 (11.9)	18 (30.5)	25 (42.4)
I am more likely to get a cervical cancer screening if the doctor is highly skilled	14 (23.7)	12 (20.3)	17 (28.8)	16 (27.1)

Source: Field Survey, 2025

Table 4.9 The pretest findings from the intervention group reveal a generally mixed attitude toward cervical cancer screening before reproductive educational intervention was applied. Less than half of the women 25 (42.4%) out of 59 agreed or strongly agreed that every woman should be screened regularly, while a majority (57.6%) either strongly disagreed or disagreed, suggesting limited attitude of the importance of routine screening. Additionally, 33 women (55.9%) believed that receiving the HPV vaccine meant they no longer needed screening, reflecting a common misconception. A significant number (74.6%) agreed or strongly agreed that they didn't need screening because they felt healthy, indicating a lack of understanding that cervical cancer can be asymptomatic. On a more positive note, 43 (72.9%) agreed that regular screening could bring peace of mind, and 33 (55.9%) were more likely to get screened if the doctor was highly skilled. These pretest results indicate that before any intervention, the participants in the intervention group had a mixture of correct and incorrect beliefs, with many still holding attitudes that could hinder cervical cancer screening practices.

Table 4.10: Showing Post-test Scores on Attitude of Cervical Cancer and Screening for the Intervention group

Variables	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
Every woman should be screened regularly for cervical cancer	5 (8.5)	4 (6.8)	28 (47.5)	22 (37.3)
I have been vaccinated against HPV and do not need to be screened for cervical cancer	3 (5.1)	2 (3.4)	30 (50.8)	24 (40.7)
I thought I was healthy enough that I did not need to be screened for cervical cancer	26 (44.1)	21 (35.6)	3 (5.1)	5 (8.5)
Regular cervical cancer screenings can give me peace of mind about my health	5 (8.5)	3 (5.1)	20 (33.9)	31 (52.5)
I am more likely to get a cervical cancer screening if the doctor is highly skilled	10 (16.9)	9 (15.3)	18 (30.5)	22 (37.3)

Source: Field Survey, 2025

Table 4.10 Shows post-test results from the intervention group show a remarkable improvement in participants' attitudes toward cervical cancer screening after the educational intervention. A large majority of women (84.7%) comprising 28 who agreed and 22 who strongly agreed now recognized that every woman should undergo regular screening. This represents a significant increase from the pretest. Additionally, (91.5%) of the respondents 30 agreed and 24 strongly agreed no longer believed that HPV vaccination alone was enough to forgo screening, suggesting greater awareness of the need for continuous preventive care. There was also a dramatic shift in the belief that feeling healthy was a reason to avoid screening 47 (79.7%) now strongly disagreed or disagreed with that idea, compared to much higher agreement before the intervention. Furthermore, (86.4%) of the participants agreed or strongly agreed that regular screening provides peace of mind, and (67.8%) expressed they would be more likely to get screened if attended by a highly skilled doctor. Overall, these findings demonstrate that the health education intervention significantly influenced participants' attitudes in a positive direction, correcting misconceptions and reinforcing the importance of cervical cancer screening.

Table 4.11 Showing Independent samples t-test table comparing the Pre-test attitude scores between the intervention and control groups

Variables	Group	Mean	Std. Dev	Mean Difference	T-value	P-value
Every woman should be screened regularly for cervical cancer	Intervention	2.37	1.17	0.09	0.42	0.6735
	Control	2.28	1.18			
I have been vaccinated against HPV and do not need to be screened	Intervention	2.58	1.12	-0.16	-0.79	0.4324
	Control	2.74	1.08			
I thought I was healthy enough that I did not need to be screened	Intervention	2.97	0.98	-0.15	-0.88	0.3811
	Control	3.12	0.92			
Regular cervical cancer screenings can give me peace of mind	Intervention	3.00	1.08	-0.18	-0.90	0.3708
	Control	3.18	1.02			
More likely to get screening if doctor is highly skilled	Intervention	2.59	1.13	-0.04	-0.20	0.8424
	Control	2.64	1.18			

Source: Field Survey, 2025.

Table 4.11 shows the results of the independent-samples t-test comparing the pre-test attitude scores of the intervention group (N=59) and the control group (N=57) revealed no statistically significant differences across all measured items. For the statement Every woman should be screened regularly for cervical cancer, the intervention group had a mean score of 2.37 (SD = 1.17), while the control group scored 2.28 (SD = 1.18), with a mean difference of 0.09 and a p-value of 0.6735. Similarly, for the belief that I have been vaccinated against HPV and do not need to be screened the mean score for the intervention group was 2.58 (SD = 1.12), compared to 2.74 (SD = 1.08) in the control group, resulting in a mean difference of -0.16 and a p-value of 0.4324.

Regarding the perception “I thought I was healthy enough that I did not need to be screened,” the intervention group scored 2.97 (SD = 0.98), and the control group scored 3.12 (SD = 0.92), yielding a mean difference of -0.15 and a p-value of 0.3811. For the statement “Regular cervical cancer screenings give me peace of mind about my health,” the intervention group had a mean of 3.00 (SD = 1.08) and the control group had 3.18 (SD = 1.02), with a mean difference of -0.18 and a p-value of 0.3708. Lastly, for “I am more likely to get a cervical cancer screening if the doctor is highly skilled,” the intervention group scored 2.59 (SD = 1.13), while the control group scored 2.64 (SD = 1.18), with a negligible mean difference of -0.04 and a p-value of 0.8424. Overall, the p-values for all items were greater than 0.05, indicating that there were no statistically significant differences in attitude of the women toward cervical cancer and screening between the intervention and control groups at the pre-test stage.

