CLINICAL TRAINING OF VISUAL INSPECTION WITH ACETIC TO INFLUENCE THE ACCURACY OF OUTCOME IN CERVICAL PRECANCER SCREENING IN SELECTED FACILITIES AT EMBU COUNTY, KENYA.

BY

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DECLARATION

Student's declaration

I hereby declare that this is my original work and has not been presented for a degree in any other university.

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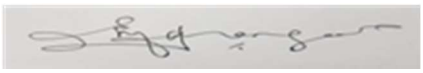
Signature  Date: 13/6/2023

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DEDICATION

I dedicate this project to my family and to every woman out there at risk of cervical cancer.

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OPERATIONAL DEFINITIONS

Cervical Intraepithelial Neoplasia–This is the abnormal growth of cells on the surface of the cervix that could potentially lead to cervical cancer. More specifically, CIN refers to the potentially premalignant transformation of cells of the cervix. VIA-positive results mean that a woman has cervical intraepithelial neoplasia, which can develop into cervical cancer in a few years if not treated. It is also known as cervical pre-cancer.

Human papilloma virus– Human papillomavirus (HPV) is an infection that can be transmitted through activity. It is one of the sexually transmitted infections, among men and women who are sexually active.

Health service providers- Nurses, doctors, and clinical officers who provide VIA services in selected facilities.

Didactic training Adopted Ministry of Health Kenya (MOH) training curriculum. Supplemented with JHPIEGO cervical images and delivered as per World health organisation recommended 5-10 days.

ABBREVIATIONS AND ACRONYMS

ACCP – Alliance for Cervical Cancer Prevention

CIN – Cervical Intraepithelial Neoplasia

CHW- Community Health Volunteers

HIV - Human Immunodeficiency Virus

HPV- Human Papilloma Virus

HSPs- Health Service Providers

KNH- Kenyatta National hospital

LMCI's– Low and Middle-Income Countries

NCD- Non-Communicable Disease

NGO- Non-Governmental Organisation

OJT- On-Job Training

PPV– Positive Predictive Value

SCJ- Squamo Columnar Junction.

VIA- Visual Inspection with acetic acid

VILLI– Visual Inspection with Lugols Iodine

WHO- World Health organisation.

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ABSTRACT

Cervical cancer ranks as the prevalent cancer, among women in developing nations. The World Health Organization (WHO) has highlighted the lack of resources for prevention programs. Despite efforts to screen for cancer and training on VIA/VILLI the number of deaths from this disease remains alarmingly high. It's worth noting that Kenyas VIA/VILI training guidelines do not place emphasis on the importance of practice in improving screening results, which is crucial due to the subjective nature of the VIA test. As a result Embu County in Kenya has only observed a 1% positivity rate for pre cancer whereas WHO standards indicate that it should be around 10 15% within any given population (as per their 2010 report). The objective of this study was to assess how effective VIA clinical training is in influencing outcomes related to inspection with acid for cervical pre cancer screening at selected facilities in Embu County, Kenya. This research aimed to contribute to existing literature and nursing studies while aligning with policies on controlling diseases. Moreover it sought to determine the training approach, for VIA that would enhance the effectiveness of cervical cancer screening outcomes using this method. To achieve these objectives we employed an embedded mixed method study design. Fourteen healthcare professionals who participated in the study underwent a training program for two days of instruction and four days of hands on clinical practice, under the guidance of experienced mentors. The selection of facilities where the respondents were recruited followed a sampling approach. Subsequently these healthcare providers were closely monitored for a duration of four months during which 434 women underwent screening. The research took place in Embu County, focusing on healthcare providers who offer VIA services, in government facilities. We collected data by using questionnaires conducting observations and interviewing informants (referred to as KII). In addition we gathered data from health facility records and the KDHS 2014. Our analysis included both techniques. We examined the data through univariate. Bivariate analyses to understand the characteristics of the study population. To measure agreement we used Cohens Kappa Coefficient (K). The qualitative data obtained from the interviews underwent analysis. The studys findings indicated that even though all respondents had received training on cervical cancer screening using VIA/VILLI, the positivity rate, before intervention was 0.8%. Adherence to cervical cancer screening guidelines was poor prior to training. Improved significantly after intervention. Cohens Kappa Co-efficient was 0.54 on day one of clinical training. Post-training, there was near-perfect agreement at (k) 0.9, with the Probability of agreement (P_o) at 0.86 and Probability of random agreement (P_e) 0.74. The t-test for pre/post-test was $P< 0.001$. This showed significant learning had been achieved. Following the intervention healthcare providers demonstrated improved skills and ability to identify lesions. There was also an increase in cancer screening uptake. The post training pre cancer positivity rate stood at 14.1%. It is recommended that proper acquisition of VIA skills be prioritized as it positively impacts outcomes. The guidelines and curriculum, for VIA training by the Ministry of Health should be updated to include hands on practice sessions for four days after classroom training. These practice sessions should involve experienced mentors and the use of images. Additionally it is crucial for the Ministry of Health (MOH) and local health departments to provide support and supervision to healthcare workers who have been trained in VIA with, at one session every quarter. Additionally they should ensure the provision of VIA supplies, to these healthcareprofessionals.

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter focuses on the background of the study, statement of the problem, justification, research questions, objectives and significance of the study.

1.2 Background to the Study

The statement, "One woman dies of cancer every two minutes... Each one is a tragedy and we can prevent it" by Dr. Tedros A. Ghebreyesus, Director General WHO (WHO 2020) highlights the global impact of this issue. Cervical cancer stands out as one of the diseases that reveals disparities on a scale. In middle income countries its occurrence is twice as high and mortality rates are three times higher compared to high income countries (Saleh 2013). Cancer ranks as the leading cause of communicable disease related deaths after cardiovascular diseases accounting for approximately 7% of all deaths in Kenya (KDHS 2014). However through detection methods and effective treatment approaches we have the potential to reduce cancer fatalities significantly. According to WHO estimates there are around 28,000 cases of cancer reported annually with a death rate of 22,000 cases. Shockingly over 60% of those affected by cancer are, under seventy years old. However it is worth noting that the likelihood of cancer occurrence, before reaching the age of seventy stands at 14% whereas the estimated probability of succumbing to cancer is 12%. In light of this breast, cervical and esophageal cancers are prevalent, among women while men tend to experience oesophagus, prostate and Kaposis sarcoma as mentioned in the Kenya Cancer Policy 2019).

In developing countries the lack of cervical cancer prevention programs has led to approximately 80% of cervical cancer cases occurring there (Markovic 2016). To tackle this issue a cost effective and reliable screening procedure called VIA has been. Recommended by the WHO for settings. Numerous studies have shown that VIAs sensitivity ranges from 65% to 96% with an average of 84% while its specificity ranges from 64% to 98% with an average of 82%. The positive predictive value falls between 10% and 20% whereas the negative predictive value is, between 92% and 97%. (Emmanuel 2016). Programmes must focus on changing these trends. That developing operative training methods are crucial in the execution of a given healthcare programme is well known. Furthermore, these methods should not only be based on proficiency but also be intensive, practical, accessible, culturally suitable, and tranquil for the

target audience to understand (Asagary and Adongo, 2016). Although different approaches are used in training, theory grounded on didactic education and hands-on proficiency-based skills acquisition are the two fundamental types. Hence, this study utilised a training model encompassing the trainees' theoretical and practical experiences.

As far as cervical cancer is concerned, linking methods of knowledge with a prevention programme has been a common practice, according to the Alliance for cervical cancer prevention (ACCP) (Asgary and Adongo 2016). Therefore, it is important that the health service provider (HSP), who is expected to provide cervical cancer screening and treatment services, have a good foundation of adequate knowledge and high-quality scientific skills. This ensures that the HSP gains the confidence and competence required to practice. In this context, therefore, an HSP who has attained acceptable knowledge, operates with minimal supervision and is able to perform not only visualisation but also inspection with Acetic Acid (VIA) and cryotherapy to the expected standards, then they will be considered to be competent.

According to reports by the WHO, cervical cancer is one of the leading causes of death among women globally, more so in sub-Saharan Africa (WHO 2020). Although *Human papilloma* virus (HPV) is known to cause cervical cancer, the Centres for Diseases Control (CDC) has demonstrated an association between infection with Human Immunodeficiency (HIV) virus to the rise in risk level for contracting HPV infection among females (WHO 2020) Other risks associated with HIV include cervical Cancer Precursor Lesions (CPL) and the Invasive Cancer (IC). Contrastingly, developed countries have a lower prevalence of cervical cancer, which has largely been attributed to high-quality cytology-based screening programmes and HPV vaccination (WHO 2020).

Subsequently, a number of cervical cancer screening strategies suitable for use in low and middle-income countries (LMICs), such as cytology, VIA or with VILI and HPV virus testing, have been studied. However, in resource-limited settings, cytology-based programmes are often difficult to implement, given the inadequate infrastructural provisions necessary for effective cytology programmes, such as laboratory, transport facilities, competent personnel, tracing systems for the specimens and patients, along with the cost as well as the need for multiple visits (Saleh 2013). Furthermore, the expenditures of the currently used HPV tests, along with a high HIV and HPV co-infection rate, make HPV testing inappropriate in Countries with high prevalence of HIV infection (Saleh 2013). Consequently, a number of health organisations and

ministries in LMICs have endorsed VIA, followed by VILI, in case of positive results. Importantly, visualizing the cervix using acetic acid is a relatively cheap screening test, usually combined with simple treatment measures for precancerous cervical lesions provided by HCP (Saleh and Sherif 2017).

Specifically it is believed that a solution containing a concentration of 5% acid can cause protein coagulation in cells. Acetic acid has been found to induce inflammation in types of tissue including abnormal squamous epithelial areas. It also leads to cell dehydration (WHO,2020). Normal squamous epithelium appears pink while columnar epithelium appears red due to the reflection from the rich blood vessels in the underlying stroma. Additionally there is some evidence suggesting that when cellular proteins are abundant in the epithelium acetic acid causes coagulation of these proteins leading to a loss of coloration, in the stroma. This gives rise, to a acetowhitening" appearance that's different from the usual pink color of the surrounding healthy squamous epithelium of the cervix. This reaction is often observable, without any magnifying tools (Dorrell 2017).

In VIA a solution of acid is applied to the cervix of women which is believed to help identify any areas that may be, at risk of developing into lesions. This process can be done without the need for laboratory processing. Can be carried out using equipment and supplies. The advantage of this method is that the results are immediate allowing for treatment in a visit often administered by a trained nurse (Mburu 2015). Although VIA screening has a level of specificity it provides information about the occurrence of precancerous conditions, which is vital for cervical cancer prevention programs (Saleh 2013).

According to the findings of a survey conducted in Kenya in 2014 it was discovered that there were 13.45 million females aged 15 years and older who were, at risk of developing cancer. Moreover a report from the Ministry of Health (MoH) in 2017 estimated that around 4,802 Kenyan women receive a cancer diagnosis each year resulting in 2,451 deaths. Consequently the MoH has identified cancer as the leading type of cancer among women between the ages of 15 and 44. Additionally it is believed that 9.1% of females, in Kenya may have HPV infection (HPV types 16/18) at any given time and approximately 63.1% of invasive cases are associated with either HPV type16 or type18 (as stated in the KDHS report of 2014).This report further indicates a lengthy incubation period of cancer of the cervix. Some previous research has shown that when women are regularly screened, the precancerous lesions can be detected early, which

could help abate it. However, some studies have shown that, comparatively, screening of the cervix through conventional cytology techniques has had a lesser impact in developing countries than in developed countries (Kutto and Mulwo 2015).

Sufficient evidence showing HPV infection as a prerequisite in the cause of cancer of the cervix exists (Dorell 2017). In response, inventions targeting HPV early detection techniques and prevention measures, such as vaccination targeting young girls, have been rolled out worldwide. However, it will probably take the WHO several years to see the impact of HPV vaccination succeed, hence the need to strengthen cervical cancer screening. According to an MOH (Kenya report 2015), it is envisioned that cytology screening may be replaced with HPV testing with cytology triage soon, particularly within an organised, high-quality cytology screening programme. However, the best approach to screening those individuals in resource-limited settings with little or no access to healthcare services remains unanswered (Li 2013). Therefore, in an attempt to answer this question, the use of the VIA technique, followed by treatment with cryotherapy as the best alternative screening approach in these kinds of settings, has been suggested (Saleh and Sherif 2017). However, there have been inconsistencies in the results emanating from the studies that focus on evaluating the performance of VIA in these settings (Kutto and Mulwo 2015). Nevertheless, numerous studies conducted in both India and Africa have reported better VIA results than those from Latin America.

1.2 Problem Statement

Cervical cancer despite being a disease poses a threat, to women in Kenya leading to high rates of illness and mortality. It is crucial to comprehend the extent of this public health burden on women worldwide. Equally important is understanding the significance of screening as the approach to reducing cancer deaths. Though the current VIA/VILLI national training guidelines have the theory training provision, they lack emphasis on the practical training of participants component under the mentorship of preceptors to learn the essential skill. There are factors contributing to the issue including participation, in screening a lack of adherence to guidelines and inadequate practical training programs. In Kenya the VIA training program consists of two days of training and two days of training. The clinical training is mostly done as a demonstration. VIA uptake is at 16% nationally, with the last national VIA training having been done in 2011. The programme has since faced attrition, and on-job training (OJT) is currently being done by health service providers with eroded VIA skills (Mwenda *et al.* 2022).

According to the KDHS report from 2014, 13.45 million females aged 15 and above are at risk of developing cancer. The report also states that there are around 4,802 cases of cancer each year resulting in 2,451 fatalities annually. Despite screening efforts the number of cancer deaths and invasive cases has not decreased significantly. Therefore the study suggests that with healthcare worker training and adherence to screening guidelines VIA can be an effective tool for early detection and timely intervention in pre cancerous lesions. Kenya already has a policy framework, for using VIA in cancer screening. However the current training program lacks a component which hampers its effectiveness. To improve outcomes it is crucial to incorporate elements into the existing program. Nevertheless evidence indicates that Embu Countys VIA positivity rate is 1% (according to DHIS 2016) falling short of the WHOs recommended threshold range of 10 15% for any given population (WHO 2010).Despite the presence of policies aimed at promoting access, to reproductive health there remains a disconnect, between these policies and their implementation. This gap needs to be addressed and filled accordingly.

1.3 Relevance and significance of the study

As a country Kenya has committed itself to human rights agreements and declarations, across Europe, Asia, America, Australia and Africa. It is important for Kenya to address two pressing issues; health and the control of communicable diseases (NCDs). In the year 2000 Kenya adopted a scheme aimed at preventing and controlling NCDs. This led to the adoption or endorsement of resolutions during Health Assembly meetings that supported components of the global strategy. These resolutions align with the Global Action Plan, for Preventing and Controlling Non Communicable Diseases (NCDs) between 2013 and 2020. Additionally there have been declarations and agreements related to NCD prevention and control. For instance the Brazzaville declaration in 2011 focused on preventing and controlling NCDs in the WHO region. Similarly the Moscow declaration from the conference, in 2011 emphasized promoting healthy lifestyles and controlling NCDs. Furthermore a Political Declaration was issued during the High Level Meeting of the General Assembly to address NCD prevention and control.

One crucial aspect outlined by SDG 3 (Development Goal) within the 2030 Agenda for Development is to ensure healthy lives and promote well being, for people of all ages. To achieve SDG 3s target of reducing mortality from NCDs by one third by 2030 (including cancer) it is essential to focus on preventing cancer mortality. In the country, as a whole matters concerning Sexual Reproductive Health (SRH) are dealt with through laws and policies.These

include: the Kenya Breast, Cervical and Prostate Cancer Prevention Strategy, 2012-2015; the National Reproductive Health Policy, Enhancing Reproductive Health Status for All Kenyans, 2007; the Kenya Vision 2030; the National Reproductive Health Strategy, 2009-2015; the National Cancer Control Strategy, 2017-2022, The Constitution of Kenya, 2010; and the Kenya Health Sector Strategic Plan III, 2012-2017.

From the information hitherto discussed, Kenya has a favourable policy and legal context. However, there were no sufficient indicators for the various milestones that cervical pre-cancer widespread training and screening has done to reduce cervical cancer cases. There is, therefore, a need for standardisation of VIA training in low-resource setups to improve the effectiveness of cervical cancer prevention strategies. Unfortunately, no study has been done on a large scale to inform the delivery of standard VIA training and capacity building. Hence, evidence informing VIA training delivery in Health facilities in Kenya is lacking. Importantly, this research proposed and conducted such a study and a tailored, practical-oriented training programme whose findings will inform decision-making for cervical pre-cancer screening programmes using VIA implementation gaps in the Kenyan health system. Further, this study offers new insight and examination of VIA screening health services offered to this sub-population, thus making an original contribution to the body of knowledge. It will also inform policy review and policy monitoring and evaluation.

1.4 Objectives of the Study

1.4.1 Broad Objective

The main purpose of this research was to assess how clinical training impacts the results of precancer screening using visual inspection, with acetic acid, in specific healthcare facilities located in Embu County.

1.4.2 Specific Objective

1.4.2.1: Phase one: Baseline phase

1. The goal is to find out the rate of positivity, for pre cancer in facilities in Embu County before any intervention takes place.
2. We aim to understand the factors related to health services that affect how many people choose to undergo VIA screening in selected health facilities in Embu County before any intervention occurs.
3. Our objective is to investigate how selected health facilities in Embu County adhere to the guidelines, for VIA screening before any intervention is implemented.

1.4.2.2: Phase two: Intervention phase/VIA and Cryotherapy training phase

4. To determine the effectiveness of cervical cancer VIA clinical training

1.4.2.3: Phase three: Post VIA and Cryotherapy Training phase

5. To evaluate the efficacy of VIA training, in detecting stage abnormalities at specific healthcare facilities in Embu County.
6. To examine the impact of VIA training on increasing the utilization of VIA screening at designated healthcare facilities in Embu County.
7. To assess the effectiveness of VIA training in promoting adherence to established guidelines at selected healthcare facilities, in Embu County.

1.5 Research Questions

1. What is the proportion of cervical pre-cancer positivity rate in selected facilities in Embu County prior to intervention?
2. What are the health service factors influencing the uptake of VIA in selected health facilities in Embu County before intervention?
3. How are VIA guidelines adhered to in selected health facilities in Embu County prior to intervention?

4. What is the effectiveness of cervical cancer VIA clinical training
5. What is the effectiveness of VIA training in identifying pre-cancerous lesions in selected facilities in Embu County?
6. What is the effectiveness of VIA training in improving the uptake of VIA in selected facilities in Embu County?
7. What is the effectiveness of VIA training in improving adherence to guidelines in selected facilities in Embu County?

1.6 Justification and Anticipated Output

The main goal of this research study was to understand the status of standardised didactic and clinical training of VIA that meets recommended guidelines of 5-10 days and that involved practical training of healthcare workers to improve the subjective nature of VIA. This study was to help healthcare workers be more confident and competent in identifying precancerous lesions, thereby reducing the mortality and morbidity rates of cervical cancer because all precancerous lesions would be diagnosed early and treated, preventing their advancement to invasive cancer. This study aimed to inform the policymakers and the Ministry of Health of a simple yet effective training method that would help reduce cervical cancer morbidity and mortality. The training model proposed in this study does not need new training methods. Still, it shows the importance of clinical practice that uses preceptors in the existing MOH VIA training guidelines, thereby increasing cervical cancer screening outcomes.

1.7 Limitation and Delimitation

This study faced the limitation of attrition; the researcher counteracted this by ensuring that the HCPs selected for training met the requirements of passion for cervical cancer screening and the ones not likely to have a job station transfer during the course of the study. The study also faced the length of training days limitation due to county staff shortage. The county could not release staff for seven days of training, so theory training was consolidated into two days rather than the initial three planned, but the four days for practical sessions were retained. The total training duration was six days. The baseline cryotherapy observational checklist was also not used since there was no HSP trained on cryotherapy in the six facilities, the one trained was in 1 facility, and the cryotherapy machine had broken down. The comprehensiveness and intensity of this VIA training can only allow 14-16 participants in a single class.

The researcher chose to train one class due to the availability of resources and the nature of practical clinical training. The recommended ratio of preceptors to trainees was 1:2. During the clinical training phase, each participant should be able to screen a sufficient number of women to master the skill. The study was limited by personal bias, but the researcher engaged a co-facilitator and involved preceptors in all study phases to ensure objectivity and overcome bias. The study was delimited to selected government health hospitals in Embu County in Kenya, targeting all healthcare workers offering VIA screening to women 25-49 years. The study participants were 14 healthcare providers trained on VIA and, in turn, screened 434 women.

1.8 Chapter Summary

This chapter has mainly focused on the background of the study, the problem statement, justification of the study, study objectives, research questions, significance, limitations and delimitations. Healthcare professionals are essential in cancer screening and treatment, and they should have a good foundation of adequate knowledge and high-quality scientific skills. The HCP competency is measured through their capability to perform a VIA and cryotherapy to the expected standards. This means that the competent healthcare worker can screen for cervical cancer following the guidelines and diagnose the cervix as either Negative (No precancerous lesion), Positive (precancerous lesion) or suspicious for cancer. Significantly, cervical cancer is the second most common cancer of women globally, accounting for 70-80% of all cancer cases in Kenya. However, health workers in Embu County lacked intensive training on cervical cancer screening. Hence, appropriate training of healthcare workers would help them adhere to the screening guidelines and effectively use VIA, which is a powerful screening tool that should be able to detect precancerous lesions. The effectiveness of training, in influencing the outcome of pre cancer screening using VIA has not been extensively studied in Embu County. Therefore it is necessary to determine the impact of training on VIA training and capacity building, in selected facilities. To my knowledge, this is the first study to address that gap in Kenya.