Table 4.12 Showing Independent samples t-test table comparing the Post-test attitude scores between the intervention and control groups

Statement	Group	Mean	Std. Dev.	Mean Difference	T-value	P-value
Every woman should be screened regularly for cervical cancer	Intervention	3.14	0.88	0.82	4.30	<.001
	Control	2.32	1.15			
I have been vaccinated against HPV and do not need screening	Intervention	3.27	0.76	0.74	4.35	<.001
	Control	2.53	1.05			
I thought I was healthy enough that I did not need to be screened	Intervention	3.27	0.76	-1.17	-6.47	<.001
	Control	2.93	1.02			
Regular cervical cancer screenings give me peace of mind	Intervention	3.31	0.92	0.31	1.68	0.096
	Control	3.00	1.04			
More likely to get screening if doctor is highly skilled	Intervention	2.88	0.91	0.09	0.41	0.683
	Control	2.80	1.14			

Source: Field Survey, 2025

Table 4.12 Presents the independent samples t-test conducted to compare post-test attitude scores toward cervical cancer screening between the intervention and control groups. Results indicated that the intervention group ($M = 3.14$, $SD = 0.88$) scored significantly higher than the control group ($M = 2.32$, $SD = 1.15$) on the belief that every woman should be screened regularly for cervical cancer, $t(114) = 4.30$, $p < .001$. Similarly, the intervention group ($M = 3.27$, $SD = 0.76$) scored significantly higher than the control group ($M = 2.53$, $SD = 1.05$) on rejecting the misconception that HPV vaccination removes the need for screening, $t(114) = 4.35$, $p < .001$. In contrast, the intervention group ($M = 1.76$, $SD = 0.92$) scored significantly lower than the control group ($M = 2.93$, $SD = 1.02$) on the belief that being healthy eliminates the need for screening, $t(114) = -6.47$, $p < .001$, indicating stronger disagreement with this misconception. However, no significant differences were found between the groups in the belief that screening provides peace of mind (Intervention: $M = 3.31$, $SD = 0.91$; Control: $M = 3.00$, $SD = 1.04$), $t(114) = 1.68$, $p = .096$, or in the likelihood of screening if the doctor is highly skilled (Intervention: $M = 2.88$, $SD = 1.10$; Control: $M = 2.80$, $SD = 1.14$), $t(114) = 0.41$, $p = .683$. These findings suggest that the intervention was effective in correcting misconceptions and strengthening positive attitudes toward the necessity of cervical cancer screening.

Table 4.13 Independent samples t-test table comparing the Post-test attitude scores between the intervention and control groups

Variables	Mean Difference (Intervention)	Mean Difference (Control)	T-value	P-value
Every woman should be screening regularly for cervical cancer	0.77	0.04	3.59	< .001
I have been vaccinated against HPV and do not need screening	0.69	-0.21	4.83	< .001
I thought I was healthy enough that I did not need to be screened	-1.21	-0.19	-5.72	< .001
Regular cervical cancer screenings can give me peace of mind	0.31	-0.18	2.61	0.010
I am more likely to get screening if the doctor is highly skilled	0.29	0.16	0.62	0.539

Source: Field Survey, 2025

Table 4.13 Shows an independent samples t-test conducted to compare the changes from pre-test to post-test revealed that the intervention group showed significantly greater improvements in several attitudes toward cervical cancer screening than the control. The results showed that the intervention group demonstrated significantly greater positive change in their belief that every woman should be screened regularly for cervical cancer ($M_{diff} = 0.77$) compared to the control group ($M_{diff} = 0.04$), $t(114) = 3.59$, $p < .001$. Similarly, the intervention group showed a significantly greater improvement in rejecting the misconception that HPV vaccination removes the need for screening ($M_{diff} = 0.69$) than the control group ($M_{diff} = -0.21$), $t(114) = 4.83$, $p < .001$. For the misconception that being healthy eliminates the need for screening, the intervention group showed a significantly larger reduction in agreement ($M_{diff} = -1.21$) compared to the control group ($M_{diff} = -0.19$), $t(114) = -5.72$, $p < .001$. The belief that screening provides peace of mind also improved more in the intervention group ($M_{diff} = 0.31$) than in the control group ($M_{diff} = -0.18$), $t(114) = 2.61$, $p = .010$. However, there was no statistically significant difference between groups in change scores for the belief that they are more likely to undergo screening if the doctor is highly skilled, $t(114) = 0.62$, $p = .539$. These findings indicate that the intervention was effective in improving knowledge-based and necessity-related attitudes toward cervical cancer screening, but had little impact on attitudes related to provider skill.

Table 4.14: Showing Association between knowledge and attitude of childbearing women on cervical cancer screening

Knowledge	Positive Attitude (Yes)	Negative Attitude (No)	Chi-square (χ^2)	p-value
Good	45 (75)	15 (25)	22.76	0.000
Fair	20 (40)	30 (60)		
Poor	11 (18.64)	30 (81.36)		

Statistically significant ($p < 0.05$)

Source: Field Survey, 2025

Table 4.15 outline the relationship between knowledge and attitude of childbearing women on cervical cancer screening. The results revealed a statistically significant association between knowledge level and attitude ($\chi^2 = 22.76$, $p = 0.000$). This indicates that the attitude of childbearing women toward cervical cancer screening varies significantly with their level of knowledge. Therefore, the null hypothesis stating that there is no significant relationship between knowledge and attitude is rejected.

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Table 4.16: Showing relationship between socio-demographic characteristics and knowledge of childbearing women on cervical cancer screening

Variable	Category	Positive Knowledge (%)	Negative Knowledge (%)	χ^2	p-value
Age	Less than 16	1 (33.3)	2 (66.7)	7.32	0.120
	16-18	3 (37.5)	5 (62.5)		
	19-21	10 (28.6)	25 (71.4)		
	22-24	6 (30.0)	14 (70.0)		
	25 and above	12 (57.1)	9 (42.9)		
Marital status	Single	7 (29.2)	17 (70.8)	5.84	0.119
	Married	11 (47.8)	12 (52.2)		
	Divorced	8 (66.7)	4 (33.3)		
	Others	3 (75.0)	1 (25.0)		
Religion	Christian	6 (27.3)	16 (72.7)	4.95	0.084
	Muslim	4 (8.9)	41 (91.1)		
	Others	1 (11.1)	8 (88.9)		
Educational status	Illiterate	3 (13.6)	19 (86.4)	9.12	0.047
	Basic	8 (22.2)	28 (77.8)		
	Secondary education	11 (21.6)	40 (78.4)		
	University	10 (27.0)	27 (73.0)		
	Postgraduate	6 (60.0)	4 (40.0)		
Ethnicity	Yoruba	9 (17.6)	42 (82.4)	3.55	0.314
	Hausa	1 (50.0)	1 (50.0)		
	Igbo	1 (50.0)	1 (50.0)		
	Others	2 (66.7)	1 (33.3)		
Occupation	Housewife	12 (32.4)	25 (67.6)	6.48	0.090
	Self employee	8 (34.8)	15 (65.2)		
	Private employee	5 (12.5)	35 (87.5)		
	Government employee	4 (17.4)	19 (82.6)		

Source: Field Survey, 2025

Table 4.16 Shows the relationship between various sociodemographic factors and knowledge of cervical cancer screening was examined using chi-square tests, leading to the rejection of the null hypothesis for this variable. This suggests that higher education levels are associated with better knowledge of cervical cancer screening. However, no statistically significant relationships were found between knowledge and other variables such as age, marital status, religion, ethnicity, and occupation (all $p > 0.05$). Therefore, the null hypothesis of no significant association was accepted for these factors.

4.3 Discussion of Findings

This study investigated the Effectiveness of Reproductive Educational Intervention on Knowledge and Attitude of Cervical Cancer Screening Among Childbearing Women in Ibadan South-East Local Government Area Oyo State.

Socio-demographic characteristics

Majority of participants (40.87%) were aged 22–24 years, with a mean age of 22.25 years. Most (83%) were married. These demographic groups of young, married women of reproductive age are typically within the target population for cervical cancer screening, this pattern aligns with findings of the study carried out on cervical cancer awareness, perception, and attitude among female students in tertiary health institutions in Azare, northeastern Nigeria.

The socio-demographic characteristics of the participants majority being Yoruba, married, Muslim, and self-employed with basic or secondary education reflect trends observed in similar studies^{1,2,3}. These studies confirmed that religion, ethnicity, education level, and occupation significantly shape women's access to information and willingness to participate in screening.

The current study's finding that women with secondary education had higher knowledge scores post-intervention supports previous findings from Kathmandu ⁴ and Suez Canal ⁵, where higher educational attainment correlated with better post-intervention outcomes. Meanwhile, the high proportion of participants who had experienced pregnancy (96.52%) is important, as pregnancy represents a strategic touchpoint for cervical cancer education, a point emphasized in ⁶.

It was concluded that most participants were aged 22 to 24years, and the majority had attained secondary education. Similarly, these findings differ from those of ⁷, who evaluated

the impact of an educational program on enhancing cervical cancer screening behaviours among rural women in Guilan, Iran, and reported that most participants in the experimental group were either illiterate or had only elementary education. Concerning the age of marriage, more than two thirds of the participant women married at 18 to 30 years, more than half have 1 to 5 pregnancies, the vast majority have 1 to 5 parties, and more than three-quarters have first birth at age 18 to 24 years. The present study's findings are also consistent with those of ⁷⁵, who investigated the knowledge, attitudes, and practices of cervical cancer screening among female teachers in an urban community in Lagos, Nigeria. Their results showed that over two-fifths of the women had experienced pregnancy 1 to 3 times, the majority had more than five children, and more than three-quarters were married between the ages of 21 and 30 years. The findings of the study revealed that most participants had previously suffered from sexually transmitted diseases (STDs). Additionally, over three-quarters of the women used contraceptive methods. For the vast majority, the duration of contraceptive use was five years. Reproductive history of the studied women, the current study results showed that; the vast majority of the participant women haven't a family history of cervical cancer. The data on multiple sexual partners shows that the majority of participants in both the experimental and control groups reported not having had multiple sexual partners. Specifically, in the experimental group, only 3 out of 59 women 5.3% reported having multiple sexual partners, while 54 women 94.7% said they had not. In the control group, 7 out of 57 women 12.3% reported having multiple sexual partners, with 50 women 87.7% indicating they had not.

In contrast, the Kathmandu study, which also targeted reproductive-age women, showed that interactive health education improved knowledge even among women with initially low awareness, suggesting that age alone isn't a barrier, but targeted education is essential. The study also found out that (46.09%) of the women had secondary education, and (29.56%)

had basic education, while fewer had university (5.22%) or postgraduate (3.48%) degrees⁴. Education level was closely linked to knowledge levels those with higher education had better baseline awareness. This is consistent with study carried out in Ibadan North, Nigeria who studied⁸ Knowledge of cervical cancer among women of reproductive age conducted in Ibadan North LGA, Oyo State, women with secondary or tertiary education were more likely to have better knowledge of cervical cancer, though actual screening remained low. This also in agreement with the research carried out in Cambodia a health education program targeting primary school teachers who are generally more educated and economically stable led to higher screening uptake, suggesting that occupation enables access when paired with awareness ³.

Majority of the respondents in this study demonstrated a poor knowledge of cervical cancer screening. Although women in the intervention group demonstrated slightly greater baseline knowledge of cervical cancer and screening compared to the control group, the difference was statistically non-significant. This suggests that both groups began the study with relatively similar understanding, a finding consistent with studies conducted in similar low- and middle-income contexts where baseline knowledge is often uniformly low before targeted health interventions are introduced. A recent study among 654 Port Said University students demonstrated the effectiveness of a preventive educational program in enhancing female students' knowledge and attitudes regarding cervical cancer. had low baseline knowledge (16.2%) despite being in a tertiary institution, but this improved dramatically post-intervention⁹.