CHAPTER TWO
THEORETICAL AND PHILOSOPHICAL UNDERPINNINGS

2.1 Introduction

This chapter encompasses the theoretical framework that provides the foundational basis for the study. Several authors have emphasised the importance of theory-driven thinking as brought out in a theoretical framework. For instance, Grant and Osanloo (2014) argue that rigorous findings from a research study and inferences thereof cannot occur in a theoretical study that is unjustified by a theoretical framework. This section, therefore, discusses the worldview of the researcher's philosophy against which the study is conceptualised in terms of epistemology, ontology, methodology and analysis. This study is divided into five sections that outline the framework. These sections cover the approach, to inquiry perspectives, on knowledge and reality the theories that support this study and the methods used in conducting it.

2.2 The Paradigm of Inquiry

In the realm of research scholars employ the term "paradigm" to express their stance and guide their thinking process. A research paradigm reflects a researchers beliefs about their world and their aspirations for a world. It comprises beliefs and principles that shape how researchers perceive and navigate their reality. Essentially it serves as a lens through which researchers examine aspects of their work determining the appropriate study methodology and analyzing collected data. Understanding these paradigms is essential, for researchers as they embark on their studies ensuring they adopt methodologies that align with their worldview and allow for analysis of data.Likewise various writers have portrayed paradigms as concepts made by humans that play a role, in revealing the researchers perspective when constructing significance embedded within data (Denzin and Lincoln 2000).

Subsequently, research paradigms are paramount because they provide a belief system which dictates what should be studied, how it should be studied and how a particular group of scholars should interpret the study results in a given discipline. In line with that, four perspectives exist for scholars to make their paradigm stances from, i.e., positivist, post-positivist, constructivist or interprevitist perspective. In this study, the researcher chose the pragmatism paradigm of inquiry, as discussed in the subsequent subtopic.

2.2.1 Pragmatism Paradigm of Inquiry

The pragmatism paradigm of inquiry accepts concepts in a study that support action. In their research pragmatists explore perspectives to understand the world. They acknowledge that a single viewpoint cannot provide a picture and that multiple realities coexist (Cresswell et al. 2003). The pragmatic paradigm of inquiry is not a description of reality or representation of knowledge but is viewed as a transactional experience that seeks to pursue theoretical and actionable worth. The focus of this paradigm is not to simply know more but to solve problems and enhance one's awareness as one interacts with the world.

This study adopted a pragmatic methodological approach because of the mixed methods design. One of the advantages of mixed methods is the ability to overcome the disadvantages of adopting one research method. Teddlie and Tashakkori (2009) suggest that mixed method research advocates, for the use of pragmatism as the paradigm for this research methodology. In a paradigm researchers have flexibility, in conducting their studies focusing on what methods effectively address the research questions rather than adhering strictly to a specific paradigm. However it is important to note that this does not imply that any approach can be taken when adopting a mixed study design.

When it comes to pragmatism a crucial aspect is formulating research inquiries that require combining quantitative approaches to arrive at conclusions (Cresswell 2003). The emphasis is that the researcher chooses the most appropriate method to answer research questions rather than the methods themselves. The research is not concerned with using abstract knowledge but rather answering the research questions (Morgan 2007). This means that no initial assumptions are made regarding the social world, and the only assumptions are derived from the research. Knowledge generation, therefore, becomes practical rather than only theoretical. Therefore, knowledge generation is derived from prior knowledge (Scott and Briggs 2009).

In this study, there was a need to understand the HCP's knowledge and skills in cervical cancer screening acquired through training. The participation rate, for cervical cancer screening is typically affected by how healthcare professionals interact with clients in the community and at healthcare facilities. To fully comprehend these interactions and how knowledge and skills related to cervical cancer screening are applied in practice, questionnaires, interviews, with individuals and baseline surveys were conducted as steps. In order to conduct a baseline survey to establish cervical cancer positivity rate in participating facilities, quantitative data was needed,

and qualitative data was also needed to supplement the quantitative data and understand baseline gaps. Hence this study adopted the pragmatism paradigm of inquiry

2.3 Epistemological Perspectives

The study of epistemology revolves around understanding the ways in which we acquire knowledge and ascertain the truth or reality as explained by McDonald in 2011. Furthermore, it is concerned with creating, acquiring and communicating knowledge (Creswell 2014). For that reason, there are two viewpoints of epistemology perspectives: objectivism and subjectivism. While objective epistemology focuses on vital realism, where there is a belief that knowledge should often be used to enlighten, predict and control events, subjective epistemology, on the other hand, makes assumptions that knowledge does get filtered through the lenses of social class, gender, language, ethnicity as well as race (Denzin and Lincoln 2005). Hence, it proposes that what influences knowledge is one's reflections and interpretations. In epistemology the idea is that when an investigator examines their data they do so by using intellectual thinking to analyze the facts. This analysis is influenced by their interactions, with the people involved. Therefore it is believed that researchers can develop knowledge collectively as they engage with individuals, in real life situations that are being studied. Likewise, It holds the theory that the researcher and his themes are involved in interactive procedures in which he interacts through writing, recording facts of the investigations, discussion, mingling, inquiry and listening.

As a result, subjective epistemology was used in this study to make sense of data collected from participants due to the researcher's interaction with them in their natural environment without any manipulation. Relying on data gathered from people in the facilities that screen for cervical cancer and key informants means the researcher's epistemology was grounded on authoritative knowledge. Also, using purposeful sampling techniques to sample facilities to participate in the study and quantitative data from facility registers, the researcher utilised objective epistemology.

2.4 Ontological Perspectives

The ontological perspective deals with the study of being in general. In particular, this perspective focuses on the philosophy of studying reality, i.e. the nature of life or of becoming, including the basic categories of things that exist and how they are related. Thus, one's underlying belief system as a scholar is studied with regard to the environment of existence as well as actuality. Importantly, relativist and critical realist ontology are the two main standpoints

of ontological perspective. While relative ontology holds that one has faith and that reality is a finite subjective experience that differs from one person to the other (Denzin and Lincoln 2005), critical realist ontology, on the other hand, assumes that the existence of reality is exclusive of the human mind, irrespective of whether an individual comprehends it or has experienced it directly. Indeed, relativist ontologists often assume that if the researcher is confident in the subject under study, then multiple realities could emerge, which can be revealed and interpreted through interactions between the researcher, the participants, and an interaction between the participants.

In this study, therefore, the researcher assumed a relativist ontology, meaning that cervical cancer screening through VIA after clinical training had multiple factors that influenced the outcome, which could be understood well when data was collected as a result of the researcher interacting with the study participants. The researcher also used a realist ontological perspective because of the use of quantitative data methods.

2.5 Theoretical Perspectives

According to Mackenzie and Knipe (2006) and Wedge (2009), theoretical perspectives refer to a set of philosophical assumptions that tend to inform the conduct of research, the establishment of given criteria, and the environmental context and foundation in which a study was to be based. It is critical to have a mindfulness of the underlying assumptions of each theory, and only based on such cognizance can an argument on the possible coherence of underlying conventions and such networking be developed.

In order to attain the objective of informative understanding, qualitative approaches are utilised to get closer and closer to the world of the participants being studied. Therefore, this study adopted a transformative theoretical perspective, which aligns with the interpretivism paradigm perspective. In particular, the interpretive approach holds the view that knowledge generated daily is creatively spawned by people and often geared towards certain practical problems. Given that knowledge of cervical cancer screening with VIA is skill cognitive, behavioural and practice interaction based, in this study, therefore, cervical cancer skill had to be learned and practised to enable healthcare providers to reach automatism in the skill and make the right diagnosis.

2.5.1. Transformative learning theory Perspective

It's worth mentioning that Transformative learning theory, proposed by Mezirow and Cranton focuses on how individuals can change their mindset based on information they acquire through learning. This theory suggests that learners can shift their thinking from accepting information without thought to reflecting on it and making conscious changes, in their worldview.

Transformative learning involves elements. Firstly it suggests creating a sense of disorientation or dilemma for the learner, which prompts them to reconsider their perspectives. This can occur in domains of learning, such as skills or communication. The learner then engages in reflection with others discussing and analyzing the subject matter that triggered the shift in thinking. Through this process transformative learning aims to transform and expand frames of reference into inclusive, reflective open minded, discerning and emotionally adaptable ones. This theory highlights the importance of questioning and critically examining existing beliefs to foster transformation, in learners understanding and behavior.

Mezirow suggests that transformative learning occurs through disorienting situations, critical thinking and open discussions. This process is not necessarily linear; it can be fragmented, personal, flexible or even cyclical (Mezirow 1991). Individuals engage in a process of introspection. Evaluate their ingrained beliefs resulting in a feeling of disconnect, from conventional societal norms. In this study, these three aspects of disorienting dilemma, self-examination and sense of alienation steps were tackled at the baseline phase of this study. Cervical cancer positivity rate prior to intervention and other gaps in practice were identified as disorienting dilemmas. The other steps of the transformative learning theories include: relating disconnect to others, which includes disconnect to similar experiences of others and recognizing that the problem is shared. The fifth step includes explaining new behaviour options and building competence and self-confidence through exploration. The sixth step is planning a course of action. Then the acquisition of new knowledge and skills. This stage is where the intervention phase is done through theoretical and clinical training.

The other steps are trying out new roles and assessing them, building confidence and competence and finally, re-integration into society with other perspectives. The skill is learnt at this point, and continuous practice enhances mastery. This was the post-intervention phase.

In this study, transformative theory allowed the study participants to learn and practice the skill of cervical cancer screening through theory and practice under preceptor mentorship. Subsequently, the exposure to repeated screening sharpened their skill and ensured a correct attitude toward increasing uptake of the service by the target population. For that reason, the researcher interacted with study participants in their natural setups.

Transformative learning theory

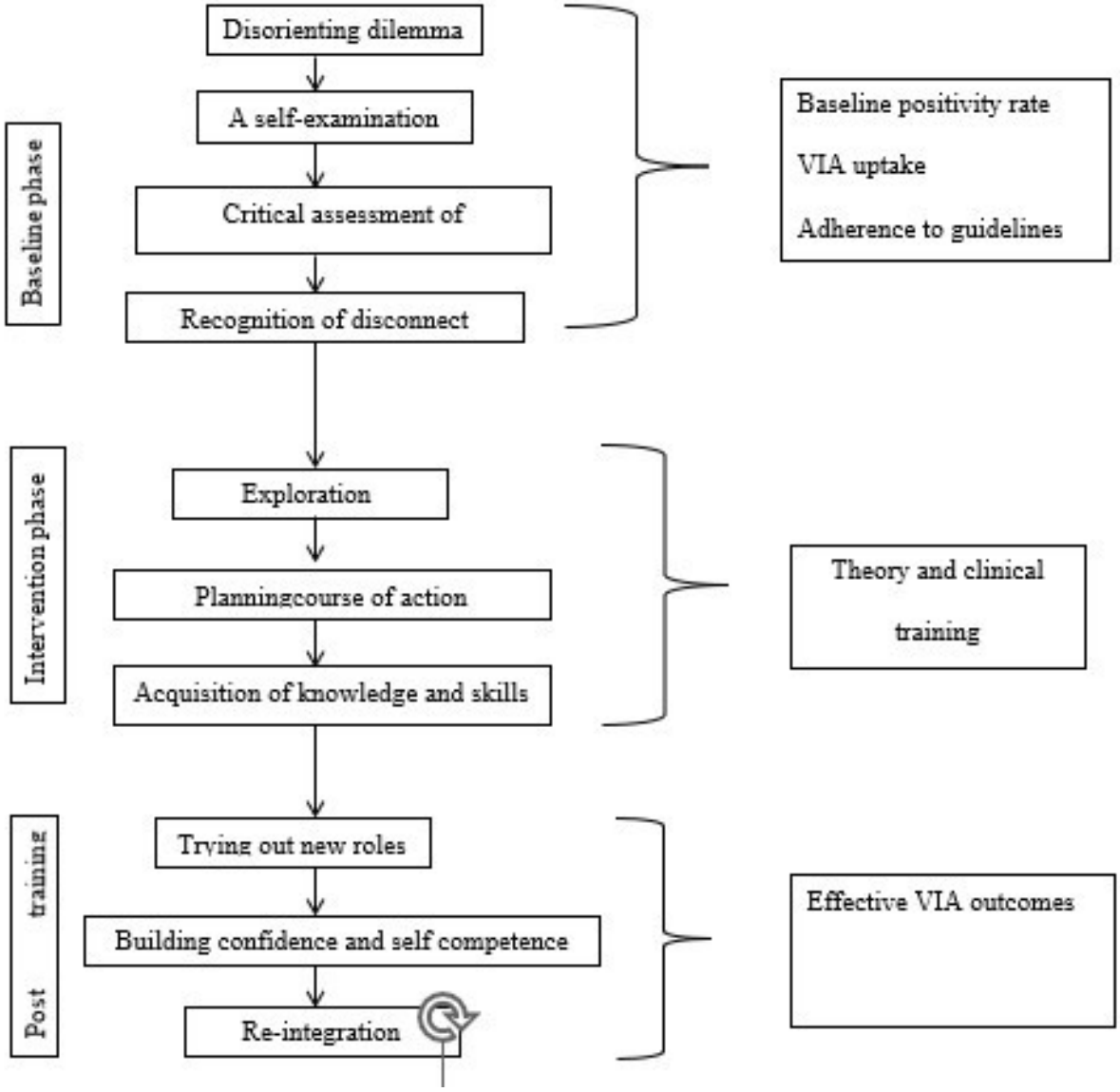

Figure 1: Transformative learning Theory (Mezirow 1991)

2.6. Methodological Approaches

Methodology refers to the strategy researchers utilise, which tends to translate ontological and epistemological philosophies into guidelines that show how research is carried out. Hence the methodology encompasses the planned research design, methods, approaches and procedures employed in the analysis to uncover insights, for a particular study. Hence, data collection, the target population, study instruments used and data analysis is described in the methodology.

Also, through methodology, one gets a clear, logical aspect of the systematic processes to gain facts about the problem. It outlines the assumptions and limitations of the study and addresses how they can be minimized or overcome, thus pointing to how researchers come to know the world (Moreno 1947).

Notably, Mixed study methods: qualitative methodology is entrenched in subjective epistemology, pragmatism paradigm and relativist ontology. Hence, it is a social inquiry that emphasises the methods researchers use to interpret and bring out meaning in their experiences. In this study the researcher aimed to evaluate the impact of training, on outcomes. To gather data a combination of quantitative methods were employed. Specifically, this qualitative method allowed the researcher to use questionnaires, observational checklists and key informant interviews to generate data.

2.7. Research Implications

There is a connection, between the paradigm and methodology because the choice of paradigm affects aspects of the research process, such, as the research questions, participant selection, research instruments and data analysis methods. Similarly the researchers epistemological and ontological beliefs also influence the methodology used in this study. This, in turn, obviously influenced the study design and the methods used to collect data, as discussed in this chapter. Consequently, this study generated data and knowledge that was studied contextually and holistically from a relativist ontology and subjective epistemology. This enabled the researcher and those participating to discover their own reality and knowledge. Tellingly, the pragmatism paradigm guided the decision to use mixed study design methodology. The pragmatism paradigm led to an in-depth analysis of the study topic.

2.8 Conceptual Framework

The relationship between independent and dependent variables is shown in Figure 2.1 below. The independent variables were examined before and after intervention to determine any effect from the intervention and the subsequent follow-up in the post-training phase.

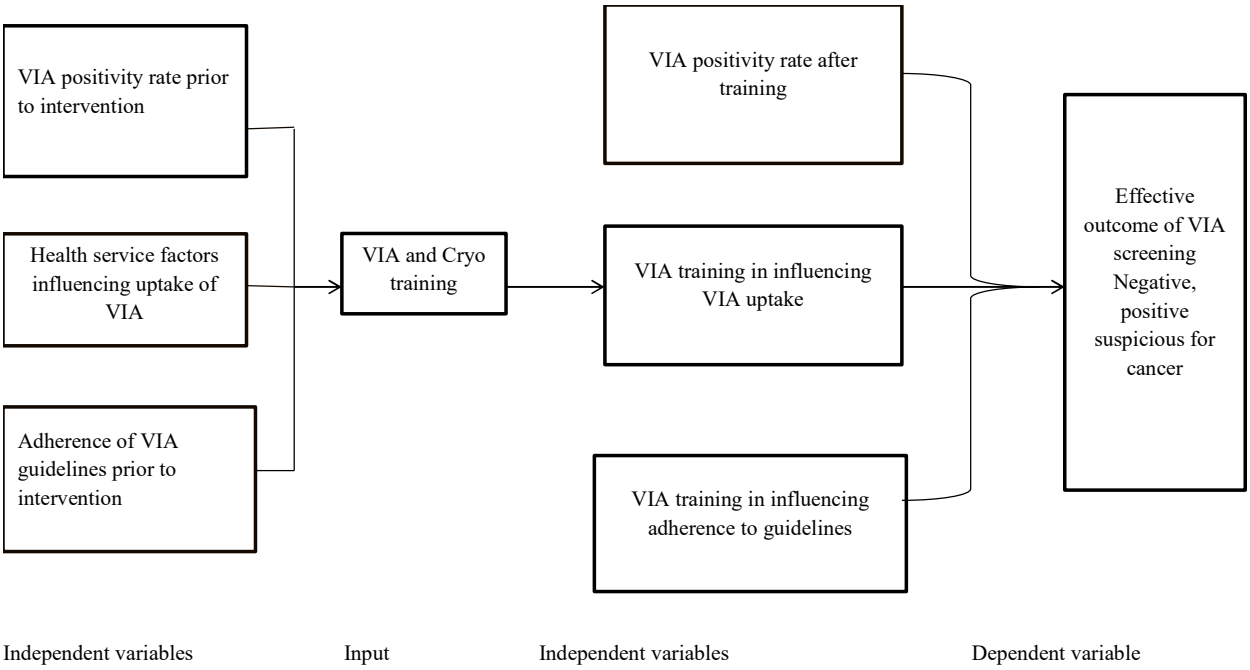

Figure 2: Conceptual framework (Source: Author, 2021)

This intervention study sought to train healthcare providers who provide VIA services in selected government health facilities to increase the effective outcome of the screening. Hence, the independent variables were healthcare factors that influenced the uptake of VIA services, ranging from knowledge, skills, attitude, the practice of VIA, adherence to the already set Kenya national guidelines for cervical cancer screening using VIA and the ability of the HSPs to correctly as well as confidently identify positive acetowhite precancerous lesions. A baseline survey on the positivity rate was done prior to the training. Likewise, the intervening variable was training that took the form of didactic and clinical practice with real-time patients who were informed that they were in a clinical practice set-up, and the trainees screened with the mentorship of a qualified preceptor. On the other hand, the dependent variable was the HSP's ability to make correct decisions following the effective screening, the VIA outcome of which would be a confident negative, positive or suspicious for cancer of the cervix.

2.9 Chapter Summary

This chapter has focused on the theoretical framework for the study. In summary, the pragmatism paradigm helps the researcher be flexible in their study, focus on problem-solving, and find practical solutions to the research questions. This allowed the researcher to use mixed

study methods in an embedded mixed study method. On the other hand, Subjectivist epistemology assumes that an investigator interprets their own data through rational and intellectual processing of facts informed by their interactions with the participants. The researcher, therefore, assumed relativist ontology, meaning that cervical cancer screening through VIA after clinical training had multiple factors that influenced the outcome. The researcher also used a realist ontological perspective because of the use of quantitative data methods. Also, in this study, transformative learning theory was adopted, which allowed the study participants not only to learn but also practice the skill of cervical cancer screening to change how they diagnosed the clients. The subsequent exposure to repeated screening sharpened their skill and ensured the correct attitude toward increasing uptake of the service by the target population.

CHAPTER THREE
LITERATURE REVIEW

This chapter focuses on the review of existing literature on cervical cancer screening using VIA. The researcher searched various databases, including HINARI, CINAHL, PubMed, SAGE, Cochrane Library and research gate, but found only limited relevant information on VIA cervical cancer screening. The search criteria used the following keywords: “Cervical Cancer screening,” “VIA,” “Human papillomavirus,” and “Cryotherapy.” The following objectives guided the search: cervical pre-cancer positivity rate, health service provider factors influencing the uptake of VIA, VIA guidelines adherence, the effectiveness of VIA training in identifying pre-cancerous lesions, the effectiveness of VIA training in improving uptake of VIA and the effectiveness of VIA training on improving adherence to guidelines.

3.1 Overview of Cervical Cancer

Ranked as the fourth most common cancer among women worldwide, cervical cancer has claimed nearly more women (90%) in developing than those in developed countries, with about 570,000 new cases recorded in 2018 (WHO 2019). However, this trend can be reversed. In particular, this can be achieved through simple but common approaches such as prevention through vaccination, effective screening services and early diagnosis and treatment. Over the years there has been a decline, in the number of cancer cases in wealthier countries with a reduction of around 70 to 80 percent. This positive trend can be attributed to the implementation of programs that focus on preventing cancer and detecting and treating conditions at a stage. In countries where prevention programsre well established such as western nations the incidence rates have decreased by 50 percent or more over the past five decades (as reported by Globocan in 2018).

According to estimates from Globocan cervical cancer is expected to be the leading cause of cancer related deaths among women in 2018. It is projected that this disease will result in 311,411 deaths. However it's important to note that middle income countries experience a number of cancer related deaths among women. A significant proportion (70 percent) of these deaths will occur in South and Central Asia (75,100) East Asia (54,500) and sub Saharan Africa (about 76,400). India alone being the country globally is anticipated to account for approximately 20 percent (equivalent to, around 60,100) of all cervical cancer related deaths. It's

worth mentioning that when cervical cancer is detected on it can be effectively treated with prognosis. The survival rate for this condition ranges between 60 and 70 percent, across countries.

With nearly 1,676 women dying from cancer of the cervix annually, about 2,454 Kenyan women are diagnosed with cervical cancer every year. This is expected to rise further by 2025 to more than 4,261 deaths, especially in the absence of services focusing on early detection and treatment (National Health Sector Strategic Plan 2017). In its early precancerous stages, cervical cancer is easy to detect and cure using simple treatment modalities (WHO 2020).

The problem is worsened further because there are fewer treatment facilities, a few trained HCP able to manage the invasive disease and training gaps for HCP in cervical cancer screening using available methods. As a result, the cost of treating invasive cancer is a huge burden that most people cannot afford, leaving families and communities economically drained. Furthermore, treatment facilities for invasive cancer, especially one needing radiotherapy, are very limited. In Kenya, for instance, Kenyatta National Hospital (KNH), a leading Kenyan national referral hospital, is the only public hospital with cervical cancer treatment facilities. In 2014, the KNH department of cancer registry was founded as one of the leading research projects aimed at providing a central cancer databank at the hospital by collecting data from all hospital departments with regard to cancer. This registry provides cancer data and maintains statistics on the incidence, prevalence and overall disease burden caused by cancer in KNH over time in relation to various demographic characteristics.

According to a study done in KNH cancer registries by Mudeyoet *et al.*. in 2014, about 4,221 cases were registered, of which one thousand six hundred twenty-seven were males and 2584 were females. Of all the cases registered, female cancer was the leading, i.e. cervical Uteri cancers at 786 cases, whereas there were 549 breast cancer cases. Most cases were from Nairobi county (1028), followed by Kiambu county with 448 cases. Of importance, among the women who had cervical cancers, 599 of them were HIV positive. Other cases of cancers were prostate (73), oesophageal (183), leukaemias (74), and retinoblastoma (54), among others. However, overall, cervical cancer remained the highest among all documented cancers. In terms of mortalities, deaths due to cervix uteri cancers were second (64) to deaths due to blood cancers (84). This clearly indicates that cervical cancer is one of the leading causes of the disease burden and the second leading cause of death in Kenya.

3.2 Aetiology and Cervical Cancer's Natural History

Cervical cancer is frequently caused by a virus called HPV, which's a contagious sexually transmitted infection (STI). It has been found that the majority of individuals will contract this infection at some stage in their lives and in some instances they may experience recurring infections. All cases of genital warts are due to HPV. Further, besides cervical cancer, it is also known to cause cancers of the perianal region, such as the anus, vagina, penis, vulva penis mouth and throat due to oral sex (WHO 2015). Although there are different serotypes of HPV overall, nearly 70 % of all cervical cancer cases result from two serotypes: 16 and 18. Often, 80 % of HPV infections are cleared spontaneously by the immune system. The current practice requires that girls who have not had their sexual debut should be vaccinated against HPV, thus providing the great potential of substantially reducing cervical cancer and other anal-genital cancer cases and deaths (WHO 2015).

Evidence of a strong association between Human HPV and cervical cancer exists, as reported by epidemiological studies (WHO 2015). Thirty years ago the World Health Organization (WHO) and the International Agency, for Cancer Research (IARC) presented evidence that stands on its own independent of other risk factors. It has been observed that all cases of cancer have a staggering 99.7% prevalence of human papillomavirus (HPV) making HPV negative cervical cancers quite uncommon. The different types of HPV such, as 16, 18, 31 33, 35 39 45, 51, 52, 56 58 59 68,73 and82 are classified based on their potential to cause cancer. These types are associated with grade intraepithelial lesions (HSIL) and can also lead to various types of invasive cancer. Out of the hundred existing types of HPV that exist globally about forty can be transmitted through contact.

Cervical HPV is a transmitted infection found in approximately five to ten percent of women in their reproductive age. Though its prevalence peaks among younger women who are sexually active, however, it tends to decline with age. Importantly, a positive HPV test does not always present a disease that will progress to cervical cancer, especially in young women. This is one of the reasons why the target population for screening is 25-49 years and 30-49 years, depending on countries' guidelines. The factors that determine why some individuals become carriers of HPV are still unclear. However it has been observed that those, with infections have a risk of developing squamous intraepithelial lesions (SIL) (Saleh et al.,2013).

That SIL can progress further to regression, persistence or progression to the next subsequent phases of cervical cancer progression is well known. Therefore, the common paradigm of the cervical cancer continuum is that it starts as low-grade lesions that develop fast into high-grade lesions and ultimately into invasive cancer. For instance, Cervical intraepithelial lesions (CIN) could occur ten or twenty years before becoming invasive cancer. Therefore, delaying sexual debut in young women and girls and being faithful to one sexual partner could help reduce HPV infection.

3.3 Cervical Cancer Screening

There are three precancerous stages of cervical cancer CIN1, CIN2, or CIN3. A premalignant lesion may exist in CIN at any of the three stages above. However, if left untreated, CIN2 or CIN3 can progress to invasive cervical cancer. About 1 to 2 % of women have CIN2 and CIN3 annually, with increased cases among HIV-positive women, possibly due to reduced immunity to clear the HPV, at 10% (WHO 2020). Therefore it is practice to screen women using cytology (Pap test). If a positive cytology result is obtained, a diagnosis of CIN is made based on examination, through colposcopy and biopsy of lesions. However treatment is only initiated when CIN2 and CIN3 have been confirmed through examination (WHO 2015). This traditional screening method requires trained personnel and substantial laboratory equipment. Hence, screening coverage is very low in developing countries due to the high costs of setting up cytology-based services. This justifies the need for alternative screening approaches. Further, it requires substantial resources to make follow-ups of positive cytology results with biopsy and colposcopy, a challenge developing countries often face (Mburu 2015).

Importantly, the prolonged wait for cytology results and the need to refer patients to distant hospitals for further diagnostic procedures are some challenges developing countries face. Therefore, ‘Screen-and-treat’ seems to be a suitable alternative method of diagnosis, ideally to provide immediate treatment based on the test results and not necessarily based on a histologically confirmed diagnosis of CIN2+. Also, the ‘Screen-and-treat’ approach is aimed at curbing morbidities, complications and mortalities associated with cervical cancer. The WHO has recommended optical review with acetic acid to “screen and treat” in small resource-limited settings (WHO 2015). In the programme, a screening test associated with CIN and the provision of referral services for those with invasive cancer for further treatment should be incorporated. In line with that, tests for HPV, VIA and cytology (Pap test) are some of the main screening tests

used, which can be used as a single test or together in sequence. Whereas treatment is indicated for positive results by a single test, in sequence test, those clients who test positive on an initial test must be tested with a second test before treatment is initiated. On the other hand, clients who test negative in two sequential tests will need to be followed up. Three main treatment options are available, i.e. cold knife conization (CKC), cryotherapy/thermocoagulation (ablation therapy) and large loop excision of the transformation zone (LEEP/ LLETZ) (WHO 2015).

When conducting screening services, it is assumed that prevention is better than cure, given that an early diagnosis for precancerous lesions tends to provide an early opportunity to treat it early enough, thus reversing adverse pathological outcomes. Hence, for a successful screening service, the following criteria should be followed: the disease, the test and the provision of services to deal with test results (Asgary *et al.*. 2016).

THE DISEASE;

1. It is important that the condition is recognized as a health issue.
2. There should be a stage where the disease can be detected early or when symptoms are just starting to appear.
3. The development and progression of the condition should be widely. Agreed upon.
4. There should be established treatments, for individuals who have contracted the infection.
5. Treating the disease during its symptomatic or early stages should have positive effects on its long term course and prognosis.

THE TEST

1. The testing procedure must be affordable, precise, responsive and secure.
2. It should also be appropriate, for the population.
3. We need to strike a balance between the cost of screening and medical care expenses.

THE SERVICES

1. Regarding services it is crucial to have facilities for both treatment and diagnosis.
2. Additionally there should be a policy in place regarding who should be considered patients.
3. Lastly case finding should be a process, than a one-time project.

Various tools for cervical cancer screening have been developed. The long period the HPV infection takes to lead to invasive cancer provides a window opportunity to screen cervical cancer in its early stages and provide treatment.

3.4 Visual Inspection with Acetic Acid

3.5 Visual Inspection with Acetic Acid Training

Visualizing with acid involves the procedure; firstly a healthcare provider (HCP) conducts a vaginal examination using a speculum and applies a diluted solution of acetic acid (commonly known as vinegar) to the cervix. When exposed to vinegar any abnormal tissue often appears white and changes, in color can be observed with the naked eye. Based on these observations the HCP can draw conclusions, including negative indications of precancerous lesions or potential cancer concerns (according to WHO 2017 guidelines). A positive VIA test is characterized by a well-defined area that may or may not have raised margins touching the squamocolumnar junction (SCJ). This finding has been reported in studies such as Adsul et al. In 2017. These studies indicate that VIA has sensitivity (81%) compared to cytology while its specificity is slightly lower at 83%. Sensitivity refers to how the laboratory test identifies individuals with the disease, as positive while specificity refers to how it identifies individuals without the disease as negative.

One important advantage of VIA is that it enables a "screen and treat" strategy since it provides results without requiring laboratory tests. This approach allows for intervention based on the findings of VIA. Moreover this approach guarantees that clients receive treatment during their visit minimizing the need, for subsequent follow ups. Consequently visual tests have exhibited levels of precision when contrasted with Pap smears.

Women who require treatment can promptly seek assistance at a healthcare facility. Be referred to another healthcare professional as they provide outcomes. It is important to note that VIA (Visual Inspection, with Acetic Acid) has a accuracy rate compared to other methods. Therefore careful and consistent supervision is essential to avoid over treatment. According to Adsul et al. (2017) there appears to be an improvement in the ability of healthcare professionals (HCPs) to correctly identify a cervix through VIA with practice (known as specificity). Effective training programs and quality assurance initiatives are crucial for ensuring the effectiveness of VIA as depicted in Annex 3 which presents the screening guidelines.

From September 2005 until May 2009 spanning four years a total of 19,579 women from six countries underwent screening. The results indicated that 10.1% tested positive for VIA and 1.7% were suspicious, for cancer upon examination. Among all VIA clients an impressive 87.7% received cryotherapy treatment within one week of their VIA screening. Additionally using the single visit approach 39.1% of women underwent screening. Received immediate treatment on the same day (WHO, 2012). The reason why some women didn't receive the 'screen and treat' single visit approach varied. It could be due, to issues like cryotherapy equipment, equipment malfunction, during the screening. Because certain clients needed spousal consent.

3.5.1 General Objectives of the Training

Training objectives provide learners with concepts of what they will learn, what is expected of them at the end of the training and how they will apply their newly acquired knowledge to a VIA service delivery programme in their health facility. Thus, appropriate training objectives help trainees plan for what is ahead of them and for the training. Additionally, any learning process is improved by training objectives because the learners can create mental pictures which guide them and pick up information and skills unique to them to pay some extra attention to. The trainer can also focus and specify the scope of the training. (Singh *et al.*. 2012).

Based on the VIA training handbook, for facilitators by WHO (2017) the training program for cancer involves equipping workers, midwives, nurses and clinicians with the necessary knowledge and skills to effectively carry out cervical cancer screening, early detection and treatment at different healthcare levels. The aim is to enhance their abilities in counseling women after screening conducting VIA tests on women making decisions regarding treatment options for precancerous lesions or referring women with suspected cervical precancer or cancer. Additionally they should be proficient in treating lesions using methods such as ablation and cryotherapy. The primary objectives of this training are to expand knowledge and develop skills specifically related to inspection, with acid.

The objectives of the knowledge based training include the ability to understand and explain aspects related to cancer. By the end of the training learners should be able to describe what cervical cancer is understand the anatomy and physiology of organs, in relation to cervical cancer screening explain how cervical cancer develops naturally discuss the role of HPV infection in causing cervical cancer describe VIA principles and techniques for screening interpret test results accurately explain the management options for VIA positive women

including ablation treatment procedures understand cryotherapy and thermal ablation techniques know about proper referral systems, at different levels of care and be aware of record keeping and VIA data management guidelines provided by WHO in 2017. The skill development objectives are as follows: by the end of the training, the trainees should be able to; demonstrate counselling of women for VIA screening, Perform VIA step by step, perform ablation treatment procedures as appropriate, manage women with cryotherapy or thermal ablation procedure-related complications, follow up clients after treatment, follow appropriate infection prevention practices when performing VIA procedure, provide quality services as per the standard operating procedures of VIA screening and ablative treatment methods (WHO 2017).

Notably, one learning approach utilised by WHO training is to start with a review of the anatomy to reinforce earlier learning, followed by a description of the medical history and pathophysiology of the disease process. All this is aimed at not only imparting but also reinforcing knowledge and improving learners' competence. Also, from the ACCP perspective, the need for participants to comprehend cancer of the cervix as a disease process and gain fundamental skills necessary to perform essential procedures such as VIA is critical (Asgary and Adongo 2016).

Although there are other training approaches, theory-based didactic and hands-on training approaches are the two main types that are widely used. Moreover, ACCP recommends combining these two approaches for VIA cervical cancer screening training programmes. (Singh *et al.*. 2012). Since the knowledge and skills acquired are critical in preparing an HCP for the provision of high-quality cervical cancer screening services, the constraint of time and resources have always necessitated maximising any training efforts. Thus, it has been possible to deliver ACCP training experiences in a limited number of days (5-10 days). Therefore, according to ACCP recommendations, the training should ideally take 5 to 10 days and be conducted in a clinical setting. This ensures the learners gain practical experiences, besides setting aside another separate venue for didactic educational sessions. Hence, adequate and effective learning should be achieved from the training programmes to ensure competent service delivery. WHO recommends that the training be conducted in 10 days for both didactic and clinical training, and the class size should be between 10-15 trainees for each batch (WHO 2017).

Of essence, competency on VIA can be assessed in various ways, including using a standardised set of procedure steps already taught in sequence as used during pre and post-test

evaluations. These checklists are simple to use as they are an organised way to train a clinical procedure and assess learners' performance. Secondly, assessment can also be done by administering a standardised set of cervical images, which learners can review at the end of training to establish any pathology. If present, it is eligible for treatment or not. If a learner scores 85% (stratified by negative, positive, and suspicious for cancer), then the learner is considered to have successfully completed the training course (Asgary and Adongo 2016). It is recommended that simulated training using models be conducted first before the trainees embark on practising with real consenting clients according to ACCP field experience.

For a VIA training program it is important to take a traditional approach. Participants should have an interest, in VIA screening and treatment. Be motivated to enhance their knowledge, skills and job performance. To ensure learning both the clinical trainer and the participant should have access to the educational materials. The clinical trainer, leveraging their expertise in cervical cancer screening and treatment will guide the trainee through the learning process based on their training and experiences. The VIA training approach follows a training method assuming that with time and appropriate training methods all participants can achieve mastery in knowledge, attitudes and skills. The ultimate goal of this learning approach is for each participant to reach 100% proficiency, in cervical cancer screening and treatment. While some participants may acquire knowledge and skills after training others might require time or alternative reinforcement methods before demonstrating mastery in practice.

3.5.2 Training for VIA

For an HCP to provide VIA effectively, it is important to learn the crucial aims and essentials of the system. Hence, the didactic component of the training should cover these areas. Hence it is crucial to have an understanding of the information regarding cervical cancer and its occurrence in order to apply the training in a practical manner. Likewise, the normal and abnormal physiology of the cervix must be understood clearly by the trainees, in addition to the pathophysiology, aetiology, life basis and natural history of the infection (Asgary and Adongo 2016). Additionally, the trainee needs to be well equipped with client counselling skills during VIA, given that counselling is required for VIA procedures, positive clients, and cryotherapy.

Similarly, decision-making confidence, like VIA results, should be weighed during training. Thus, any training programme should be long enough to allow participants to practice until they develop the requisite confidence. Visual aids are a vital part of VIA training, as they

play a crucial part in demonstrating to learners a variety of cervical infections and the normal functioning of the cervix to look at (Sigh *et al.*. 2012).

Thus, pictures, interactive videos and digital photos are valuable supplements to learning. Significantly, learners have previously reported that training aids make the training dynamic and fun. This is according to the experience of ACCP training on VIA and cryotherapy. Seemingly, when the training materials are varied and diverse, the learners are less bored or feel astounded by lots of information. Nonetheless, despite their usefulness in aiding learning, photographs and other teaching aids cannot replace human beings' role in reinforcing learning. The rise of smartphones equipped with cameras also brings opportunities to leverage their capabilities in training healthcare professionals storing patient screening records sharing images, for opinions and even retraining through text messaging. (Asgary and Adongo 2016). In his study in India training paramedics on cervical cancer screening using VIA, Veena (2012) used 175 images projected on the screen to aid the participants in identifying Normal epithelium, precancerous lesions and a suspicious cervix.

Interestingly researchers at ACCP have. Established the role of aids as a supplement to VIA. According to an article by Sellors & Camacho experts showed a 67% agreement level when assessing a set of photographs. The kappa value for three categories of results was found to be 0.57, which's consistent with findings in areas where subjective laboratory tests were conducted among individuals. When comparing the agreement between experts who observed pictures of the cervix on platforms (computer or projector) a "live cervix," or video images from Thailand and Ghana there was a remarkably high level of agreement ranging from 80% to 90%. This indicates that they were perceiving and evaluating the thing in ways (Sellors and Camacho 2004).

Similarly trainees who viewed digitized photographs of the cervix ten days, after completing their training agreed with expert assessments than 60% of the time. This suggests that the skill to evaluate images progressed at a pace and that there was a potential for colleagues to reach agreement consistently. Consequently establishing a "consensus" standard could serve as a reference point, for organizing and implementing quality assurance procedures akin, to the methods employed by cytologists.

In a research conducted in India participants were asked to provide their opinions on a set of 175 images showing cervical lesions that they had seen earlier during VIA training. The

agreement, between the trainer (considered as the gold standard) and each trainee was calculated using Kappa statistics. The level of agreement was separately determined for aspects, such as acid and Lugols iodine positive or negative results, normal or abnormal cervix appearance and cancerous lesions. After the training there was a moderate to perfect agreement (ranging from 0.5 to 0.95) for all comparisons among the workers. This included acid (+/ 0.5 0.90) Lugols iodine (+/ 0.58 0.79) benign/ 0.08 0.86) and healthy/unhealthy cervix (0.64 0.94). However at the six month assessment the performance significantly declined for six out of nine workers across all categories; acid (+/ 0.46 0.88) Lugols iodine (0.05 0.69) benign/ 0.00 073) and healthy/unhealthy cervix (001.077). There was a range of agreement levels observed, varying from poor to substantial agreement between different workers (Veena, 2012). This study highlights that utilizing images during training contributes, to acquisition of VIA screening skills.

In addition, the use of visual aids for training purposes, such as the JHPIEGO atlas that shows the variation of the normal cervix (VIA negative), cervix with acetowhite lesion (VIA positive) and a cervix suspicious for cancer is advised. Crucially, the importance of using the JHPIEGO atlas at the cervical cancer screening clinics as job aids cannot be ignored since they also help in client counselling. More importantly, the visual aid should also include a photograph of the cervix after cryotherapy. Therefore, these charts are useful tools for patient education and counselling. Too, HCP uses VIA to demonstrate to the client where her cervix fits in the "scheme" of things in the job aid visual chart or atlas. In agreement with the aforementioned, ACCP found that both HCP and clients found this atlas helpful clinical tool.

3.5.3 Training for Cryotherapy

Like VIA, cryotherapy training also requires both didactic and practical sessions. This proceeds from theoretical explanations of what cryotherapy is, followed by its step-by-step procedure and the treatment modalities for cervical cancer. A systematic explanation of the steps involved, including reprocessing of the used equipment and their storage and maintenance after use, is outlined. Further, the risks and benefits of the procedure to the patient should be explained. It is also imperative to include elements of client counselling specific to the cryotherapy procedure as part of what should be taught.

Additionally, the eligibility criteria for treatment with cryotherapy should be clearly explained. In order to ensure every HCP has acquired the necessary, correct skills in cryotherapy, a post-training evaluation should be performed to gauge whether or not the learner is able to

perform the procedure in accordance with the expected laid down standards and guidelines. Thus, a master trainer can use a checklist to assess the trainee while emphasising infection prevention and control procedures. In cervical cancer screening and treatment, behaviour modelling and observational learning occur in three stages: in skill acquisition, the participant observes the demonstration of the procedure from an expert and gets a mental picture of the required steps. Once the mental image has been formed, the participant performs VIA and cryotherapy with supervision. Next, the participant performs VIA and cryotherapy until they feel confident while performing the procedure. At this point, skill proficiency has set in. According to WHO, a trainee must observe two cryotherapy treatments and be able to perform two in order to attain the skill (WHO 2017).