The low level of knowledge of cervical cancer screening among the respondents may be attributable to their predominantly low-income status, as low socioeconomic status is associated with poor health literacy. Poor knowledge of cervical cancer screening among women can negatively impact the willingness of these individuals to participate in Cervical

Cancer Screening and utilize the services when offered as they may not adequately appreciate its usefulness. In contrast, other studies revealed relatively higher levels of knowledge of cervical cancer screening¹⁰. In agreement, while significant improvement was found in the level of knowledge and attitudes of women in the intervention group following educational talk. Additionally, the mean knowledge and attitudes scores between women in the intervention group and control group following reproductive health education were significantly different.

Also in research conducted In Minia University Hospital in Egypt, a quasi-experimental study pre-test, post-test was used with purposive sample of 100 women which was conducted at the out-patient clinic for gynaecology to assess the effect of an educational program on women's knowledge and attitudes towards cervical cancer screening. Before the intervention, knowledge improvement after intervention was most pronounced among women with at least secondary-level education¹¹. Conversely, women in rural India¹², many of whom were not formally employed, benefited significantly from multimodal interventions, indicating that structured education can overcome occupational or income-related disparities.

Findings from the study revealed that less than half 48.70% of the participants had heard about cervical cancer, and only 27.83% knew about cervical cancer screening. Even fewer 15.66% had undergone a Pap/HPV test prior to the educational intervention. These findings reflect a broader pattern observed across low- and middle-income countries. In rural Kisumu County¹³, cervical cancer screening rates were estimated at just 16–18%, largely attributed to limited knowledge among women of reproductive age. Similar patterns were found in Ibadan North, Nigeria⁸, where although 41.3% had good knowledge of cervical cancer, only 9.4% had undergone screening. This knowledge behaviour disconnect is also evident in Peru, where many women were aware of cervical cancer but embarrassment, fear, and misinformation hindered screening participation¹⁴. Likewise, in Adama University Teaching

Hospital in north-east Nigeria, lack of awareness was the most cited reason for not undergoing screening, even among antenatal clinic attendees ¹⁵. These consistent findings demonstrate that awareness alone is insufficient there must be focused interventions to bridge knowledge and action.

The study showed statistically significant improvements ($p < 0.001$) in all knowledge indicators post-intervention. Awareness about cervical cancer rose from 48.7% to 82.61%, knowledge that HPV is the cause rose from 41.74% to 71.30%, and awareness of screening methods jumped from 27.83% to 80.87%. Despite these advances, the proportion who had undergone a Pap/HPV test remained at 15.66%, highlighting persistent behavioural barriers. This aligns with numerous global studies that emphasize the effectiveness of structured educational programs. At Beni-Suef University, a quasi-experimental intervention led to significant gains in knowledge, attitudes, and practices among working women¹.

In Kathmandu, Nepal ⁴, a targeted health education program led to substantial improvements in cervical cancer prevention knowledge, reinforcing the potential of community-based health education. At Minia University Hospital, Egypt, knowledge improved from poor (21%) to good (69%) levels post-intervention, with positive attitudes rising from 62% to 82% (Study 6). Similarly, a randomized controlled trial in Turkey ¹⁷ showed that educational interventions significantly improved knowledge, health beliefs, and Pap smear motivation while reducing perceived screening barriers¹⁶. These findings align with the post-intervention knowledge surge observed in your study.

Moreover, in Cambodia revealed that health education significantly increased screening registration (from 18.8% to 32.1%) and uptake (from 12.7% to 24.1%) among primary school teachers, reinforcing the effectiveness of targeted community programs³.

In Nigeria, factors such as stigma, lack of spousal support, limited autonomy, and poor access to services hinder screening participation. A systematic review ¹⁸ found misconceptions about risk factors and uncertainty about where to get screened were persistent obstacles even among informed women. In Hong Kong⁶, ethnic disparities and misconceptions about HPV vaccination and screening remained high, particularly among pregnant women. These findings underline that improving knowledge alone is not enough education must be coupled with accessibility, cultural sensitivity, family engagement, and supportive health policies.

Post-intervention, the study recorded strong positive attitude changes: willingness to undergo screening if the doctor is skilled rose from 38 to 95; the belief that vaccination does not eliminate the need for screening improved from 43 to 104; and rejection of the idea that screening is unnecessary for healthy people rose from 19 to 105. This is in line with the study at Suez Canal University ⁵, where a targeted program led to improved practices and positive attitudes with lasting effects. Likewise, Study 57 in Port Said University saw positive attitudes rise from 26.6% to 86.9% post-intervention, sustained at 83.2% after three months. Following the intervention, awareness significantly improved, with knowledge of cervical cancer, its preventability, and screening options increasing by over 50% across multiple items. This aligns with intervention studies from Minia University (Study 6), Nepal (Study 15), and Suez Canal University ⁵, all of which demonstrated that structured educational programs can substantially enhance women's understanding of cervical cancer and its risk factors.

Despite improved knowledge post-intervention, the percentage of women who had undergone Pap/HPV tests remained unchanged (15.66%), highlighting a persistent knowledge–practice gap. This mirrors findings from studies in Ibadan ⁸ and ¹³, where even

after educational efforts, the actual screening uptake remained limited due to systemic and psychosocial barriers such as cost, fear, or unavailability of services.

This suggests that information alone is insufficient to motivate behavioural change. As supported by, even when women are aware of cervical cancer and screening benefits, uptake is hindered by poor accessibility, cultural beliefs, stigma, and fear of diagnosis¹⁸.