3.5.4 Training on Quality Assurance and Supervision in VIA

For the success of any health programme, it is very important to put in place the appropriate quality assurance (QA) tools. Likewise, integrating a QA element in the VIA exercise permits the partakers to internalise the importance of QA, its components and its overall effects on performance. Principally, quality assurance involves record keeping, documentation of information and how the VIA programme is monitored.

3.6 Proportion of Cervical Pre-Cancer-Positivity Rate

As hitherto mentioned, three outcomes are possible after performing a VIA: positive, negative, or suspicious for cancer. Although the WHO has made some attempts to classify or categorize the positive results as either “strong positive” or “faint positive”, depending on the intensity of the acetowhite lesion, this approach has had little impact on the accuracy of the laboratory test (WHO 2020).

Most previously published and ongoing studies show that VIA positivity rates vary from 10 % to 35 % (WHO 2010). Given that VIA is highly subjective as it solely depends on the HCP’s interpretation after the procedure, this variation is therefore expected. However when it comes to aceto lesions that have clearly defined borders and originate from the SJC the rate of positivity has been estimated to be, around 10 15% according to the World Health Organization (WHO), in 2010. Likewise, in studies categorizing any acetowhite lesion as a positive, the positivity has been high at about 18-35%. The definitive method, however, should be using truly defined margined deep white acetowhite lesions from SCJ, as they are the true positive lesions.

Gad *et al.*. (2019) evaluated visual inspection of the cervix with acetic acid as a cancer screening test. The assessment involved 379, and 65 tested positive for VIA (17.1%). The sensitivity was 91.3%. Findings showed that VIA was not a strong test when applied alone and needed combination with other indicators like location lesion on the right side of the cervix or contact bleeding. This combination was effective in detecting the precancerous cervix. Gamboa *et al.*. (2019) sought visual techniques for cervical cancer screening in Colombia. The study revealed that the rates for visual inspection reduced with age. Cancer detection rates with VIA and VIA-VILLI significantly reduced cervical cancer-related deaths amongst women with accessibility challenges to the health centres.

During a project conducted in six countries (Malawi, Madagascar, Nigeria, Uganda, Tanzania and Zambia) from September 2005, to May 2009 a total of 19,579 individuals were screened. The results revealed that around 10.1% of the inspection with acid (VIA) tests were positive indicating potential issues. Additionally 1.7% of the clients had lesions that could be cancerous upon examination. Interestingly the rates of VIA results varied across the countries involved in the project. For instance Zambia had the rate at 28% while Nigeria had a rate at around 5.7%. However when considering all countries collectively the overall VIA positive rate averaged around 10.1%. Out of all those who tested VIA across all countries involved in this initiative an impressive 87.7% were eligible for cryotherapy treatment. Remarkably most clients (63.4%) received cryotherapy within one week after their screening. The single visit approach implemented during this project proved to be highly beneficial as it allowed for 39.1% of clients to undergo both screening and treatment on the day. However despite these outcomes and efforts made during this demonstration project there were still some challenges faced regarding treatment delivery to all clients for cryotherapy. Some factors contributing to non treatment included malfunctioning equipment during screening and cases where consent from spouses was required beforehand. It is noteworthy that women participating in this initiative reported tolerating both VIA and cryotherapy procedures. In fact all women who underwent these procedures expressed their willingness to recommend them to women. Overall findings from this demonstration project indicate that introducing a "screen and treat" approach into health services is feasible, in low resource countries. According to the World Health Organization, in 2012 it is viable and practical to conduct VIA screenings for lesions and provide cryotherapy treatment, at healthcare facilities in six countries.

In an assessment of Optical examination as the primary diagnosis method in countryside China by Rong *et al.* (2013), the overall test positivity rate was 8.07% (1495/18532) for VIA. The same study established that VIA was a simple, achievable and actual primary cervix cancer diagnosis technique in a poor, marginalised community that does not get access to advanced laboratory test methods. Significantly, these findings do not vary much from a study done in Latin America and Eastern Europe on various stand-alone screens for cancer of the cervix. The findings showed that out of 12,093 women screened with VIA, 1395 were VIA positive, which is 11.5% (Sanan *et al.*. 2010). During a research conducted in India spanning seven years from January 2006 to December 2012 a total of 18,869 women underwent screening. The results showed a positivity rate of 10.75% (Poli et al. 2015). These studies further show that the positivity rate in most populations is 10-20%.

3.7 Health Service Provider Associated Factors in Uptake of VIA

In a study conducted at King Fahad Medical City, in Saudi Arabia researchers found that 4% of the participants were aware of the importance of cervical cancer screening. The majority believed that the Pap Smear Test was a way to detect cancer and around 87% had already undergone this test. However surprisingly the study revealed a lack of knowledge about cancer among women despite their participation in Pap Smear Testing.

Another research study carried out in England by Wardle et al. (2019) discovered that 85% of the women surveyed had undergone their screening test while 15% expressed some discomfort and 2.6% had never received a laboratory smear. When asked why they didn't undergo screening participants mentioned reasons such, as feeling ashamed (29%) intending to go but not finding the time (21%) fearing pain (14%) and worrying about the results (12%). However there were a challenges linked to screening that stood out such as problems, in scheduling appointments being sexually inactive and a lack of trust, in the screening test itself (Wardle et al., 2019). Another research conducted in Mexico highlighted the significance of having trained healthcare providers who can perform screening and treatment procedures to enhance the accessibility of cervical cancer screening services (Boom & Lopez 2012).

During a demonstration project counselling before screening was highly valued by participants as it helped set expectations. Furthermore those who received counselling were more open to discomfort during the process. Appreciated receiving information and communication, about the value of cervical cancer screening. They can contribute to building a sense of

community support and diminishing the perceptions thus making the service more accessible and attractive, to women. Research conducted in parts of the world has also shown that the husbands encouragement plays a role, in motivating women. In situations, such, as in Malaysia and rural areas of Zimbabwe providing support can be especially beneficial for women. It grants them the independence needed to afford services (Population services international 2016).

The important relationship between social and individual barriers, which stimulate females' poor uptake of screening services, is well described. Moreover there are obstacles that hinder screening practices. These factors encompass a variety of issues such, as availability of healthcare services, cultural norms and beliefs expectations, around gender roles inadequate public health education initiatives and individual hurdles. While the importance of preventing cancer through screening has been established there is still a need to identify why some females do not take advantage of screening services. In developing countries common barriers to cervical cancer screening among women include awareness, inadequate knowledge about cervical cancer and preventive measures social stigma surrounding gynecological diseases and cancer misconceptions unfavorable socio economic conditions, insufficient infrastructure, absence of prioritized national services for screening implementation along, with guidelines (Fentie et al. 2020).

Fundamentally, the structure of the service delivery system is one aspect that influences the uptake of cervical cancer screening in any given health facility. Cancer of cervix prevention requires multiple visits to health facilities for screening, confirmatory diagnosis and treatment, and confounding financial implications and opportunity costs lead to high attrition rates (Hiuhu 2015). The WHO has suggested a “Screen and Treat” strategy in a single-visit approach with VIA to reduce the number of visits to the facility by a woman (WHO 2010). Primarily, the “Screen-and-Treat” strategy ensures that screening and treatment of the precancerous lesions are done on the same day, thus minimizing the number of visits the client has to make to the facility for follow-up.

The availability of information on the cost of VIA and related costs affects the uptake of VIA is a known fact. Accurate information is probably not given to women on the cost, or lack thereof, of the VIA and related services like cryotherapy or any medications that might be required Hiuhu (2015). In countries like Bolivia, screening for cancer of the cervix for women aged 25 years to 49 years is at no cost, which has improved access to services by 200% in some

regions, although many women did not know that the VIA screening was free (Hiuhu 2015). Furthermore, most HCPs do not offer cervical cancer screening services unless the client asks. Chua *et al.* (2021) sought to discover the challenges and enablers of VIA uptake amongst women in South Asia. The main facilitators were related to age, healthcare professionals' guidance, and literacy levels. Women guided by health professionals and enlightened on the benefits of cancer screening recorded higher uptake of VIA.

DeGregorio *et al.* (2017) studied the strengths and barriers of a women's health programme in Cameroon. The authors noted that screening charges discouraged many rural women from seeking screening services. The VIA uptake rates increased from 6-25% daily when offered free screening services. The health providers provided education on the importance of seeking cancer screening services, especially for women of childbearing age. Women who required treatment were offered the services and allowed to pay later, which motivated other women in the community to turn out for cancer screening. Lieber *et al.* (2019) evaluated the quality and sustainability of cervical cancer screening among HIV-positive farmers in South Africa. Only a few farmers volunteered for cancer screening. The main reason for shying away from cancer screening was identified as; fear of health workers' patient confidentiality, negative attitudes of the health workers, distance to health centres, and high screening fees. However, few trained health workers maintain doctor-patient confidentiality, and they were the most preferred healthcare professionals for HIV-positive women farmers seeking cancer screening services.

In their study Binka et al. (2019) examined the obstacles that hinder the adoption of cervical cancer screening and treatment, in Ghana. They discovered that there is a lack of awareness about cancer and the available screening services. The high costs associated with cancer screening and subsequent treatment especially if cancer is detected were found to be the challenges preventing women from undergoing cervical cancer screening. Additionally they identified attitudes among healthcare professionals access to suitable screening facilities and inaccurate diagnoses as additional barriers to increasing uptake of cervical cancer screening, in Ghana. There was also inadequate information regarding cancer screening as some women perceived cancer as a curse and were confident that only the cursed women get infected with cervical cancer. Cancer screening facilities were also unavailable, and most women waited for corporate or religious organisations to sponsor cancer screening events.

Mugassa and Frumence (2020) sought to interrogate factors influencing the uptake of cervical screening services in Tanzania. This study focused on national and district levels. The major hindrance to the uptake of cervical cancer screening was flawed information flow from the government to lower levels. Another factor identified in this research study was inadequate tools and low-skilled and incompetent staff. At the district level, findings showed minimal cancer screening partners, a lack of collaboration with the private sector, a lack of prioritization, and low cancer screening awareness. The failure to use healthcare information systems among relevant stakeholders in the healthcare sector was the most appalling factor.

Isabirye *et al.* (2020) examined the predictors of cervical cancer screening in Uganda. Findings showed that women whom health professionals and economically stable had sensitised had high knowledge of cancer screening. Cancer screening sensitization was significantly related to the uptake of cancer screening. Shiferaw *et al.* (2018) investigated awareness about cervical cancer signs, prevention, detection, treatment, and screening challenges amongst HIV-positive women in Ethiopia. Findings showed that only 10.8% of the women had a screening, and 86.2% were willing to be screened. Still, they had no means of paying for screening in private hospitals since they feared bad treatment by healthcare professionals in public hospitals. Knowledge about cervical cancer was low, proportional to the cancer screening uptake rate. The recommendations included training healthcare professionals to equip them with communication skills and cancer screening guidelines.

Tiruneh *et al.* (2017) assessed factors related to cervical cancer screening in Kenya. Results showed that knowledge of cervical cancer was very high (72.1%). However, only a few (19.4%) had sought cancer screening services, and 41.76% were screened with VIA. Most women who sought cancer screening were exposed to various media that spread information about cervical cancer, were economically stable, had health insurance, and lived near health facilities.

According to a research conducted by Hiuhu (2015) in Kitui, Kenya one of the reasons why cervical screening is not widely adopted is due, to a lack of awareness about VIA/VILLI services. It was found that healthcare providers rarely inform women about this service. Another study conducted by Ichimanya (2016) in Vihiga, Kenya revealed that 43.3% of respondents considered the charges for cervical cancer screening to be affordable while 56.7% reported that the cost was not, within their means. Whereas the need for women-centred quality services also

influences the uptake of VIA services, a healthy client-health-provider relationship majorly affects client satisfaction. For example, while the counselling was vital in the provision of VIA services, the circumstances under which counselling was done, its effectiveness and how respectfully the HCP informed the client, the ability of the client to ask questions, make an informed decision, give informed consent, the respect for a woman's privacy as well as confidentiality were very important aspects that influenced woman's experience with VIA services.

The physical aspects of the facility also influenced the uptake of VIA services. In particular, the facility's physical aspects, such as appearance, cleanliness, provider presentation, and arrangement within the screening room to ensure maximum privacy during screening, were all very important. As, per the research conducted by Ichimanya (2016) clients felt more confident in healthcare providers who maintained cleanliness in their grooming equipment, environment and overall organization. Similarly it is crucial to ensure the availability of screening supplies and equipment to sustain VIA screening efforts. A study conducted in Kitui County, Kenya by Hiuhus (2015) highlighted factors such as a shortage of trained personnel (45%) insufficient materials and equipment (35%) and inadequate support, from authorities (55%) workloads (65%) and uncooperative clients (55%) were identified as challenges affecting VIA uptake.Similarly a research conducted by Orang'o and colleagues, in 2016 investigated the factors linked to the acceptance of cervical cancer screening using VIA in Western Kenya. The findings revealed that womens understanding of the screening process for cancer was strongly correlated with a decrease, in the number of women opting for cervical cancer screening.

Keah *et al.* (2020) geared towards understanding factors influencing the uptake of cervical cancer screening among female doctors and nurses in the Kenyan context. Specifically, the study focused on KNH. The findings of this study revealed that approximately 97.5% of female doctors and nurses in this healthcare institution were aware of cervical cancer screening. The findings also revealed that most female doctors and nurses had undergone cervical cancer screening. Most participants highlighted that the most commonly used cervical screening methods were PAP and HPV DNA tests. Most importantly, the findings established that the lack of adequate healthcare infrastructure and necessary resources significantly hampers cervical cancer screening in the country.

Ichaminya (2016) geared towards interrogating factors influencing the uptake of cervical cancer screening among women of reproductive age within Vihiga County. The study's findings suggested that access to healthcare facilities greatly influenced the uptake of cervical cancer screening services among women of reproductive age in Vihiga County, Kenya. The level of education was also found to be a key factor influencing the uptake of the same. Findings further showed that social factors like religion did not significantly influence the uptake of cervical screening in this region. However, the cost of screening services influenced the uptake of cervical cancer screening.

On the hand previous research suggests that providing affordable and high quality services can encourage more women to undergo cervical cancer screening. The cost factor plays a role in a womans decision to get screened. Therefore implementing interventions that raise awareness and provide support, for screening options can empower women to make informed choices. Moreover the presence of competent staff is crucial for a screening experience. Studies involving women from Asia and Africa have indicated that having a screening room and a female provider can contribute to their comfort with the service. Similarly factors such as convenience, efficiency and affordability also play roles in individuals decision to seek services.

Fentie *et al.* (2020) studied various factors affecting cervical cancer screening uptake among women in Addis Ababa, Ethiopia. The findings revealed that most participants had given birth at least once in their lifetime. Among the participants, only 0.6% had a family history of cervical cancer. However, around 30% of the participants were HIV-positive. VIA positivity among the women was interrogated in this study. Age, marital status, lifetime sexual partners and HIV status significantly influenced the positive VIA test results rate. This was proven true through logistic regression analysis. After interviewing the women participants about factors influencing the uptake of cervical cancer screening, the following issues were raised: low awareness, lack of screening services, and cultural and religious beliefs. This study identified the need to improve or increase cancer screening awareness in the community by employing the current health extension programme.

Gizaw *et al.* (2020) interrogated the uptake of cervical cancer screening in Ethiopia. The study focused on self-sampling HPV DNA and VIA. This study revealed that the most common cervical cancer screening method is VIA. The study findings established that at least 50% of the women in Ethiopia tend to visit hospitals for VIA. The study also revealed that women with high

risks of HPV usually attend VIA for follow-up tests. The study showed that most women are receptive to VIA after HPV-positive testing. Through self-selection, it is highly likely for HPV tests to be carried out at the local hospitals.

Based on research conducted by Kieti (2016) cervical cancer ranks as the leading cause of death, among women in Kenya. The objective of the study was to assess the awareness, attitudes and behaviors of nurses regarding cervical cancer screening and prevention. The findings revealed that a majority of nurses possess knowledge, about cervical cancer screening. Also, the study found that Kenyan nurses tend to have adequate information about various screening tests, including VIA and their purpose. It is essential to note that this study was particularly enlightening in that it proved that Kenyan nurses have the required knowledge that cancer screening should help curb cervical cancer at an early age. However the research revealed that the utilization of these cancer screening techniques is notably limited. According to Kieti (2016) healthcare organizations, nurses beliefs and apprehensions, about employing these screening methods, societal stigma, financial expenses and social stigma serve as obstacles to the implementation of these cancer screening methods. Rosser et al. (2015) examined the influence of interventions in Kenya and their potential impact, on awareness, attitudes and behaviors related to cervical cancer screening. Findings showed that creating awareness about cancer screening would help improve cervical cancer screening rates.

Linde *et al.* (2016) studied competing needs among cervical cancer patients suffering from HPV in Tanzania. The study used semi-structured individual interviews to interrogate attendance and non-attendance to cervical cancer screening follow-up among HPV-positive women in Tanzania. The study's findings suggested that healthcare providers in Tanzania should encourage their patients to follow up on their cervical cancer screening. This notion was purported to be true because most women with cervical cancer are low-income earners. Hence, it is highly likely that financial needs highly influence their attendance. Still, the perceived benefits should emanate from the healthcare provider’s persistence and encouragement of attendance. The study also identified that such attendance may be patient-initiated. Such a patient-initiated cervical cancer screening usually results in treating cancer symptoms.

3.8 Adherence to Cervical Cancer Screening Guidelines

Importantly, screening for cervical cancer has proved to be a successful approach to cervical cancer prevention and was responsible for a 70% decrease in cancer of cervix deaths in the USA in the last 50 years. The widely used screening tests in the USA were cytology, HPV vaccine and HPV testing (America Cancer Society 2012). Further, the cervical cancer screening guidelines in the USA addressed when to start screening, when to stop screening and how often to screen for cancer of the cervix. To summarise, the guidelines state that:

- Cervical cancer screening should not begin coincidentally with the start of sexual activities when HPV infection is high and the risk of cervical cancer is lowest. Screening should start three years after sex but not later than 21 years.
- Screening for cervical cancer should rest at 60-70 years if there is documented evidence of three consecutive negative pap tests in the preceding ten years.
- Until 30 years, women's interval of screening should be yearly, with conservative cytology smears or bi-annually with liquid-based cytology. Once one turns 30, screening should be every 2-3 years. For females with total hysterectomy, routine screening should not be done unless the procedure was done due to cervical pre-cancer or cancer.

Additionally, in the USA, cervical cancer screening guidelines and adherence to them were key factors affecting the number of pap tests done. However, full compliance with the guidelines was expected to reduce pap tests from 75 million to 34 million in 2010 (America Cancer Society 2012). Adherence to screening guidelines prevents unnecessary tests done on women who are not eligible and those done tests at intervals not recommended by guidelines.

The WHO (2020) observed that it was important that cervical cancer screening protocols for VIA were established on how to take to mean and act on screening laboratory test results, for the main care team. In addition, the protocols should be adhered to. The absence of guidelines, for cervical cancer screening and treatment can result in inaction and the potential for missed diagnoses. This increases the risk of overlooking patients who require screening, further investigation and appropriate treatment. Similarly, failure to comply with VIA screening guidelines results in high additional costs to the healthcare system and the individual patients, as women who do not require tests get screened or are requested to return for repeated laboratory requested tests more than unnecessary.

Throughout history various organizations, like the American College of Obstetricians and Gynecologists (ACOG) the American Cancer Society (ACS) the American Society, for Colposcopy and Cervical Pathology (ASCCP) and the US Preventive Services Task Force (USPSTF) have recommended that women should start getting screened for cancer when they reach the age of 21 regardless of their sexual activity history. However recent guidelines from the American Cancer Society in 2020 suggest starting screening at age 25 due to an incidence rate of cancer among women aged 20 24 (Chittithaworn et al., 2021). Similarly the Royal Thai College of Obstetrics and Gynecology (RTCOG) in 2021 recommends starting cervical cancer screening at age 25 for women or at age 30 for those who have never been sexually active due to the low occurrence of cervical cancer, in this group. The screening interval has been suggested to be every two years with cytology and every five years with co-testing. Cervical cancer screening has been recommended to be discontinued at 65 years with adequate negative prior screening in the past ten years. For women with hysterectomy, omit screening if a hysterectomy was done because of benign conditions. Women who are immunocompromised due to infection with HIV, younger than 21 years and sexually active should be screened for cervical cancer once every year. The rest of the population in this group should be screened once yearly (Chittithaworn *et al.* 2021).

In a study done in California state on ending the cancer of the cervix screening in low-risk females after the age of sixty-five years on understanding barriers to adherence with evidence-based guidelines among primary caregivers, 25.5% of those surveyed screened women were above 65 years. This is despite the published reassurance being on the contrary. Many healthcare providers screened this age group out of fear that after 65 years, invasive cancer may be missed.

In a study done in the USA to assess healthcare workers' adherence to cervical cancer screening guidelines, 42% of the respondents were not conversant with the 2012 guidelines changes, with only 5.7 % having the correct knowledge. The correct screening procedures were followed by 65.8% of respondents who screened the age group 21-29 years and 74.3% of those who screened women above 65 years. The screening interval among women aged 30 to 65 varies, with 89.3 % screening correctly at three-year intervals with only pap smear while 57.4 % correctly screening at five-year intervals with combined pap smear and HPV testing. The two most common reasons the guidelines were not being adhered to were inadequate knowledge of

the guidelines and the patients' preferred frequency of testing other than that recommended by the guidelines (Teoh *et al.* 2012).

VIA screening guidelines have been developed through the Department of Reproductive Health in the Kenyan Ministry of Health, and the following recommendations have been made (National Cervical Cancer Prevention Programme 2012):

- The screening age should be between 25 and 49 years unless, for HIV-positive women, screening starts as early as 18 years.
- The screening interval for HIV-positive women is every year, and for HIV-negative women with no precancerous lesion is five years.
- In case of a precancerous lesion, treatment is LEEP, cryotherapy or cone knife biopsy, and post-treatment screening should be repeated after one year.
- The Ministry of Health has laid out the procedure for VIA.

Selmouni *et al.* (2016) assessed healthcare providers' compliance with cancer screening guidelines with a visual acetic acid (VIA) inspection. Findings showed that only 14.2% of the health professionals followed all practices, and compliance to the guidelines significantly differed amongst HCPs in rural areas than in town centres ($p<0.001$). Recommended VIA examination steps were followed at approximately 83%.

Lee *et al.* (2016) studied cervical cancer screening in developing countries. Findings showed that VIA was an effective cost-saving and alternate cervical cancer screening technique that can serve many women in developing countries. After training, nurses, midwives, and paramedic staff can effectively screen for cervical cancer using VIA and VILI. Furthermore, VIA provided immediate feedback and results in real-time. This proved to be an effective method to overcome the challenges of non-adherence to follow-up clinics.

3.9 Effectiveness of Clinical Training on Identification of Pre-Cancerous Lesions

That VIA is an effective cervical cancer screening tool if used well is well documented. Therefore, comprehensive competency-based exercises must offer consistent and effective VIA tests. The main aim of VIA is to detect pre-cancerous lesions and provide treatment before progressing to invasive cancer and for diagnosis of early pre-clinical asymptomatic invasive cancer (WHO, 2015). The WHO recommends brief, effective training (1-2 weeks) that a teaching manual should support. This teaching should be administered to healthcare providers,

although there is still a lack of standardisation of VIA training. Training in performing and documenting VIA through the actual performance of the screen has been done for sessions ranging from three days to two weeks. The Kenyan cervical cancer prevention programme trains for four days: two days of theory sessions and another two days of practical training in health facilities.

Vu *et al.* (2018) studied community-based screening for cervical cancer using VIA in Vietnam. The study showed that all the healthcare workers effectively performed VIA with Acetic Acid after intensive training. The VIA had a 100% sensitivity, 67% specificity, a positive estimated value of 5.7%, and a 100% negative estimated value. Midwives and clinical officers were also trained in VIA screening. Nooh *et al.* (2015) assessed the viability and appropriateness of VIA in spotting cervical cancer traces in Egypt. Results showed that VIA was a viable and appropriate cervical cancer screening test, especially in countries with limited resources in the African region.

Talama *et al.* (2020) studied measures employed by the Malawian government to improve the uptake of cervical cancer screening services among HIV-positive women. The measures included; improving screening rooms to enhance confidentiality, regular sensitization, accreditation of national cervical cancer prevention training for all health professionals, frequent community awareness programmes, frequent monitoring and evaluation, and allocation of resources to strengthen cancer screening. Raifu *et al.* (2017) examined determinants of VIA and VILI screening effectiveness in the Democratic Republic of Congo. Results showed that healthcare professionals were rarely trained on VIA and VILLI since only a few had attended more than one training. To improve the uptake of VIA and VILLI, the Ministry of Health was advised to caution healthcare professionals on the age and parity of women seeking cancer screening services. The HCPs were advised to enrol in cervical training sponsored by the ministry or NGOs in the health sector.

In previous studies, the proportion of positive screens identified by newly trained healthcare providers ranges between 25% and 35 %. However, a decline has been observed later, i.e. to 10-18% in most study setups and instances (WHO 2010), which could be attributed to the tendency to classify any white changes in the cervix as positive at the beginning. Nonetheless, with experience, they identify the deep white acetowhite changes originating from SCJ with defined margins as true positives. A study by Fouly *et al.* (2019) reported that the nurse with

VIA training showed good diagnostic results, with proper intensive training nurses and could perform VIA tests with acceptable accuracy.

Charts, printed guides, atlases, and hand on clinical practice exercises have been used to train HCP who screen. According to WHO, for effective VIA training to take place, the following are the recommended components of a VIA training programme:

- Anatomy of the female reproductive system
- Physiology of female genital tract: normal secretions, development of SJC or transformational zone and squamous metaplasia.
- Pathology of female genital tract: infection and inflammation, causes of cervical carcinogenesis and its natural history.
- Clinical component: methods of correct speculum inspection, bimanual palpation, digital vaginal examination per rectal examination; recognition of clinical signs of metaplasia, recognition of normal and abnormal anatomical components, polyps, leukoplakia, signs of infection and inflammation and the process of interpreting and scoring acetowhite changes and gross appearance of invasive cancer.
- Assessment of provider skills orientation

The HCP that should be considered eligible for VIA screening training include registered paramedical technicians, nurses, doctors, other HCP, auxiliary nurse midwives and school graduates in health-related programmes. All the components, such as anatomy and physiology and pathology of the female reproductive tract, should be covered in training, given that lack of such knowledge may affect HCP screening skills, knowledge and subsequent interpretations. This allows for proper mastery of the training content and the acquisition of screening skills. (Jhpiego 2015).

Monitoring trainees and self-assessments by documenting test results; test positives and false positive rates provide an objective parameter to evaluate trainees' skills and the training outcome. A useful benchmark of VIA training is the proportion of women diagnosed with acetowhite lesions and the proportion of acetowhite lesions diagnosed with dysplasia. With sufficient skills gained after the training, 10-20% of women examined by healthcare providers will have acetowhite lesions. At least one of five VIA-positive results will lead to dysplasia of cervical intraepithelial neoplasia of any grade being diagnosed (WHO 2010).

The ability to effectively acquire VIA screening skills a trainee will depend on:

- The healthcare provider's interest in providing VIA screening that is inborn or emanating from passion.
- The desire of a healthcare provider or a trainee to be involved in the course activities.
  Provider's experience- the provider needs continuous screening with VIA to improve the skill of making appropriate diagnoses. Failure to practice leads to skill loss over time (JHPIEGO 2015).

3.10 Effectiveness of visual inspection with acetic acid training on improving uptake of cancer screening

The more confident the healthcare workers are about the VIA screening, the more likely they are to mobilise clients for uptake, and a higher treatment rate could occur (Shastri *et al.* 2014). Suzanne *et al.* (2020) studied factors related to cervical cancer screening uptake in Jordan. The study's findings showed that at least 32% of women in Jordan have been screened for cervical cancer. The study showed that healthcare providers' encouragement for cervical cancer screening plays a key role in the uptake of these screening services. Hence, if such encouragement were to be done intensively, cervical cancer screening would increase dramatically in Jordan. The study also showed that marriage years were critical predictors of cervical cancer screening. The study recommended the use of structured screening programmes, improved collaboration between national and private partners and the overall improvement of the healthcare system in Jordan.

According to a study conducted by Lu et al. In 2012 researchers examined strategies to promote breast and cervical cancer screenings, among women. The study highlighted the significance of community based education initiatives and workplace programs in increasing awareness, about cancer screening. As much as this intervention was effective, according to this study, it is paramount to combine it with increased cultural awareness, improved training among healthcare professionals, negating cultural barriers, and offering much-needed support to nurses to improve further cervical cancer screening awareness. The study suggested that there ought to be massive media campaigns. However, Lu *et al.* (2012) also identified the need to consider the aspect of ethnicity while interrogating cancer screening among various cultural groups. This study concluded that practical and reliable existing interventions could effectively promote breast and cervical cancer screening among Asian women. Adsul *et al.* (2017) reviewed cervical cancer screening using VIA in India. Factors that facilitated the implementation of cancer

screening programmes were identified as standardised training to maintain the competency of test providers, cooperation with community-based organisations that offered training to community health workers, and using the screen-and-treat method to improve the rate of clinic adherence.

Abiodun *et al.* (2014) examined the effect of training on cervical cancer and screening among women in rural Nigeria. The study findings suggested that an educational intervention about cervical cancer screening aimed at adult women helped raise the awareness level to one hundred per cent. The findings also revealed that the percentage of women with a high knowledge of cervical cancer screening skyrocketed from 2-70%. The impact of this rise was the increase of women who had undergone cervical cancer screening. The study also showed that most women had not undergone cervical cancer screening due to a lack of awareness. The study recommended using multiple media health education aimed at adult women. This would, in turn, help improve cervical cancer screening awareness.

Pittalis *et al.* (2020) sought to find out factors promoting or uptake of breast and cervical cancer screening services in Malawi. Findings showed that inadequate funding and staffing, lack of screening machines, and inappropriate monitoring and guidelines hinder the uptake of cancer screening, while constant training and creating campaigns amongst sexually active women promoted the uptake of cancer screening. Makau-Barasa *et al.* (2018) interrogated ways to improve Kenya's cancer testing and treatment. This study identified seven major barriers to cancer testing and treatment. These barriers included low cancer awareness among the population, high cancer testing and treatment costs, low cancer knowledge among the practitioners, inaccessibility of healthcare services, lack of decentralised healthcare facilities, poor communication, and poor cancer policies. The study established that there is an underlying need to remedy these barriers by employing reliable, practical, and effective strategies. This would help improve access to cancer testing, screening, and treatment in Kenya. The main barriers to access to cancer screening were the cost of screening and treatment, lack of information about cancer among women, lack of trained health professionals to do the screening, long distances to the few hospitals equipped with the machines, communication barriers, and lack of better cancer policy development and implementation.

3.11 Effectiveness of visual inspection with acetic acid training on improving adherence to screening guidelines

To ensure the effectiveness of VIA screening it is crucial to have trained providers and ongoing quality assurance. The VIA providers are responsible, for gathering and documenting the medical histories of all women undergoing screening. Routine screening effectively reduces cervical cancer mortality, but screening coverage remains low in low-income countries with a high cervical cancer burden (Rahman *et al.* 2019). Selmouni *et al.* (2016) assessed healthcare providers' compliance with cancer screening guidelines with a visual acetic acid (VIA) inspection. Findings showed that only 14.2% of the health professionals followed all practices, and compliance to the guidelines significantly differed amongst HCPs in rural areas than in town centres ($p<0.001$). Recommended VIA examination steps were followed at approximately 83%. The study established that pre and post-VIA counselling was essential. Most participants were content with the VIA training sessions since they improved their screening skills using VIA. However they believe that continuous training is necessary to maintain a high quality standard.

In a study conducted by Poli et al. (2015) it was found that health workers, in South India successfully performed screening, cryotherapy and follow up care with limited resources thanks to their training and supervision, by professionals. Another study by Asgary and Adongo (2016) focused on smartphone based training for health professionals in cervical cancer screening using inspection with acid (VIA). They discovered that utilizing imaging through smartphones not provided opportunities for peer to peer learning but also helped facilitate clear communication with patients. This approach proved effective in building trust, with patients providing education ensuring compliance and implementing quality control measures. Interestingly all the patients willingly accepted smartphone based VIA despite having no screening experience.

In their study Awolude et al. (2018) aimed to explore and assess a strategy, for sharing tasks in order to achieve widespread cervical cancer screening in Nigeria. The findings of this research demonstrated the difficulties associated with implementing a screening approach based on cytology, in Nigeria. A few healthcare practitioners might be willing to implement low-technology screening services like VIA. The study findings showed that community health workers can help remedy the situation. Accordingly, these healthcare workers can effectively work at the primary healthcare level if their remuneration is raised. Still, the study revealed that the health workers had appropriate competency training that helped attain universal coverage of

cervical cancer screening in Nigeria. Following the completion of the training healthcare professionals experienced an improvement, in their understanding of cancer and its prevention. The percentage of knowledge among these professionals rose from 52.4% prior to training to 91.5% immediately after completing the program.

In a study conducted by Fouly et al. (2019) the effectiveness of a training program on detection of cancer using VIA was evaluated. The study compared the performance of nurses, who had knowledge about cancer with that of junior clinicians who received intensive training. The findings indicated that both groups demonstrated accuracy in conducting VIA tests showing sensitivity and specificity when compared to clinicians and their availability, during scheduled work hours. However it is important to note that periodic reinforcement sessions and intensive training are necessary to minimize predictive values among nurses.

3.12 Chapter Summary

The literature reviewed has shown that nearly 1,676 women die from cancer of the cervix per year, and about 2,454. In Kenya, women are diagnosed annually with cervical cancer. The statistics were expected to rise further by 2025 to more than 4,261 deaths due to lack of services focusing on early detection and treatment. Cancer detection in its early stages requires effective screening equipment. Only about 5 % of women aged 25-49 years undergo cervical screening in developing Countries, Kenya included. This low percentage of women seeking cervical screening services is due to few treatment facilities, a low number of trained HCP able to manage the invasive disease and training gaps for HCP in cervical cancer screening using available methods. One of the most common causes of cancer of the cervix is HPV, a highly infectious STI known to cause over 99 % of all invasive cancers of the cervix. Hence, there is a strong association between HPV and cervical cancer.

Typically it is common to examine women through cytology (Pap test). If the cytology result shows any signs further investigation is carried out using colposcopy. Biopsy to confirm the presence of CIN. Treatment is then initiated once CIN2 and CIN3 have been confirmed through analysis. However this conventional screening approach demands trained personnel and significant laboratory equipment. Screening coverage is very low in developing countries due to the high costs of setting up cytology-based services. The WHO has recommended optical review with acetic acid to “screen and treat” in small resource-limited settings. These include using VIA and cytology (Pap test). A VIA shows a higher sensitivity rate than the traditional cervical cancer

screening methods. Additionally VIA enables a strategy known as "screen and treat" by delivering results without the need, for laboratory tests. This approach ensures that individuals receive treatment in a visit thereby reducing the risk of follow up loss.

Three outcomes are possible after performing a VIA, including positive, negative or suspicious for cancer. The Positivity rate varies from 10 % to 35 %. If VIA is used as an alternative to cytology, a higher rate of treatment could occur, which may overburden developing countries that lack resources. Thus, VIA is a simple, achievable and actual primary cancer of the cervix diagnosis technique in a poor, marginalised community that does not get access to advanced laboratory test methods. Nevertheless the uptake of VIA in Kenya has been hindered by factors such as a shortage of personnel inadequate availability of materials and equipment insufficient support, from relevant authorities, excessive workload and uncooperative clients. Adherence to screening guidelines prevents unnecessary tests done on women who are not eligible and those done tests at intervals not recommended by guidelines. Failure to comply with VIA screening guidelines results in high additional costs to the healthcare system and the individual patients, as women who do not require tests get screened or are requested to return for repeated laboratory requested tests more than unnecessary. This makes VIA an effective cervical cancer screening tool if used well.

CHAPTER FOUR
RESEARCH METHODOLOGY

4.0 Introduction

This chapter discusses the research design and methods for responding to the research questions. Therefore, it defines the target population and the sampling technique used to attain the desired sample size for the study. The sampling frame was the total population of all healthcare workers in Embu County. Subsequently, data collection techniques, tools, and pretesting techniques to correct errors used for this study are also described herein. The data analysis plan describes how the researcher organised, processed, analyzed, and made interpretations and inferences and how she presented the results. The chapter concludes by emphasising the right issues that the investigator considered during the study period.

4.1 Study Setting

Embu County, which is located 130 kilometres northeast of Nairobi is one of the forty seven counties, in Kenya. It covers an area of 2,818 kilometres as mentioned in Appendix 9. The population census conducted in 2019 revealed that, around 516,212 individuals called Embu County their home. The main ethnic groups residing in this county include Mbeere, Embu and Akamba. Embu County is divided into four sub counties; Runyenjes, Manyatta, Mbeere South and Mbeere North. Embu County is renowned for housing the Mwea National Reserve and three notable hydroelectric dams—Kamburu, Kindaruma and Kiambeere—located along the Tana River. The regions economy thrives on activities such as tea cultivation, coffee farming macadamia production and dairy farming.

Notably Embu County boasts a total of 75 public health facilities along with two governmental facilities, 24 faith based facilities and 41 private facilities. In terms of healthcare personnel ratios per population size within Embu County; there are 111 nurses for every 100k people; twenty one doctors for every 100k individuals; and roughly twenty one clinical officers for every 100k residents (Embu County Report 2018). Cervical cancer screening services offered within Embu County mainly include VIA/VILLI screenings and Pap smears. Cryotherapy procedures are only available at healthcare centers equipped with machinery. However during this study period it was found that cryotherapy services were not operational, at Embu County Referral Hospital. Cancer is not very common, in Embu County, with a prevalence rate of 0.5%. Specifically cervical cancer has a prevalence rate of 0.2%.

4.2 Research Design and Rationale

This research project involved phases and locations. To begin with we conducted a baseline survey, in Embu County to determine the rate of VIA positivity in the selected healthcare facilities. Following this we conducted both quantitative assessments to understand how well healthcare providers adhered to VIA screening guidelines and the various factors that influenced its uptake.

In Phase Two we proceeded with the training, for cervical cancer screening based on the ACCP recommendations and Kenyas VIA and cryotherapy training guidelines. Prior to the theory training participants took a pre-test followed by a post-test after completing the portion. A two day theory training session was then followed by four days of training during a health campaign at Dallas dispensary, in Embu. Each pair of trainees received guidance from a mentor throughout their training. Moving on to Phase Three, the trained healthcare providers started offering VIA screening at their facilities while being closely monitored for a period of four months. We collected data on their ability to identify lesions during this period. The screening outcomes were verified by preceptors who're experts in pre cancer screening. It's worth mentioning that these preceptors are certified trainers for trainers, in VIA cervical cancer screening.

They have practical hands-on skills on VIA by being in clinical practice, have teaching and VIA demonstration skills, and can train various learners based on their needs assessment. A qualitative checklist assessment was done at the end of the four-month follow-up period to evaluate adherence to VIA screening guidelines. The study duration was one month in the baseline phase, six days for the intervention phase and four months for the post-training follow-up phase.

Because of the multiphase nature of this study, the quantitative and qualitative data needed, the study used an embedded sequential mixed methods study design. According to Cresswell and Plano (2011), mixed method study design emphasises collecting and examining data while combining qualitative and quantitative data. Mixed study methods offer logical ground, methodological flexibility and an in-depth understanding of the subject in smaller cases. Qualitative data brought depth to the study honouring the voices of the key informants, while quantitative data brought breadth.

Combining these two techniques offered a better understanding of the matter than using either approach alone. Since this study needed to answer different questions requiring different data types, it thinned down to using an embedded sequential mixed method study design per Victor *et al.* (2004) recommendations. The study design is majorly quantitative, with a qualitative aspect to provide a supportive, secondary role. A single data set was insufficient in this study, and different research questions needed to be answered with different data sets. Complimentary qualitative data was therefore embedded within primary quantitative data. The study used the embedded sequential mixed study method to ensure improvement of recruitment procedures, to enable examination of the intervention process and because more priority was given to quantitative methods compared to qualitative methods. In this study we assessed how effective VIA training is, in enhancing the knowledge and skills of healthcare professionals as improving the outcomes for clients at specific hospitals, in Embu County.

4.3 Study Variables

4.3.1 Independent variables

a) Cervical precancerous lesions positivity rate

b) Health service factors influencing the uptake of VIA

c) Adherence to VIA national screening guidelines

4.3.2 Dependent variable

Effective VIA screening outcome: negative for pre-cancer, Positive for pre-cancer or suspicious for cancer.

4.4 Study Population

The focus of this study was, on healthcare professionals who provide VIA screening services in government facilities in Embu County. These healthcare providers specifically offer VIA services to women between the ages of 25 and 49 at selected government owned hospitals in Embu County. In the county of Embu there are 287,531 people living. Among them 86,259 individuals fall within the reproductive age category. Are eligible, for cervical cancer screening. The study involved 14 HSPs who received training on VIA and subsequently screened a total of 421 women.

4.5 Sampling Techniques

The researcher deliberately chose seven government health facilities in the county, where VIA (Visual Inspection, with Acetic Acid) was already being provided. In this county there are four hospitals and twelve government owned health centres. Purposeful sampling was employed because there was the need for a facility to have an existing VIA screening programme and a cryotherapy machine where possible to support screening and treatment criteria and be a high-volume facility to ensure client flow. Seven facilities were purposefully sampled. Out of the seven selected facilities two nurses were specifically chosen from each facility to provide VIA services. These nurses underwent a six day training. They Were closely monitored for four months as they screened women for cancer. The screening outcomes were assessed in the presence of a preceptor.

4.6 Sample Size Determination

The Word Health Organisation VIA Trainer's Manual recommends a class size of 10-15 participants for each batch (WHO 2017). Considering the intensity and nature of the training the curriculum was designed to accommodate 14 participants, in training. Each participant had a preceptor assigned at a ratio of 2;1. The 14 healthcare providers were expected to screen 421 women after the training over four months after the intervention phase. According to the Alliance of Cervical Cancer Prevention and other VIA implementing organisations, small classes are advised due to the thoroughness of the course and the need for preceptors and clinical training where the minimum number of women screened for every participant is 15-20. For key informant interviews, three key informants were targeted. They were the County Senior Nursing officer, County non-communicable diseases coordinator and oncology nurse.

The Fisher calculation formula was used as outlined below to determine further the sample size of women to be screened by the participants.

$$n=\frac{z^2_{1-\alpha/2}\times p\,(1-p)}{d^2}$$ (Mugenda and Mugenda, 1999)

N=Minimum sample size.