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Endnotes

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Chapter Five

Conclusion

5.1 Summary of Findings

This study found that a reproductive health educational intervention significantly improved the knowledge and attitudes of childbearing women toward cervical cancer and its screening in Ibadan South-East LGA, Oyo State. Post-intervention, awareness of cervical cancer, understanding of HPV as the main cause, and knowledge of screening methods increased markedly, alongside positive changes in attitudes toward preventive practices. However, despite these improvements, actual screening uptake remained unchanged, highlighting a persistent gap between knowledge and practice. This gap is likely sustained by barriers such as cost, limited-service availability, stigma, fear of diagnosis, and lack of spousal or family support. The findings underscore that while education is a vital first step, it must be integrated with accessible, affordable, and culturally sensitive screening services, as well as supportive policies and community engagement, to achieve meaningful and sustained increases in screening participation.

However, despite these notable gains in knowledge and attitudes, actual screening uptake remained unchanged. This finding underscores the persistent knowledge practice gap, which is influenced by systemic, cultural, and psychosocial barriers such as cost, limited service availability, stigma, fear of diagnosis, and lack of spousal or family support. The results highlight that while educational interventions are essential for improving awareness, they must be complemented by accessible, affordable, and culturally sensitive screening services

as well as supportive health policies and community engagement to translate knowledge into sustained preventive action.

5.2 Conclusion

This study demonstrated that a structured reproductive health educational intervention significantly improved the knowledge and attitudes of childbearing women toward cervical cancer and its screening in Ibadan South-East LGA, Oyo State. The intervention led to marked increases in awareness of cervical cancer, recognition of HPV as its primary cause, and understanding of available screening methods, while also fostering positive attitude changes that challenged misconceptions and encouraged preventive action. However, despite these improvements, actual screening uptake remained unchanged, revealing a persistent gap between knowledge and practice. This gap is likely sustained by barriers such as cost, limited access to services, cultural beliefs, stigma, fear of diagnosis, and lack of spousal or family support. The findings underscore that while education is essential for improving awareness and shaping positive attitudes, it must be integrated with accessible, affordable, and culturally sensitive screening services, alongside supportive policies and community engagement, to achieve sustained increases in screening participation.

5.3 Recommendations

1. Health authorities and policymakers should integrate cervical cancer education into routine reproductive health services at primary healthcare centres, antenatal clinics, and community outreach programs to ensure continuous awareness creation. Efforts should go beyond information dissemination by addressing practical barriers to screening, such as reducing costs, expanding service availability in local communities, and ensuring privacy and confidentiality to reduce stigma.

2. Community-based interventions should involve men, religious leaders, and other influential figures to foster spousal and family support, which is crucial for women's participation in screening. Tailored strategies should target women with lower educational attainment and low-income backgrounds, using culturally appropriate materials and local languages to enhance comprehension.
3. Additionally, mobile screening units and periodic free screening campaigns could bridge accessibility gaps, especially in underserved areas. Finally, policymakers should implement sustained public health campaigns and supportive policies that combine education, service accessibility, and community engagement to translate improved knowledge and attitudes into higher screening uptake.

5.4 Contribution to Knowledge

This study adds to the growing body of evidence that structured, community-based reproductive health education can significantly improve knowledge and attitudes toward cervical cancer screening among women of reproductive age in low-resource settings. It uniquely demonstrates that even within a predominantly young, married, and moderately educated population, targeted interventions can correct misconceptions, enhance awareness of HPV as the primary cause, and foster positive preventive attitudes. However, the findings also highlight the persistent gap between knowledge and practice, reinforcing the understanding that education alone is insufficient without parallel improvements in accessibility, affordability, and cultural acceptance of screening services. By documenting the demographic, reproductive, and sociocultural factors influencing cervical cancer screening behaviours in Ibadan South-East LGA, this study provides locally relevant evidence to guide policymakers, health educators, and community stakeholders in designing integrated interventions that combine education with service delivery to improve screening uptake.

5.5 Suggested Areas for Further Research

1. Longitudinal studies to assess the long-term retention of knowledge and attitudes after educational interventions and to evaluate whether these eventually translate into increased screening uptake.
2. Intervention-comparison studies to determine the most effective education delivery methods (e.g., peer education, multimedia campaigns, mobile health platforms) for improving screening participation in low-resource settings.
3. Qualitative research exploring the cultural, psychosocial, and gender-related barriers that persist despite improved knowledge, with a focus on spousal influence and community norms.
4. Policy-focused studies examining the impact of subsidized or free screening programs on uptake among different socio-economic and educational groups.
5. Integrated program evaluations that combine education with service accessibility (e.g., mobile screening units) to determine the effectiveness of multi-pronged approaches in bridging the knowledge–practice gap.
6. Long-term impact of interventions: Future studies should track participants over extended periods (e.g., 12–24 months) to determine whether knowledge and attitude improvements are sustained and whether they eventually lead to higher screening uptake. This would help establish the lasting effect of educational programs.
7. Comparative effectiveness of educational methods: Research should compare different delivery approaches such as community health worker-led talks, peer-to-

peer education, social media campaigns, and mobile phone reminders to identify the most cost-effective and culturally acceptable strategies for encouraging screening in low-resource settings.

8. In-depth qualitative exploration of barriers: There is a need for qualitative studies, including focus groups and in-depth interviews, to better understand why women with good knowledge still avoid screening. Such studies could explore cultural beliefs, stigma, fear of diagnosis, misconceptions, gender norms, and the role of spousal consent or family influence.
9. Policy and economic evaluations: Future research could assess the impact of policy interventions, such as free or subsidized screening services, health insurance coverage, or integration of screening into routine maternal health checks, on screening participation rates. Cost-effectiveness analysis would also be important to guide resource allocation.

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Appendix I

Questionnaire

Leadcity University, Ibadan.

Effectiveness of Reproductive Educational intervention on Knowledge and Attitude of Cervical Cancer Screening Among Childbearing Women in Ibadan South-East Local Government Area.