α=Level of significance (0.05).

$Z_{1-\alpha/2}$= Standard normal deviation at 95%, confidence interval (1.96).

P= Proportion in the target population with specific characteristics.

d=Absolute precision (Error margin), (0.05).

Thus **n**=$1.96^2 \times (0.47)\ (0.53)/0.05^2$

n=383.

383 Healthcare providers were the minimum required sample size; however, to allow for **10%** non-response, the sample size of women to be screened by the 14 health care workers was adjusted upwards to **421.**

4.7 Pretesting

A pre-test was done to test the reliability, validity and feasibility of the research tools and also the capabilities of the data collection assistants in data collection, which was aimed at evaluating clarity, relevance, and accuracy as well as the flow of questions asked in the questionnaire. Further, it helped to approximate the time needed for each tool and the clarity of the instructions to the respondents. Kerugoya county hospital, a hospital not participating in the study, was selected for the pretest because it had similar characteristics to those of the study facilities. The pretest was done before collecting the initial data prior to training on VIA. According to Orodho (2009), a pre-test comprises 1 to 10% of the target population since it represents the respondents well. The pilot test was carried out among two healthcare providers providing VIA services in Kerugoya County referral hospital, representing 10% of the 14 nurses included in the study in Embu County. The pretest results helped the researcher adjust questions that were unclear to respondents.

4.8 Inclusion Criteria

To minimize attrition and maintain engagement throughout the study certain criteria were considered;

1. We selected healthcare workers who had undergone VIA screening and willingly consented to participate.
2. Preference was given to healthcare providers who showed initiative and interest in VIA screening as they would likely stay committed without feeling pressure.
3. We aimed to include healthcare providers who were not expected to be transferred from their facilities during the study period to reduce dropout rates.

4.9: Exclusion Criteria

1. Healthcare workers who also served as facility managers in their healthcare facilities were excluded from participating in this study.
2. When managers are deeply engaged in such a study it can put a strain on their ability to balance their hospital management responsibilities. Since the study is not typically included in the job description of a manager there may be a lack of commitment, towards it.

4.10 Validity

The measure of accuracy and credibility of the information in terms of how the information is in line with reality is called validity. Hence, the researcher must ensure internal and external validity (Creswell 2009). A strong internal validity increases a researcher's confidence in concluding the association between independent and dependent variables (Morgan 2007). There are several threats to internal validity, the first being maturation. However, in this study, the maturation effect was unlikely to affect the study since the study period was relatively short. The second threat was the measurement of the dependent variable, which tends to move outliers towards the mean if it is not perfect, as Jackson (2008) described. Therefore, the measurement for dependent variables was scrutinized to address this threat. The other threat was the selection bias, which involved sample selection. Hence, adopting a purposeful sampling technique on trainees who expressed interest in cancer cervix screening was one way of addressing this threat within the study period. Experimental mortality, which tends to occur when participants quit the study permanently, is one of the most recent threats to internal validity (Morgan 2007). Thus, keeping the participants anonymous helped reduce this threat.

When the findings of a study are generalizable to the population, external validity is said to be present (Morgan 2007). Ecological and population validity are the two main forms of external validity. The sample selected represented the population well, i.e., the VIA health providers, especially in public facilities.

4.11 Reliability

To determine the reliability of research instruments it is important to assess their consistency, in producing results across trials (Creswell 2014). In this study we used Cronbachs alpha coefficient to measure the consistency of the research instrument items. This coefficient,

which ranges from 0 to 1 indicates how closely the items, in the scale are related. A higher value indicates consistency. To ensure a threshold we followed Tracys recommendations (2019). Set a minimum alpha coefficient of 0.70. The questionnaire achieved a Cronbachs alpha scale of 0.804 indicating that the research instruments could be confidently relied upon for this study.

To prevent participant errors, which threaten reliability, data was collected at a prior scheduled and agreed time with participants. Data collection involved using preceptors to ensure objectivity and prevent researcher bias.

4.12 Data Collection Techniques

In this study we employed questionnaires, observational checklists and structured interviews to gather information. We used self-administered structured questionnaires to collect quantitative data, which served as the baseline for identifying any gaps in VIA screening among the participants. Additionally we conducted interviews, with informants and utilized the VIA observational checklist for VIA providers. To assess adherence to guidelines we employed checklists for both VIA and cryotherapy during the baseline data collection phase and post training phase. Furthermore we gathered data from the health facilities cervical cancer screening and treatment registers well as KDHS 2014.

4.13 Data Analysis

Both qualitative and quantitative analysis techniques were used.

4.13.1 Quantitative data analysis

During the training phase we conducted assessments before and, after the tests to ensure accuracy. The principal researcher closely supervised the process of collecting data to maintain its quality. Prior, to inputting the data into analysis software (SPSS) version 21.0 the information gathered from tools was coded. We conducted both univariate and bivariate analyses on this dataset. For analysis frequency distributions were utilized to demonstrate how background characteristics were distributed within our study population. After entering the data for analysis cross tabulation was performed to explore relationships between dependent variables. Spearmans correlation values were then computed at a statistical significance level of $P \leqslant 0.05$ to determine associations, between these variables. Additionally we utilized the Cohen Kappa coefficient (k) to demonstrate the precision of VIA diagnosis. To determine the significance of the pretest and post test during the intervention phase we employed a T test at a confidence level of 95%.

4.13.2 Qualitative data analysis

The qualitative data was collected from key informant interviews, where the researcher recorded the interviews digitally. Then the recordings were listened to repeatedly and transcribed as the researchers familiarised themselves with the data. The initial codes were then created, representing the meanings and patterns identified in the qualitative data. Data was read through again, and excerpts identified as appropriate codes were applied. Excerpts that represented the same meaning had the same code applied to them. The codes were then collated with the various excerpts that supported them. The researcher combined all excerpts associated with particular codes and read through the excerpts again. The researcher then revised and adjusted the codes as they seemed fit to gain a deeper understanding of each of the codes developed.

The codes were then grouped into themes by grouping all excerpts associated with a particular code. Similar themes were merged, irrelevant themes removed, and those without relevant themes to back them up were also removed. The researcher then created the final narrative from the derived themes. The study objectives guided the emerging themes. Qualitative data findings were triangulated with quantitative data to gain a better understanding.

4.14 Logistical and Ethical Considerations

4.14.1 Research Ethics Committee Approval

We obtained the approvals for our research, from the Ethical Review Committee at KNH University of Nairobi (KNH UoN ERC). The reference number for this approval is KNH ERCIA/332. It was granted on September 9th, 2019. Additionally we acquired a research permit from the National Commission for Science and Technology (NACOSTI) with reference number 291817 which was granted on October 10th, 2019. We also received authorization from both the county commissioner of Embu County and the Ministry of Education in Embu County. You can find these authorizations documented in Appendices 11 and 12 respectively.

At the hospital level we obtained authorization from the director of health in Embu County. They wrote to county MOHs to gain access to hospitals within their jurisdiction. This correspondence can be seen in Appendix 13. Subsequently we presented this letter to the Nursing officer in charge at selected health facilities who granted us access to MCH/FP rooms and helped us administer research questionnaires to healthcare professionals. They also authorized healthcare workers to attend a six day training session. At Embu Level Five Hospital we

provided the hospital officer with the county director's letter granting us permission to conduct our research. This approval is documented in Appendix 14.

4.14.2 Consent for the Questionnaire and Key Informant Interviews

The participants were asked for their consent in a way that ensured they were fully informed. We made sure that they understood the purpose, benefits and risks of the study by providing information in a language that was most comfortable, for them. We also emphasized their freedom to decline participation or withdraw at any time. To maintain privacy we conducted the procedures in a room that ensured both auditory confidentiality. Additionally, we. Anonymized the data collection tools to protect confidentiality. The data collected was stored under lock and key, including the digital recorders used in key informant interviews, with access limited only to the principal researcher.

4.15 Recruitment methods and VIA training process

The training started on a Thursday at the Dallas dispensary. The two days theory training included the following topics: Cervical Cancer, HPV, Anatomy of the Cervix, Screening for Cervical Cancer, VIA, Treatment of Pre-cancer, Counselling, Management of Cervicitis and Pelvic Infections, Infection Prevention and Community Engagement. The objective of the training was to equip participants, with the understanding and abilities to carry out screening and treatment for precancers. The course primarily emphasized the utilization of inspection with acid and cryotherapy, as the main methods. The training methodologies included:

- Assessment of baseline knowledge with a pre-test
- Classroom Training – 2 days of training in a conference room set that included: interactive presentations with PowerPoint slides, demonstrations, role play and discussions, interactive activities, games and small group work, use of skill stations for learning core exam skills, viewing cervical slides and Jhpiego cervical images flash cards in both large and small groups.

- Clinical Training, four clinical days in a cervical cancer screening and treatment campaign Participants worked in pairs of two, seeing 15-20 patients over the four days with a supervising preceptor in each room.
- The training paperwork and hand-outs included: Day one- pre-tests/post-test (Appendix 18) and answer key, female anatomy hand-outs, blank papers for activities as needed, cervical grid paper, vocabulary matching papers, and classroom schedule (appendix 19). Day 2- counselling checklists (Appendix 20), Counselling overview for cervical cancer screening (appendix 21), counselling role play scenarios (appendix 22), VIA and cryotherapy cervical quiz homework (appendix 23), VIA/cryotherapy forms, registers, logs, game questions and post-test.

Day one: Theory training sessions

This session started with the introduction of participants and the two facilitators, an ice-breaker was done, and participants then mentioned their training expectations. The purpose of the training was spelt out, and participants were reminded that this was a research study. The County Chief Nursing Officer was to open the training officially. Unfortunately, she was unavailable, and the Dallas Dispensary Nursing Officer In-charge officially opened the training and appreciated the participants for attending. Then participants did the pre-test.

In the introduction, cancer was discussed generally, and then cervical cancer was delved into specifically. Participants described cervical cancer and the burden of the disease globally and regionally. They developed the ability to feel confident in discussing cervical cancer with women, men, and the community. Some barriers to accessing cervical cancer services in the facilities were discussed in an open discussion. Reasons for the high prevalence of cervical cancer rates in low- and middle-income countries were discussed as:

- Lack of awareness that cervical pre-cancer is easy to detect and treat before cervical cancer can develop and that cervical cancer is a major killer of women.
- Lack of health infrastructure for screening and treatment
- Limited resources, given to other pressing healthcare needs

Some of the known solutions to this are:

- Increasing awareness of cervical cancer prevention among all community members, healthcare workers, and people with the power to decide about this problem
- Focusing the use of our limited resources on women who are at the highest risk
- Detecting cervical pre-cancer in women through screening.
- Treating women with pre-cancer to prevent progression to cancer.

Female anatomy: the participants were given hand-outs of female genitalia to label in pairs. Their role was to identify the location of the primary organs of the female reproductive system. This session lasted approximately fifteen minutes.

Human papillomavirus: this session's objective was to enable participants to identify HPV as a causative agent for cervical cancer and describe HPV prevention, transmission, and prevalence. The HPV vaccine, which effectively prevents approximately 70% of HPV infections, was discussed briefly. It should be given to girls before initiation of sexual activity – best if given between the ages of 9-12, but this depends on the policies of various countries.

In this session, an activity known as pass it around was done:

This activity helps demonstrate how all of us can become infected with HPV

- Each person in the room was given a small piece of paper after putting a star in the corner of one of them

- Then participants were asked to walk around the room, introduce themselves to three different people, write their names on each other's paper, and then return to their seats.
- Then the facilitator asked the person with the star on their paper to stand up and explain to the group that this person has HPV.
- This person read the names on their paper. The group explained that those people had HPV as well.
- Each of these people then stood up and read the names on their paper
- Very quickly, the whole room was standing, and we could see that everyone had been in contact with HPV.
- One by one, the participants were asked to sit, explaining that their bodies cleared the infection, they used a condom to protect themselves, they were vaccinated, or they were screened for pre-cancer and treated.
- Emphasis was made that although most of us are exposed to the virus, only a small number will go on to develop cervical cancer, especially if prevention, screening, and treatment measures are taken.

Anatomy of the normal cervix

This session's objectives were: for participants to describe what a normal cervix looks like, Be able to identify the endocervix, ectocervix and SJC and Understand how the cervix changes with age.

Variations of a normal cervix were then covered. The objectives here were to: describe the variations of a normal cervix, identify ectropion and nabothian cysts and cervical polyps and identify and draw the key characteristics of a normal cervix.

Activity carried out: Flash Cards review

- Participants were divided into small groups, and give each group a stack of flashcards with images of normal cervixes
- Facilitators had participants work together to identify the location of the endocervix, the ectocervix and the SCJ.
- Facilitators ensured each participant practised drawing the location of the cervical OS and the SCJ from cervical images onto the cervical grid papers.
- Facilitators Roamed around the room and provided help as needed.

Activity: vocabulary matching (appendix 26)

- Participants were divided into groups of 2-3, and hand out slips of paper with key vocabulary words and definitions were provided.
- Each group matched the words to the definitions.
- Facilitators reviewed answers with the entire group.

Screening For Cervical Pre-cancer and Cancer

The objectives of this session were that the participants would be able to: describe the screening methods, their advantages and limitations, and identify eligibility requirements for the screening method.

VIA, pap smear and HPV screening were discussed.

Afternoon session day 1: VIA

The objectives of this session were that: Participants would be able to: identify who is a candidate for VIA and what supplies are needed, identify positive VIA lesions and identify lesions that are suspicious for cancer.

Activity in the session: VIA demonstration of two stations (materials need for each station)

- Small table
- Stool or chair
- Napkins or a clean piece of flip chart paper to cover the table
- A small plastic water bottle cut as in the picture below
- Duct tape for securing the model to the table
- An avocado or other vegetable or fruit that is a similar size as a uterus and has a “cervix.”
- Vaginal speculum
- Gloves
- Container for vinegar
- Large swabs
- Headlamp or flashlight
- Garbage can
- Bucket for soapy water
- Copy of the handouts "Evaluation of clinical abilities in VIA" and "Basic Steps of VIA".

On screening using VIA, the specific areas covered were: why use VIA as a screening test, who are candidates for VIA, who are not candidates for VIA, HIV and Cervical Cancer, what supplies are needed for VIA, vision and Light, acetowhite Lesions, steps in Performing VIA, cervicography, before and After Acetic Acid: What do you see?, classifications of VIA Test Results -Negative & Positive, Suspicious for Cancer and Unsatisfactory, Possible VIA Results, what questions do I ask myself when performing VIA?, visualizing the SCJ.

- How do VIA negative results look?
- Characteristics of a VIA Positive Lesion
- VIA Positive: facilitators had the participants answer the three questions.

- Is it suspicious for CA?
- Can you see 100% of the SCJ?
- Is VIA positive or negative?

- Review of VIA Positive Lesions

- The lesions are aceto-white. They may be raised, dull or intense white. They originate from the SCJ.
- They do not go away after one minute

- Relative Risk

- If we consider all uncertain results as potentially positive and treat them with cryo, we will have the greatest chance of stopping pre-cancers and the smallest risk of inadvertently sending a woman with pre-cancer home to die in the next 5-10 years.
- The greatest harm we should be concerned with is the potential harm caused by false negatives.

- Squamous Metaplasia
- Suspicious for Cancer
- VAT: (Visual Assessment for Treatment) in areas where HPV testing is the primary screening modality, visual inspection is only necessary to determine if there is a lesion present that is inappropriate for cryotherapy

Activity: VIA Learning Stations

- Participants were divided into groups of 3 for each station
- Facilitators demonstrated the basic steps of VIA using clean technique
- Use the handouts: "Evaluation of clinical abilities in VIA" and "Basic Steps of VIA" was done.
- Facilitators had each participant practice speculum and VIA exam skills at the learning stations being sure to use clean technique.

Activity: JHPIEGO flash card reviewed in small groups

- Divided the participants into small groups (2-3 per group)
- Distributed the Jhpiego cards
- Facilitators had participants work together to review the cards
- Encouraged them to follow the questions on the Jhpiego cards:

- Is it suspicious for cancer?
- Can you see the entire SCJ
- Is it VIA positive or negative

- Facilitators had participants turn the cards over for the answers.
- Facilitators circulated between the groups to assess how they were doing and answered questions.

THEORY TRAINING DAY TWO

The day started by welcoming the participants for day two of the theory training. The objectives for the morning session were to review key information from day one of the course and energize the participants for another full day of learning and team building.

Activity: Icebreaker

The Human Web

• Created a ball by crumpling some paper into a ball

• Facilitators asked the group to stand in a circle

• Facilitator asked the participants to think about things that they had learned the previous day

• Demonstrated by saying their name followed by something they learned

• Then, the participant would say the name of a person across the circle then toss the ball

• Participants then asked that person to repeat what they said, introduce themselves and share something they learned the previous day as well.

• This process was repeated, making sure each person shared a new key learning

• At the end, we tried to pass the ball quickly among members of the group, practising names as the ball was tossed.

Session 2: Treatment for Cervical Pre-Cancer

The objectives of this session were to Identify and understand treatment options for pre-cancerous lesions and compare advantages and limitations.

Contents of the session.

- Treatment of Cervical Pre-Cancer
- Considerations When Choosing a Treatment Method
- Loop Electrosurgical Excision Procedure – LEEP

- Loop Electrosurgical Excision Procedure – Advantages and Limitations
- Cone Biopsy
  - Cone biopsy requires general surgery, anaesthesia, and a gynaecologist. For these reasons, it is expensive and not widely available.
- Cone Biopsy - Advantages and Limitations
- Ablation Methods (Cryotherapy and thermal regulation)
- Ablation Advantages
  - Most women will have lesions appropriate for cryotherapy or thermal coagulation.
  - For this reason, we are focusing on cryotherapy. Many of you will learn how to perform this treatment.

• Ablation Limitations

- It is expected that some women will have positive lesions a year after treatment- therefore, follow-up screening is essential.

Cryotherapy

This is the main treatment method for precancerous lesions that were taught. The objectives of this session were: to identify the equipment and supplies necessary to perform cryotherapy, describe treatment eligibility and learn how to perform cryotherapy. The specific contents of the session included:

- Equipment Needed for Cryotherapy
- Cryotherapy Equipment: Equipment can vary as gas tanks come in different sizes
- Supplies Needed for Cryotherapy
- Lesions Appropriate for Cryotherapy
  - Can you perform Cryotherapy? Yes

- ❖ Can you perform Cryotherapy? No
  - ➢ The lesion extends off the anterior lip of the cervix
  - ➢ You also need to confirm that you can see the end of the lesion inside the endocervix
- Can you perform Cryotherapy? Probably
  - ➢ If you can see the edge of the lesion inside the endocervix, you can perform cryo
- Is Cryotherapy appropriate?
  - ➢ Reinforce the importance of overtreating vs undertreating
  - ➢ If no visible lesion is seen by the cryotherapist, cryotherapy should still be performed based on the drawing done by the VIA provider.
  - ➢ It should be assumed that a small lesion was seen and may no longer be responding to the application of acetic acid.
- Cryotherapy Procedure.
  - ➢ Facilitators had participants look at their cryotherapy handouts.
- Applying Cryoprobe to Cervix
- Cryotherapy Procedure.
- Cryotherapy Unit Disinfection

Screen and Treat

This session was to equip the participants with knowledge and skills on how to screen for cervical pre-cancer and treat the patients on the same day to avoid many lost to follow-up clients. The objectives of this session were that the learners would: understand the advantage and disadvantages of a screen-and-treat approach and know the eligibility criteria for cryotherapy treatment on the same day as screening.

The specific contents of the session were:

- Screen and Treat Advantages
- Screen and Treat Limitations
  - Most women can have cryo or thermal coagulation.
  - A few women will need to be referred for more care
- Research on Screen and Treat Approach
- Screen and Treat

Counselling For Via and Cryotherapy

This was a one-hour session on discussing counselling for VIA and cryotherapy with clients. The session objectives were to: describe the importance of counselling in cervical cancer prevention programmes, appreciate client rights and the importance of informed consent and know the key points that should be covered in a comprehensive counselling visit.

The specific content for the session included:

- Purpose and importance of counselling.
  - Facilitated a brief conversation or brainstorming about the purpose of counselling.
- Counselling.
  - Ensures women have accurate information about cervical cancer prevention, screening, and treatment.
  - Creates a safe environment for a woman to discuss her concerns o Allows women to make informed decisions.
- Client Rights
- How can I be a good counsellor; Facilitated a conversation about what a good counsellor does in terms of approach and behaviour
- Effective Counselling Strategies; Listen well and validate your clients' concerns

- Use non-verbal communication to provide a safe and inviting atmosphere
- Provide information using simple, clear language and written information when possible
- Answer her questions and address her concerns

- Informed Consent
- Counselling is an Ongoing Process
- Counselling Before VIA
- Counselling After VIA o Referral for cryotherapy or LEEP would be appropriate if a lesion is too big, if a woman needs treatment for PID first, or if cryotherapy isn't available

- Reviewed Kenya's specific follow-up protocols for VIA negative screening

- Counselling Before Cryotherapy
- Counselling After Cryotherapy

Management of Cervicitis and PID

Whereas this was VIA and cryotherapy training, this study and MOH screening guidelines recognize that cervicitis and Pelvic inflammatory disease (PID) are the most common infections that can be diagnosed as cervical screening using VIA is done. For this reason, Nurses and Midwives need to be equipped with management of the same.

This session's objectives were that the participants would be able to: identify treatment protocols for cervicitis and PID, know how to do a bimanual exam and the significance of findings and understand the management of cervicitis and PID in a woman with positive VIA results.

The specific content for this session included:

- Cervicitis
- MOH Treatment Guidelines: Cervicitis

- Pelvic Inflammatory Disease (PID): How to perform a Bimanual Exam
- MOH Treatment Guidelines: PID
- Management of Cervicitis with VIA Negative
- Management of Cervicitis with VIA Positive
  - If you are certain that the woman will return, deferring treatment until after her cervicitis has resolved is okay.
  - If you are worried that she will not return, starting her on antibiotics and treating it with cryotherapy is better and safe

Infection Prevention: High-Level Disinfection

With the recognition that VIA screening is most common in low-resource setups, participants needed to know how high-level disinfection of speculum can be done in places where there is no electricity for autoclaving or in instances of power outages in these setups. The objectives of this thirty minutes session were to: understand the risks of infection and the strategies used to reduce the risk, appreciate the effectiveness of high-level disinfection as a strategy, and know the steps in performing high-level disinfection.

The specific content of the session included:

- Risks of Healthcare Work
- What can we do to make our work environments safer
- Infection Prevention Strategies
- How to prevent infection when in the clinical setting
- Decontamination
- Waste Disposal and Initial Decontamination
- High-Level Disinfection (HLD)

- Use heavy gloves to collect dirty instruments
- HLD Washing Station
- Step 1: Decontaminate
- Step 2: Clean
- Step 3: Disinfect
- Place on a clean cloth and leave to air dry
- Review of Chemical HLD Steps.

Community Engagement

With effective VIA and cryotherapy skills, the community must know that screening methods exist in health facilities. The objective of this session was to enable participants to appreciate the importance of community engagement in VIA cervical cancer screening development and sustainability.

The specific contents of this session were:

- Community Health Workers/volunteers (CHVs)
- How CHVs can be involved in community mobilization and linking women to screening in health facilities.
- Our role in the prevention of cervical cancer
- References

Activity: small group stations

TIME: 60 minutes (3 groups rotating to the new station after 20 minutes)

VIA cervical cancer screening data is very important to inform the various performance indicators in cervical cancer prevention efforts. This session also enabled more VIA practice in demonstration stations and more review of JHPIEGO flash cards.

The objective of this activity was that participants would become familiar with forms and registration logs, learn about and practice the clean technique, and gain further experience in identifying positive lesions.

Specific activities in each station included:

Activity: MOH Forms review

Copies of all MOH registers, forms, and log forms for each participant. Cervical cancer referral form (appendix 27), cervical cancer screening and treatment form (appendix 28).

Activity: Review of clean technique at exam stations used in VIA training

- Small table
- Stool or chair
- Clean piece of flip chart paper
- A water bottle and fruit pelvic model
- Vaginal speculum
- Gloves
- Container for vinegar
- Large swabs
- Headlamp or flashlight
- Garbage can
- Bucket for soapy water

Activity: Flip cards in small groups

- Jhpiego cervix flip cards (positives, negatives and suspicious for cancer)
- Cervix grid paper: for drawing the Cervical Os, SCJ and lesions

Midcourse Review

This review was an evaluation of participants' ability to review cervical images independently. The images were projected, and participants were expected to make a diagnosis and a management plan. The objectives of this session were to have an opportunity to evaluate learning, review key information necessary in identifying VIA positive and negative lesions, and reinforce learning about eligibility for cryotherapy. Midcourse image assessment answer sheet (appendix 25)

Activity: Press a button (appendix 24)

An activity to have fun and celebrate how much had been learnt in two days:

- Divided the participants into two teams and had them stand single file in lines facing the front of the room
- Placed a press button on a table a good distance away from the beginning of the lines
- Participants were informed that the facilitator would ask the people at the front of the lines about cervical cancer prevention.
- Had them run to the front of the room when they knew the answer and press the button (or hit the table), then answer the questions
- If they gave the correct answer, their team would get a point, and we would add it to the scoreboard. If their answer was incorrect, their colleague from the other team got a chance to answer and get a point. The team with the most points at the end won.

Reviewing Questions of Concern and Post Test

This was the second last activity of the two-day training. The objectives of this session were to: to ensure that all remaining questions or gaps in knowledge were addressed and to determine if

participants had gained knowledge in cervical cancer prevention that is necessary for effective performance. The post-test was then administered.

Logistics For Clinical Training

This last session's objective was to inform the participants of all the details and expectations of the coming clinical training. The clinical training was starting the following week on Monday for Four days. We reviewed the clinical training plans and logistics, including location, roles/expectations, transportation, and others. The location remained the Dallas dispensary.

CLINICAL TRAINING: VIA CERVICAL CANCER SCREENING CAMPAIGN

Two weeks before the theory training, the researcher requested a meeting with five active community health workers affiliated with the Dallas dispensary through the facility nursing in-charge. In the meeting, a brief introduction of the study's purpose was done, and cervical cancer screening community mobilization strategies were shared. The oncoming clinical campaign was communicated to CHVs, and community mobilization posters were shared to be distributed in schools, churches, mosques, household units and shopping centres; a Kiswahili version of the notice is attached here (appendix 29). The objective of the clinical training is that each participant would screen 15-20 women by the end of the four days.

On clinical training day one: the flow of women was slow; the CHVs were on site to ensure that mobilisation around the catchment population was continuous.

The screening started on Monday at 9:00 am.

SCREENING SITE SET UP

The antenatal ward at Dallas dispensary was improvised into seven makeshift rooms, subdivided with bed sheets and strings. Each room had two participants and one preceptor. All the necessary

screening equipment was in each room: screening couch, three seats, writing surface, torch for lighting, bucket with soapy water for dirty speculums before being disinfected, garbage collection bin, wall clock for timing VIA and cryotherapy, soap and source of water for handwashing. The supplies for VIA were also in each room, which included: American garden white vinegar, clean gloves, wooden cotton applicator sticks, a small bowl for putting vinegar, a maternity pad, serviettes, sanitiser, a spray bottle with 0.5% solution of sodium hypochlorite for disinfecting the coach after every client was attended to.

Additional supplies in two rooms with cryotherapy machines were: four kidney dishes for disinfecting the cryotips. One had soapy water, clean water, and methylated spirit where tips would soak for twenty minutes, and the last kidney dish had clean water, after which air drying of cryotips was done. After airdrying, the cryotips were ready for use.

High-level disinfection station: one nurse who was not a study participant was responsible for high-level disinfection throughout the clinical campaign. The nurse would collect used speculums in the soapy water bucket from each room and take them to the central disinfection point. There the speculums would first be put in 0.5% chlorine solution for ten minutes, then be put in clean water to rinse out chlorine, then a bucket of soapy water to clean out with a soft brush, then a bucket of clean water to rinse out the soap, then in a bucket of 0.5% chlorine solution for 20 minutes for high-level disinfection, after which the speculums would be rinsed in a bucket of clean water and then air dried on a flat surface lined with sterile green towels. The speculums were ready for use at this point. Autoclaving of speculums would be done at the end of each day.

Cervical Cancer Screening Health Messages

Before starting screening, group teaching would be done by one participant. The women who had turned up for screening were taught what cervical cancer is, what causes cervical cancer: HPV and how cervical cancer can be prevented. Visual inspection with the acetic acid procedure was explained, and the three possible outcomes were also explained. Women were informed that precancerous lesions would be treated on-site. The clients were also informed that this was an ongoing study, and verbal consent to screen them was sought. VIA eligibility criteria would then be applied. Women had to be between 25-49 unless HIV positive population, where the screening age starts at 18 years, and they needed not to be pregnant or on their menses.

Via Screening for Individual Women

Each woman would then be directed to a screening room with two participants and one preceptor. The participants would counsel the client before screening and obtain verbal consent, fill the client bio-data on various registers and forms and then ask the client to lie on the couch in the lithotomy position, ensure the client is comfortable, inspect the external genitalia, insert the speculum, ask the questions: is the cervix suspicious for cancer, can you view the entire SCJ, is the cervix positive or negative (after application of 5% vinegar/ acetic acid). Applying 5% acetic acid would be done for two minutes after full visualization of SCJ, and VIA counselling during the procedure would then continue. The diagnosis would be made depending on the cervix findings. The preceptor would emphasise the characteristics of VIA-positive lesions, e.g., originating from the SCJ, having clearly defined margins, acetowhite, and raised. For VIA-positive lesions, the participants would then determine if they were eligible for cryotherapy, e.g., the ability to visualise the entire lesion, not in endocervix or vaginal mucosa and can fit the

cryotips available. A bimanual examination would exclude pelvic inflammatory disease for all VIA-positive clients.

The participants would make their initial diagnosis, and the preceptor would make their, agreeing or disagreeing with the participant's initial diagnosis. Then, all three would arrive at a final working diagnosis. The diagnosis and VIA findings were recorded in the client's cervical cancer screening and treatment form and MOH's cervical cancer screening register.

The speculum would then be removed, and the client asked to dress up and sit on a chair. Results would be either suspicious for cancer, Negative or positive.

If suspected of cancer, the client would be referred to Embu County referral hospital for further management through the gynaecology clinic. MOH cervical cancer referral form would be filled out to accompany the client. If Negative and HIV negative, rescreening was advised in five years. If Negative and HIV positive, rescreening was advised in one year. For those with VIA-positive lesions/ precancerous lesions and eligible for cryotherapy, cryotherapy counselling and consent would be obtained. The woman would be asked to empty the bladder and treated with cryotherapy. The cervix would be frozen for 3 minutes, then 5 minutes rest and another 3 minutes of freezing. Those who were not eligible for cryotherapy due to PID or severe cervicitis were given medication and asked to report back to the facility after two weeks for rescreening and treatment. Those with big lesions or lesions extending to the endocervix and not eligible for cryotherapy were referred for LEEP. A MOH cervical cancer referral form would be filled, and the patient would be referred with the notes.

Every woman treated with cryotherapy was given post-cryotherapy counselling and advised on signs of infections or complications they should report to the facility. The post-cryotherapy counselling included the importance of abstaining from coitus for four weeks after the procedure.

If not possible, the first two weeks of abstinence was a must, and for the remaining two weeks, condoms could be used. Advice against douching during this time and the use of tampons was given. The women were also advised to use panty liners for at least six weeks and maintain body hygiene due to excess watery discharge from the cryotherapy. They were also advised on the importance of one-year post-treatment screening. Cryotherapy treatment success is about 95% hence the need to determine if the precancerous cells were cleared one year after treatment.

The VIA screening went on for four days. A total of 216 women were screened.

4.16 Dissemination of results:

The findings of this study were disseminated through reports to the health facilities, a report to the UoN School of Nursing, presentation of findings at international conferences, and publication of results in peer-reviewed journals.

4.17 Chapter Summary

The chapter has focused on research methodology. The study was conducted in selected health facilities within Embu County using a phased and multi site research design that incorporated both qualitative and quantitative methods. The study focused on healthcare professionals who provided VIA screening to women aged 25 49 in county hospitals, within Embu County. We selected seven government health facilities that already offered VIA services using a sampling technique. Prior, to conducting the study, a pre test was carried out to assess the reliability, validity and feasibility of the research tools employed. To ensure accuracy and generalizability of findings, both internal and external validity were carefully considered by the researcher.

To ensure the trustworthiness of our research tools we conducted a validity check using the Cronbachs alpha test. In this study we employed methods, for data collection, including questionnaires, observational checklists and structured interviews, with the participants. For data we utilized self administered questionnaires whereas structured interviews and an observational checklist were employed for gathering information from VIA providers. The collected data was analyzed using inferential statistics. The results were then presented in tables and figures. All

research permits were obtained from relevant authorities, and respondent consent was sought before the administration of data collection tools.

CHAPTER FIVE
RESULTS

5.1 Introduction

In Chapter 1 we aimed to investigate how clinical training can impact the effectiveness of inspection, with acid for cervical pre cancer screening in selected healthcare facilities within Embu County. Our research followed a mixed method approach, where we carefully selected seven health facilities. From these facilities we purposefully sampled fourteen healthcare providers who offer VIA services. Two, from each facility. These fourteen providers received a two day training and four day practical training with the supervision of experienced mentors.

The clinical training/practice was a medical campaign for cervical cancer screening and treatment—every two participants screened under the mentorship of one preceptor. The 14 HSPs were followed for four months after the intervention training to screen at least 421 clients in their respective health facilities. They were provided technical support by preceptors to ensure the sensitivity and specificity of the VIA outcomes. All 14, out of 14 participants (100%) took part in the study whereas a total of 434 women (to 100.69% due to rounding) underwent screening for cervical cancer using VIA. These findings indicate that the response rate was at an average of 100% which meets the criteria for analysis as suggested by Mugenda and Mugenda (2008). According to their assertion a response rate exceeding 60% is considered sufficient, for analysis as it adequately represents the sample size of the study.

5.2. Demographic Data for Healthcare Providers

Table 5.1 provides a summary of the information, for the HSPs. Looking at the data in Table 5.1 it can be observed that out of the fourteen healthcare providers the majority were women accounting for 92.9% (n=13). Among this group 78.6% (n=11) had completed their education up to a diploma level and half of them (50%, n=7) had been working at the facility for than five years. This suggests that they were qualified to work in a healthcare setting and had experience to answer questions related to cancer screening, in their workplace. In terms of religion 50% (n=7) identified as Protestants while the remaining providers identified as Catholics.

Table 1: Demographic Data for Healthcare Providers in Embu County

Variables	n=14	Percentage
Gender		
Female	13	92.9%
Cadre		
Nurse	14	100.0%
Highest education level		
Diploma	11	78.6%
Bachelor's degree	2	14.3%
Master's degree	1	7.1%
Religion		
Catholic	7	50.0%
Protestant	7	50.0%
How long have you been in this facility?		
Less than one year	1	7.1%
1-5 years	6	42.9%
More than five years	7	50.0%

5.3 Proportion of cervical pre-cancer positivity rate prior to intervention in selected facilities in Embu County.

As previously mentioned in Chapter 4, the baseline data for the HSPs was collected by self-administered questionnaires. The data from cervical cancer screening and treatment registers was recorded one year retrospectively in each of the seven facilities.

5.3.1 Baseline Cervical Cancer Screening Data

During the baseline study, it was established that 239 screenings had been done, one year in retrospective from the seven-government health facilities; 70 (29.3%) from Embu Provincial General Hospital, 43 (18.0%) from Dallas Dispensary, 24 (10%) from Ishiara Level Four Hospital, 16 (6.7%) from Kianjokoma Health Centre, 28 (11.7%) Kiritiri Health Centre, 56 (23.4%) from Runyenjes Level Four Hospital and 2 (0.8%) from Siakago Level Four Hospital. The mean age of the participants was 38.02 ±10.32, which ranged from 18 years to 66 years old, with 9.6% (*n*=23) below 25 years, 76.2% (*n*=182) ranging between 25-49 years and 14.2% (*n*=34) been above 49 years. On the type of visit used to test VIA, the researcher established that 9.2% (*n*=22) were for initial screening while 1.7% (*n*=4) were for routine screening. However, most healthcare workers, 89.1% (*n*=213), did not indicate the type of screen visit the clients were

categorised under. Most women screened were 38 years old, and initial screening was the most common type of VIA visit at the baseline phase.

Table 2: Baseline Cervical Cancer Screening Data per facility

Variables	n=239	Percentage (%)
Health Facility		
Dallas Dispensary	43	18.0
Embu provincial hospital	70	29.3
Ishiara Level Four Hospital	24	10.0
Kianjokoma Health Centre	16	6.7
Kiritiri Health Centre	28	11.7
Runyenjes Level Four Hospital	56	23.4
Siakago Level Four Hospital	2	0.8
Age		
Below 25 years	23	9.6
25-32 years	54	22.6
33-41 years	77	32.2
42-49 Years	51	21.3
50 years and above	34	14.2
Type of screening		
Initial screening	22	9.2
Routine screening	4	1.7
Not indicated	213	89.1
VIA results		
Negative	231	96.7
Positive	2	0.8
Suspicious	6	2.5
HIV status		
Negative	19	7.9
Not indicated	220	92.1

5:3.2 Baseline precancerous lesions positivity rate

The researcher calculated the VIA positivity rate from the baseline data. Consequently, the findings established that most of the test results or 96.7% (*n*=231), were VIA negative while the VIA positivity rate was 0.8%, and 2.5% were suspicious for cancer, as shown in Figure 5.3. This shows that most cases screened one year in retrospect were VIA negative.

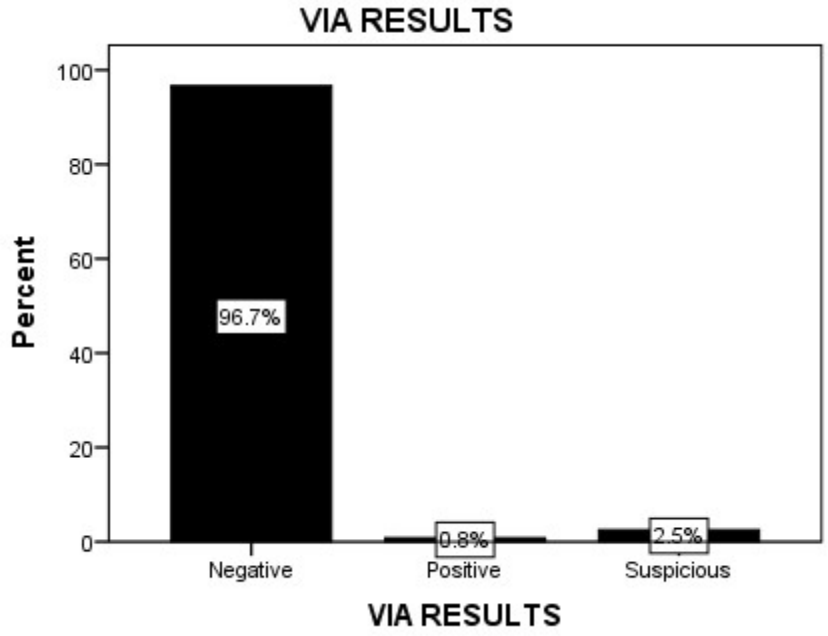

Figure 3: Baseline VIA Results

5.3.3 VIA Baseline Results across Age Groups

Table 5.3 below shows that the VIA-positive cases during the baseline study were all aged between 25 years and 49 years. Of the total cervical cancer suspicious cases, the majority, 83.3% (*n*=5), were aged between 25 and 49 years. The results show that no standard guidelines were followed on the eligible population for VIA screening, as women below 25 and above 50 years were also screened. Yet no woman was HIV positive in the age group below 25 years.

Table 3: VIA Baseline Results across Age Groups

		Age groups			Total
		Below 25 years	**25 - 49 years**	**50 years and above**	
VIA RESULTS	Negative	23	175	33	231
	Positive	0	2	0	2
	Suspicious	0	5	1	6
Total		23	182	34	239

5.3.4 Baseline VIA Results for HIV Population Screened and Cryotherapy Done

Table 5.4 below shows that out of the total screened population, only 7.9% (*n*=19) self-reported to be HIV negative. The rest did not indicate their status, as this question was never asked during screening. This is serious nonconformity to cervical cancer screening guidelines, as HIV status has a role in determining the timing of the next rescreening. Two clients were VIA positive, and cryotherapy was indicated but not done because there were no trained personnel to do the cryotherapy or machines were unavailable. The patients were therefore referred to Embu level five hospital.

Table 4: Baseline VIA Results for HIV Population Screened and Cryotherapy Done

Variables	**N=239**	**Percentage (%)**
HIV status		
Negative	19	7.9
Positive	0	0.0
N/A	0	0
Not indicated	220	92.1
Cryotherapy done		
Yes	0	0.0
No	0	0.0
N/A	237	99.2
indicated	2	0.8
Reason for not doing cryotherapy		
N/A	237	99.2
No skills to do cryotherapy	2	0.8

5.3.5 Training needs prior to intervention

The study established that all the respondents had training on VIA and Cryotherapy. This was important to demonstrate that some form of prior training was done. However, as shown in Figure 5.4, the training occurred at different times. This implies that the nurses were not frequently trained, and they might lose out on new developments in cervical cancer screening, which might be more accurate and help to detect cancer at very early stages. This also showed that the skills for VIA had eroded over time.