Dear Respondent,

I am a master student of the above-named institution Carrying out research on Effectiveness of Reproductive Educational intervention on Knowledge and Attitude of Cervical Cancer Screening Among Childbearing Women. This questionnaire is for academic purpose and shall be treated with utmost confidentiality. Participation in the study is voluntary and you can withdraw or decline the continuation at any stage without penalty whatsoever. You are kindly employed to fill the questionnaire as accurately as possible. No need of address and name.

Rebecca O. Apata

Phone _____ number _____

Signature _____

SECTION A: Sociodemographic Data

Please tick (✓) as appropriate

1. Age at last birthday _____
2. Marital status (a) Single [] (b) Married [] (c) Divorced [] (d) Others []
3. Religion (a) Christian [] (b) Muslim [] (c) Others []
4. Educational status (a) Illiterate [] (b) Basic [] (c) Secondary education []
(d) University [] (e) Postgraduate []
5. Ethnicity (a) Yoruba [] (b) Hausa [] (c) Igbo [] (d) Others []
6. Occupation (a) Housewife [] (b) Self-employee [] (c) Private employee []

(d) Government employee[]

7. Age started sexual intercourse (In year) (a) ≤ 16 (b) >16

8. Multiple sexual partners (a) Yes (b) No

9. History of smoking (a) Yes (b) No

10. History OF STD (a) Yes (b) No

11. Ever use a modern FP method (a) Yes (b) No

12. Duration of modern FP method (a) 1-4years (b) ≥ 5 years

13. Family history of cervical cancer (a) Yes (b) No

14. Ever had got pregnant (a) Yes (b) No

15. Gravity (a) 1-5 (b) >5

16. Parity (a) 1-5 (b) >5

17. Ever had given birth (a) Yes (b) No

SECTION B: Knowledge of Cervical Cancer Screening

S/N	Item	Yes	No
18	Ever heard about cervical cancer		
19	The most common cause of cervical cancer is HPV		
20	Ever heard about cervical cancer screening		
21	Development of cervical cancer takes years		
22	Is cervical cancer preventable disease		
23	Is cervical cancer curable disease		
24	Cervical cancer is a killer disease		
25	Bleeding during sexual intercourse may be one of the signs of cervical cancer		
26	Is it possible to have cervical cancer without signs and symptoms		
27	All eligible women can have cervical cancer screening without complication		
28	Have you heard of human papilloma virus vaccine?		
29	Have you heard of pap test /HPV test?		

30	Have you ever had a Pap/ HPV test in your lifetime		
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SECTION C: Attitude of Women of Childbearing Age towards Cervical Cancer Screening

		Strongly Disagree	Disagree	Agree	Strongly Agree
31	Every woman should be screening regularly for cervical cancer				
32	I have been vaccinated against HPV and do not need to be screening for cervical cancer				
33	I thought I was healthy enough that I did not need to be screened for cervical cancer				
34	Regular cervical cancer screenings can give me peace of mind about my health				
35	I am more likely to get a cervical cancer screening if the doctor is highly skilled				

Afikun Kinni
Leadcity University,
Faculty of Basic Science, Department of Nursing.

Iwe Ibeere

Iṣiṣe **ilaaja** lori ẹkọ nípa imo ati iwa nipa ayewo fun jejeje ẹnu-ona ile ọmọ larin awon obinrin ti o wani ipo ibimo ni agbegbe Ijoba Ibile Guusu-ila orun ibadan.

Olukopa,

Mo je ọmọ ile ẹko giga ti o wa ni Ibeje iwe yii, mo nse iwadii lori Iṣiṣe **ilaaja** lori ẹkọ nípa imo ati iwa nipa ayewo fun jejeje ẹnu-ona ile ọmọ larin awon obinrin ti o wani ipo ibimo. Iwe Ibeere yii wa fun imo ẹkọ ati wipe yio wani bọnkẹlẹ. Kiko pa ninu iwadii yii gbodo jẹ atinuwa. E jòwọ ẹ fọwọsi iwe ibeere yii bi o ti ye.

Rebecca Apata

Ẹrọ ibani soro _____

Ibuwọlu _____

Ipele kinni : akojopo iwadii lori eto-igbe ati ajoṣe

j'ówó fí ami sí eyi tí o yẹ

1.Ojo ori (ojo ibi ikehin) _____

2.Ipo igbeyawo: (a) Nikan [] (b) Gbeyawo [] (c) Ti tuka [] (d) Opo []

3. Esin: (a) Esin igbagbo [] (b) Musulumi [] (c) Omiran []

4. Ipele Eko (a) Nko lo si ile-iwe kankan (b) Ile-iwe alakobere (c) Ile-iwe girama (d) Ile-iwe giga (e) Ile-iwe giga julo

5.Eyaa (a) Yoruba (b) Hawusa (c) Igbo (d) Omiran

6. iṣe-iṣe (a) iyawo ile (b) osise fun ara re (c) Osise in ile-ise aladani (d) Osi se ijoba

7. Ojo ori ti o koko ni ibalopo (odun) (a) ≤ 16 (b) > 16

8. Nje o ni ibalopo ju eniyan kan lo (a) Beenii (b) Beeko

9. Siiga mimu (a) Beenii (b) Beeko

10. Nje o ni aisan Kokoro oju- ara rii (a) Beenii (b) Beeko

11. Nje o se ifeto somo bibi igbalode (a) Beenii (b) Beeko

12. Igba wo ni o ti se ifeto somo bibi igbalode (a) 1-4 years (b) ≥ 5 years

13. Njẹ o ni ibatan ti o ni aisan Jejẹrẹ ẹnu-ona ile ọmọ (a) Beeni (b) Beeko
14. Njẹ o ni oyun rii (a) Beeni (b) Beeko
15. Oyun meelo lo ni rii (a) 1-5 (b) >5
16. Ikun le meelo (a) 1-5 (b) >5
17. Njẹ o tibi omo rii (a) Beeni (b) Beeko

Ipele keji: Imo nipa aisan Jejẹrẹ ẹnu-ona ile ọmọ

S/N		Beeni	Beeko
18	Njẹ o gbọ nipa aisan Jejẹrẹ ẹnu-ona ile ọmọ		
19	Kokoro HPV je Idi ti o wọpọ julọ lati fa aisan Jejẹrẹ ẹnu-ona ile ọmọ		
20	Njẹ o gbọ nipa nipa aye wo fun Jejẹrẹ ẹnu-ona ile ọmọ rii		
21	Jejere enu-ona ile omo ma n sele leyin opolopo odun idagbasoke gba odun		
22	Njẹ jejere enu-ona ile omo se dẹna		
23	Njẹ jejere enu-ona ile omo gbo wiwo		
24	Jejere enu-ona ile omo je aisan to le seku pa ni		
25	Riri eje la si ko iba lo po le je okan lara amin jejere enu-ona ile omo eje ibasepo aami		
26	Njẹ ose se la ti ni Jejẹrẹ ẹnu-ona ile ọmọ awon aami aisan		
27	Gbogbo obinrin abileko lo ye ki o se ayewo fun aisan Jejẹrẹ ẹnu-ona ile ọmọ lai sii idena		
28	Njẹ oti gbọ nipa abere ajesara ti oun dena Jejẹrẹ ẹnu-ona ile ọmọ ?		
29	Njẹ o mo nipa ayewo pap/ayewo HPV		
30	Njẹ oti se ayewo pap/ayewo HPV rii		

Ipele keta: Iwa awon obinrin abileko sii ayewo Jejẹrẹ ẹnu-ona ile ọmọ

S/N		Koo gidigidi	Koo	Mo gba	Gba gidigidi
31	Gbogbo obinrin ye ki o se ayewo ni gbogbo igba				
32	Mo ti gba abere ajesara ti on dena Kokoro Jejẹrẹ ẹnu-ona ile ọmọ un ko ni lati se ayewo				
33	Mo ni ilera ti o peye un ko ni lati se ayewo fun Jejẹrẹ ẹnu-ona ile ọmọ				
34	Sise ayewo fun Jejẹrẹ ẹnu-ona ile ọmọ lore kore yio fi okan mi baale ni pa ilera mi				
35	Ma fe lati se ayewo fun Jejẹrẹ ẹnu-ona ile ọmọ bi dokita mi ba ni imo				

	to peye				
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Appendix II Informed Consent Form for the Participants Confidentiality

Information obtained will be treated with outmost confidentiality.

Voluntariness

The study allows participants with kin and genuine interest to participate

Management and Care

In any case of injury or assault to the participants in the course of this study, it will be taken care of by the researcher.

Statement of person obtaining Informed Consent

I have fully explained this research to _____ with sufficient and accurate information including risks and benefits to make an informed decision.

Name _____

Signature _____

Date _____

Statement of person giving consent

I have read the description of the study and that my participation is voluntary. The purpose, risks and benefits of the research have been explained to me. I understand that I can withdraw my participation from the study at any time. I have received a copy of this consent form for my personal keep.

Name _____

Appendix III
Training guide and time table for the experimental group

A	B	C	D	E	F
Training Objective (s)	Topic(s) Content	Audience	Methods	Instructional Materials	Evaluation
Participants will be	General orientation.	Childbearing women	Group discussion.	Paper, biro and questionnaire	What is Cervical Cancer?
	Introduction		Direct teaching.		
Familiarise with each	Familiarization with the participants		Lecturing		
Fill the questionnaire and benefits they will get from the training.	Administration of pre-test.				
Know the meaning of Cervical Cancer	Cervical cancer is simply the cancer of the cervix which starts in the cells lining the cervix.				

Appendix IV

Treatment procedure for participants in experimental group

The group will be taken through reproductive health education

The summary is as follows:

Duration of Program: 8 days

Venue: Oranyan Primary Health Care Centre, Oranyan Ibadan

Program Goals: To improve the knowledge of reproductive age women on meaning, causes, type, risk factors, symptoms, stages, prevention and treatment cervical cancer through health education and demonstration.

Objectives of the training: At the end of the training the participants are expected to know the meaning, types, causes and prevention of cervical cancer

- Have positive attitude towards prevention of cervical cancer
- Identify the cervical cancer preventive behaviour.
- Emphasize the benefits of early detection and treatment
- Administer the post-test instrument on the participants.

Activity

Energizer: Singing songs that are related to prevention of diseases

The group will be taken through reproductive health education as follows:

- **Cervical Cancer Basics:** Explain what cervical cancer is, how it develops, and why it's important to get screened.
- **Screening Methods:** Clearly explain the different screening methods (Pap smear, HPV test) available and their effectiveness.
- **Benefits of Screening:** Emphasize the benefits of early detection and treatment, including the possibility of preventing cervical cancer.
- **Risk Factors:** Discuss risk factors for cervical cancer, such as HPV infection, smoking, and multiple sexual partners.
- **Addressing Myths and Misconceptions:** Correct common misconceptions about cervical cancer and screening.
- **Follow-Up:** Explain what to expect if a screening test is abnormal and the importance of follow-up care.

Session one

Topic: General Orientation and Administration of Pre-test instrument.

Objectives of the session:

- To state the purpose of the meetings
- To explain the procedures to follow by trainers and the participants to follow by trainers
- To administer the pre-test instrument on the participants activity.

Step 1: The researcher will welcome the participants

The participants will be allowed to introduce themselves to ensure familiarization among them.

Step 2: The researcher will state and explain in clear terms the purpose, objectives and benefits of the training. Day, duration (number of contacts) time and number of hours for each contact, venue for the interaction and relevant information will be discussed with the participants.

Step 3: Participants will be told what is expected of them such as punctuality, regular attendance, cooperation and participation during discussions.

Step 4: The researcher thereafter will administer the pre-test on the participants with the help of trained research assistants. Same will be collected on the spot.

Closing Remarks.

- The participants will be commended for giving their time.
- The participants will be reminded of the time and venue for the next session.
- The researcher appreciates the participants and close the session.

Session two

Topic: Cervical Cancer (definition, concept and symptoms)

Objectives: At the end of this session, the participants will be able to:

- Define Cervical Cancer
- List the symptoms of Cervical Cancer

Activity

Step 1: The researcher welcomes the participants

Step 2: The topic for the week will be introduced and explained

Step 3: The researcher will ask questions to evaluate the topic taught and make corrections where necessary.

Closing Remarks:

- The participants will be commended for giving their time.
- The researcher appreciates the participants and ends the session.

Session three

Topic: Types and classification of Cervical Cancer

Objectives: At the end of the session, the participants will be able to:

- List the types of Cervical Cancer

Activity

Step 1: The session will commence with an overview of previous session

Step 2: The researcher introduces and explain the topic for the week

Step 3: The researcher asks questions to evaluate the topic taught and correct where necessary

Closing Remarks:

- The researcher will commend the participants for their co-operation
- They will be reminded of the time for the next visit
- The researcher appreciates the participants and ends the session next session.

Session four

Topic: Risk factors and development of Cervical Cancer

Objectives: At the end of the session the participants will be able to:

- Define Cervical Cancer risk factor
- Identify two Cervical Cancer risk factors
- Explain the effects of HBV infection on reproductive system and how it can be contacted

Activity

Step 1: The researcher welcomes the participants

Step 2: The topic for the week will be introduced and explained

Step 3: The researcher will ask questions to evaluate the topic taught and make corrections where necessary.

Closing Remarks:

- The participants will be commended for giving their time
- They will be reminded of the time and venue for the next session
- The researcher appreciates the participants and ends the session.

Session five

Topic: Symptoms of Cervical Cancer

Objectives: At the end of the session the participants will be able to:

- List two symptoms of Cervical Cancer
- Explain the effects on the system

Activity

Step 1: The researcher welcomes the participants

Step 2: The topic for the week will be introduced and explained

Step 3: The researcher will ask questions to evaluate the topic taught and make corrections where necessary.

Closing Remarks:

- The participants will be commended for giving their time.
- They will be reminded of the time and venue for the next session.
- The researcher appreciates the participants and ends the session.

Session six

Topic: Prevention of Cervical Cancer

Objectives: At the end of the session the participants will be able to:

- Mention two methods of screening for Cervical Cancer
- Explain the effects of Cervical Cancer

Step 1: The researcher welcomes the participants

Step 2: The topic for the week will be introduced and explained.

Step 3: The researcher will ask questions to evaluate the topic taught and make corrections where necessary.

Closing Remarks:

- The participants will be commended for giving their time
- They will be reminded of the time and venue for the next session.
- The researcher appreciates the participants and ends the session.

Session seven

Topic: Prevention of Cervical Cancer

Objectives: At the end of the session the participants will be able to:

- Mention two methods of screening for Cervical Cancer
- Explain the effects of Cervical Cancer

Step 1: The researcher welcomes the participants

Step 2: The topic for the week will be introduced and explained.

Step 3: The researcher will ask questions to evaluate the topic taught and make corrections where necessary.

Closing Remarks:

- The participants will be commended for giving their time
- They will be reminded of the time and venue for the next session.
- The researcher appreciates the participants and ends the session.

Session eight

Topic: Review of Previous Sessions and Administration of Post-test Instrument

Objectives: At the end of the session participants will be able to:

- Summarize what they had learnt from the training programme
- Express their willingness to continue to improve on healthy reproductive behaviours.

Activity

Step 1: The participants will be welcomed

Step 2: Questions will be asked on all topics taught to know how participants have internalized the training.

Step 3: Post-test instrument will be administered on the participants. Same will be collected on the spot with the help of trained research assistants.

Closing Remarks:

- The participants will be commended for giving their time
- The researcher appreciates the participants and serves some refreshment to end the training programme.
- The participants are dismissed.

Bio-data

A) Personal Data:

Full Name	Rebecca Opeolu APATA
Date and of Birth:	26th July, 1983
Nationality:	Nigerian
Permanent Home Address	No 1b Irepodun Street, Ogbere Oriyangi, Ibadan.
Phone Number:	08055060193
Email:	rebeccaopeolu2@gmail.com
Next of Kin:	Dr. Apata Banji
Address of Next of Kin	Abayomi Estate, Sawmill Old-Ife road, Ibadan

B) Educational Background with Dates:

(i) Ladun Primary School, Oja-igbo Ibadan	1989 – 1994
(ii) Renascent High School, Aremo Ibadan	1994 – 2000
(iii) Kwara State School of Nursing, Ilorin	2005 – 2008
(iv) Ladoke Akintola University	2018 – 2022

C) Work Experience with Dates:

(i) Bemel Hospital, Agugu Ibadan	2011
(ii) Midwife Service Scheme (MSS)	2012
(iii) University College Hospital, Ibadan	2013-Till date

D) Awards and Fellowship:

(1) Award for the best student in Occupational Hazards

E) Membership of Academic/Professional Bodies

(i) Nursing and Midwifery Council of Nigeria

F) Publications

Nil

G) Major Conferences attended with dates

Nil

H) Names and Addresses of Referees:

(1) Dr. Apata Banji
08055060193
banjiheight@yahoo.com

(ii) Dr. Segun Adeagbo
08035857820
Segunadeagbo@gmail.com

Date

Signature

The University Compliance Certification

This is to certify that this thesis by Rebecca Opeolu APATA with matriculation number LCU/PG/005996 in the Department of Nursing Science Lead City University, Ibadan is in full compliance with the approved University format and style.

Signature

Date

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