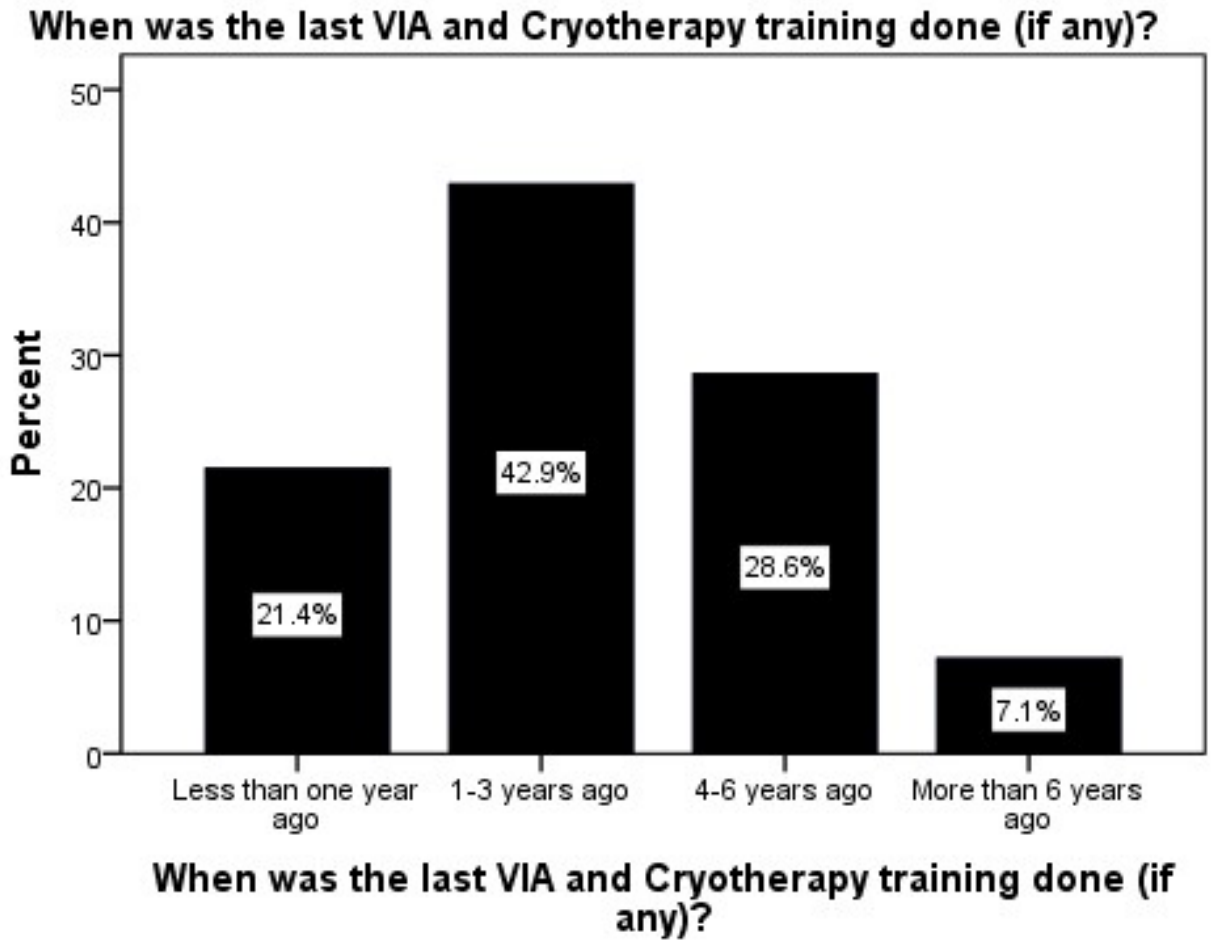

Figure 4: Period when the VIA and Cryotherapy Training was Conducted

5.3.5 Components of VIA training exposed to respondents prior to intervention

Table 5.5 below shows that upon examining whether there were components of didactic training (theory training) in VIA training, it was established that most respondents, 71.4% (*n*=10), said there were none. Most respondents (75%) said that practical training took more than

one hour, although there were no preceptors in the practical training of VIA, as reported by 91.7%. It was also established that all the respondents had no technical support after VIA training. This showed that most respondents had done on-the-job training without a theory component or a preceptor. Therefore, intensive training on various methods to conduct cancer screening would result in effective screening using VIA and a consequent reduction in cervical cancer-related mortality cases.

Table 5: Components of VIA training exposed to respondents prior to intervention

Variables	**Response**	**Frequency**	**Percentage (%)**
Whether there were components of didactic training (theory training) in the VIA training	Yes	4	28.6
	No	10	71.4
Duration of didactic training take (if any)	One day	2	50
	Two days	1	25
	3 days or more	0	0
Whether VIA training comprised of practical training with real-time clients	Yes	12	85.7
	No	2	14.3
Duration of practical VIAclinical training	Less than 1hr	2	16.7
	1hr or more	1	8.3
	1 day	9	75
Presence of preceptors in the practical training of VIA	Yes	1	8.3
	No	11	91.7
Technical support after VIA training	Yes	0	0
	No	14	100

5.3.6 Respondents' Perception of Skills to Perform VIA and Cryotherapy

The majority, 92.9% (*n*=13) of the respondents, felt they did not gain sufficient skills to perform VIA and Cryotherapy after the training before intervention.

The study further established why the respondents felt they did not gain sufficient skills to perform VIA and Cryotherapy. Figure 5.5 below shows that the major factors that made the healthcare workers feel they did not gain sufficient skills to perform VIA and Cryotherapy were insufficient on-the-job training (OJT), lack of practice after training, and insufficient training.

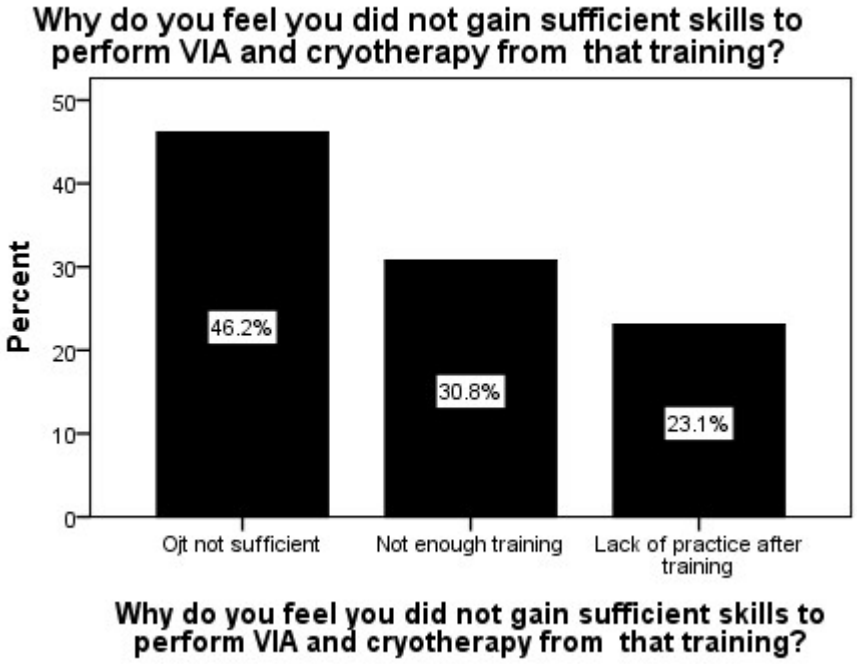

Figure 5: Reasons HSPs felt they lacked sufficient skills to perform VIA and Cryotherapy

Upon further probing done during the interviews among key informants, three themes emerged to support this;

Theme 1: Lack of training guidelines:

> *"We do not have our own VIA and cryotherapy training guidelines as a County, but we use the Ministry of Health Training guidelines" (Key informants 1,2,3). Practical training rarely happens due to a lack of machines and participants not getting hands-on practical clinical skills. The practical session sets a standard for diagnosing and treating precancerous lesions. Even with the theory, skill and proficiency in practicals are vital in reproductive health services. Trainers just want to train the theory and leave the nurses to practice independently; this could result in substandard patient care" (Key Informant 3).*

Theme 2: Few trainees:

> *"We have very few trained nurses. Initially, we were training the VIA/VILLI, and now with VIA, we have trained like 25. For now, we have low figures of those trained. With cryotherapy, it is only 25 who have been trained. This is a very small figure considering we have 2000 nurses in the County" (Key Informant 1).*

Theme 3: Inadequate skills to perform VIA:

> *"Our healthcare professionals do not have adequate skills to perform VIA, and I would recommend we teach theory and practical at the same time to impart competency skills on cervical cancer screening. After the theory, the practicals should follow in breakout practical stations with the mentorship of qualified cervical cancer screening professionals. Cryotherapy practicals should also be done at the same time so that theory can be backed up with real skills. Long-Acting contraceptives method should be combined with the VIA and cryotherapy practicals so that we do not have any missed opportunities" (Key Informant 2).*

5.4 Health service factors influencing uptake of VIA prior to intervention

In Table 5.6 it is evident that when examining the factors that affect the uptake of VIA it was discovered that just, over half of healthcare providers inform all their clients about the availability of VIA in their facilities. Others only inform their MCH/FP clients while some unfortunately forget to mention VIA. Whats interesting is that most of the respondents themselves had undergone VIA screening and had a partner who did well. Surprisingly many health facilities do not display information about cervical cancer screening on their service charter boards outside the facility. Moreover approximately half of the HSPs counsel their patients on VIA using aids until they are satisfied and have an understanding. The findings also indicate that most clients have to pay for both VIA and cryotherapy screenings.

To raise awareness, about VIA screening beyond Embus facilities we utilize approaches. These include engaging community health volunteers in community units, churches and schools as relying on recommendations, from clients through word of mouth. Some facilities even engage CHVs to promote awareness about VIA within the facility itself and, in the surrounding community. It is worth noting that a significant majority (85.7%) of community health workers, in Embu have not received any training or awareness programs related to VIA/VILLI community mobilization.

In conclusion: the cost of screening at 71.4%, the lack of awareness creation from service charter was at 57.1%, the lack of awareness creation from CHVs was at 64.3%, and only 50% of healthcare providers not giving sufficient counselling to clients, all led to low uptake of cervical cancer screening.

Table 6: Factors influencing VIA uptake

Variables	Responses	Frequency	Percentage (%)
How frequently do you inform clients at your clinic about the availability of VIA for cervical cancer screening?	I frequently communicate this information to everyone.	8	57.1%
	I specifically inform the MCH/FP clients.	4	28.6%
	There are occasions when I inadvertently neglect to inform them.	2	14.3%
Have you or your partner ever undergone VIA screening for cancer?	Yes	12	85.7%
	No	2	14.3%
If not what is the reason?	Fear of procedure	2	100%
	Anticipated discomfort	0	0
Is cervical cancer screening mentioned in the service charter board that is displayed outside the facility?	Yes	6	42.9%
	No	8	57.1%
How much time does it typically take to provide counseling to a woman who needs cervical cancer screening?	About 5 minutes	3	21.4%
	About 10 minutes	4	28.6%
	Until I am satisfied, she has understood	7	50.0%
Does the appearance of the health facility. How the VIA clinic is organized influence clients decision to utilize the service?	Yes	10	71.4%
	No	4	28.6%
Do women tend to be more inclined towards getting screened when they encounter a presented healthcare provider?	Yes	11	78.6%
	No	3	21.4%
Is there an use of visual aids in counseling clients about VIA within your facility?	Yes	9	64.3%
	No	5	35.7%
What is the level of awareness regarding VIA among staff members, within your facility?	Nurses during morning health education	1	7.1%
	Nurses, when attending to clients' other healthcare needs	8	57.1%
	Nurses during morning health education and when attending to clients' other healthcare needs	3	21.4%
	Nurses during morning health education and when attending to clients' other healthcare needs and community health workers	1	7.1%

Variables	Responses	Frequency	Percentage (%)
	Nurses, when attending to clients' other healthcare needs and Community health workers	1	7.1%
Whether charging VIA and cryotherapy affects uptake.	Yes	10	71.4%
	No	4	28.6%
If the cost of VIA screening or lack thereof is done when informing the client about the service.	Yes	7	50.0%
	No	7	50.0%
Methods of VIA screening awareness creation outside the facility.	CHVs in their community units	6	42.9%
	Word of mouth by clients already screened	4	28.6%
	CHVs in their community units, churches, and school and Word of mouth by clients already screened	1	7.1%
	CHVs in their community units, churches and Word of mouth by clients already screened	3	21.4%
Use of CHVs to create VIA awareness in the facility and at the community	Yes	5	35.7%
	No	9	64.3%
Training of CHVs in your facility on VIA/VILLI training and awareness creation.	Yes	2	14.3%
	No	12	85.7%

5.4.1 Other factors contributing to Low VIA uptake

Based on the insights presented in Figure 5.6 healthcare providers have identified reasons why VIA uptake's low. These include womens apprehension, towards speculum examination insufficient supplies to support the program women requiring consent from their husbands misconceptions about cancer within the community and a lack of awareness, among women regarding VIA screening.

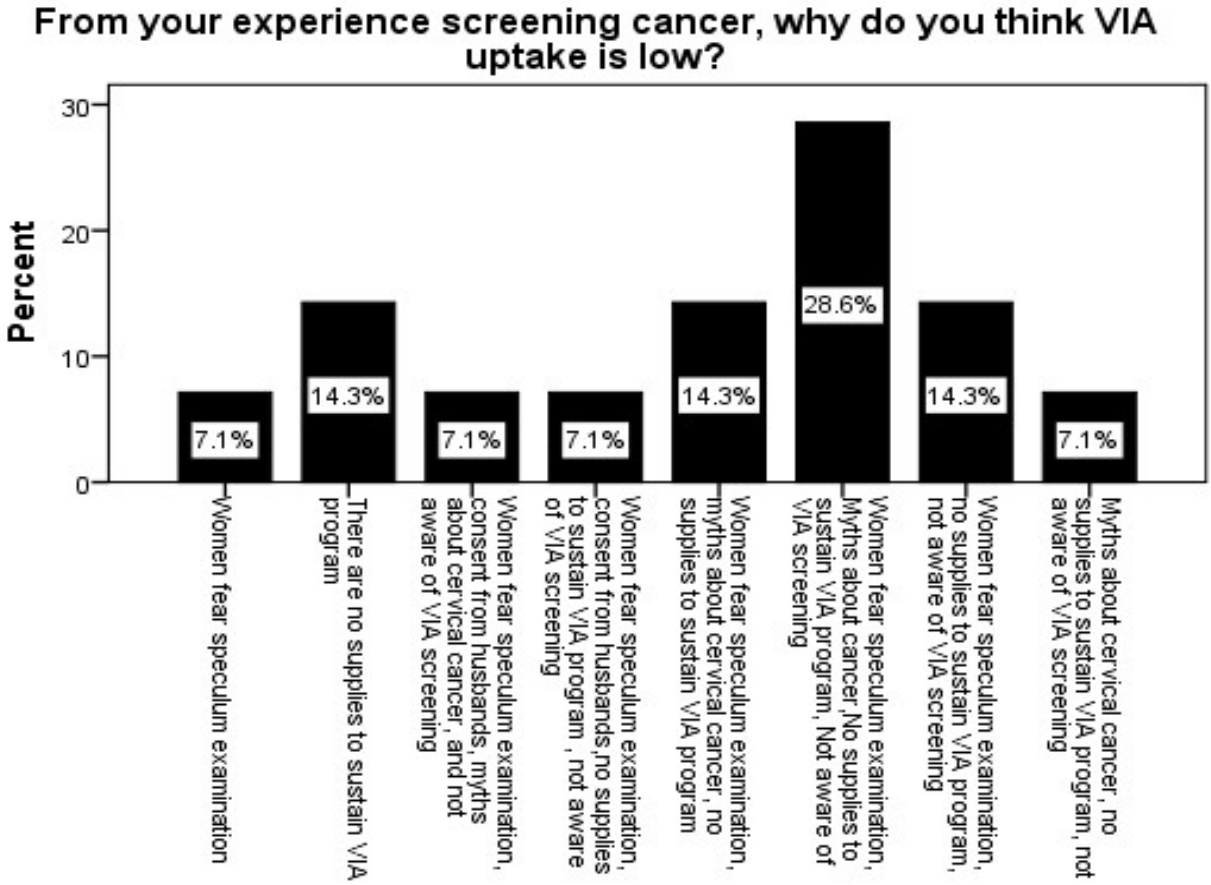

Figure 6: Reasons for Low VIA Uptake

Under this objective, two themes emerged from among key informants:

Theme 1: Staff Competency

"Capacity and competency issues are some of the hindrances to scale up uptake of cervical cancer screening. Most staff are not trained, and hence they do not take the initiative to screen clients. Resources, like the lack of supplies used in VIA and lugols iodine." (Key Informant 3).

Theme 2: Inadequate resources

"The stock-outs are a real challenge. Some machines are not actively used because no people have the skills to use them, like the cryotherapy machine. There is also a shortage of supplies and frequent stock-outs for VIA, and it takes a long to get these supplies back in stock" (Key Informant 2).

"We have 8 cryotherapy machines in Embu but only one is functional. So we do not have a single-visit approach for cervical cancer screening in as many facilities as we would want. Currently, it is only Embu level 5 hospital that we are having the single visit approach since it has a cryotherapy machine" (Key Informant 3). "Cost is a factor because some facilities charge VIA; most people will not afford that fee. Human resources is also a hindrance because many nurses are not trained on VIA." (Key Informant 1).

Theme 3: Low mobilization of clients for *VIA*

"There is low mobilization of clients for VIA. Healthcare professionals do not fully inform/create awareness in their patients; hence lesser clients show up for the service. Attitude on practice is also an issue. Some healthcare providers do not have the right attitude towards screening; this doesn't help in the uptake of the services" (Key Informant 3). "There are no good avenues for social mobilization for VIA and cryotherapy. For example, we need to organise medical camps and do intensive mobilization to increase uptake" (Key Informant 2).

5.5 Extent to which VIA screening guidelines are adhered to in the facilities prior to intervention

The study also aimed to evaluate how well healthcare facilities adhered to VIA screening guidelines. According to the findings provided in Table 5.7 most respondents expressed a preference, for using Zesta brand acid for VIA. Out of the three brands tested only American Garden had the recommended concentration of 3.5%. However it was observed that even though the acid used contained some level of acid it did not meet the recommended percentage, for VIA screening. Most healthcare providers applied the acid on the cervix for one or two minutes believing that using a cotton applicator or cotton ball would adequately cover the junction. Before applying acid as part of VIA, for women aged 25 49 years in Kenya it was essential to visualize this junction. However 50% of participants held the belief that women over the age of 50 might not qualify for VIA due, to their columnar junctions characteristics.

Table 7: VIA Procedure, Supplies and Guidelines

Variables	Responses	Frequency	Percentage (%)
What type of acid should one use for performing VIA?	*Zesta*	8	57.2%
	American Garden	3	21.4%
	Cloves	3	21.4%
Does the brand of acid used for VIA contain any percentage of acetic acid?			
	Yes	9	64.3%
What is the recommended percentage of acid, for performing VIA?	No	5	35.7%
	2%	9	64.3%
How long should the acetic acid be applied to the cervix?	3%	3	21.4%
	5%	2	14.3%
What size of cotton on an applicator stick is recommended for applying acid to the cervix?	1min	8	57.1%
	2min	4	28.6%
	3min	1	7.1%
Which age group of women in Kenya is eligible for VIA screening?	Bathing the cervix with acetic acid is sufficient	1	7.1%
Why do you think women above 50 years are not considered eligible, for VIA screening?	Enough to cover the cervical os	5	35.7%
	Enough to cover the SJC	9	64.3%
	Any size can be used	0	0.0%
What type of acid should one use for performing VIA?	Women of reproductive 15-49 years	13	92.9%
Does the brand of acid used for VIA contain any percentage of acetic acid?	Women of 25-49 years	1	7.1%
	Women of 30-49 years	0	0.0%
What is the recommended percentage of acid, for performing VIA?	The Kenya guidelines recommend that they should not be screened	2	14.3%
	Their SJC is not obvious	7	50.0%
How long should the acetic acid be applied to the cervix?	At that age, one is supposed to have a pap smear	5	35.7%
	Cervical cancer is common in women above 50 years	2	14.3%
	Yes	13	92.9%
	No	1	7.1%

5. 5.1 VIA Standard Procedure Observational Checklist

Before the training session we assessed the skills of fourteen healthcare workers using a checklist, for inspection with acetic acid (VIA). The checklist had two sections; preparation and the actual visual inspection. Each participants abilities were evaluated on a scale ranging from satisfactory to unsatisfactory based on how they followed guidelines and standard procedures. During the baseline evaluation data from twelve participants were considered, as two of them lacked the supplies to perform the procedures.

NB: It's worth noting that we didn't use a checklist for cryotherapy since six out of seven facilities lacked trained personnel in that area. Additionally there was a malfunctioning cryotherapy machine at Embu County referral hospital, which was supposed to have one trained staff member.

In Table 5.8 we observed that all participants rated the stage of removing and decontaminating the speculum by placing it in a bucket with water or a 0.5% chlorine solution for 10 minutes, as 'Very satisfactory.' This indicates execution of this step. However during the procedure certain steps were taken to assess the cervix, for any indications of cancer. This involved using a source to examine areas such as the cervical os, SCJ and transformation zone. Additionally a cotton swab soaked in a solution of 3 5% acid (vinegar) was applied to the cervix, for a duration of 2 minutes. The SCJ was carefully inspected for any raised and thickened patches or acetowhite epithelium while noting the size of any lesions present and reapplying vinegar if necessary, for an additional minute while ensuring clear visibility by removing any mucus or blood obstruction. It was observed that most participants did not perform these stages above a level indicating areas where intervention may be required.

Based on the checklist we used for observations we found that the participants lacked knowledge on how to identify SCJ. Additionally they didn't time the duration of contact, between the cotton applicator soaked in acid and their cervix. None of them had a watch to keep track of time. Furthermore they weren't familiar, with what an ACETOWHITE lesion looks like. The lighting source used to visualise the cervix ranged from participants' mobile phones to natural lighting from nearby windows and some cases, broken-down spotlights. This study established that most HSPs dabbed the cervix for a few seconds and then removed the cotton applicator stick from the cervix. They inspected the cervix; most were looking for shiny white spots. The test results were given to the client while still on the couch.

Table 8: Percentage Performance on VIA Abilities at Baseline Stage

VIA Performance Steps	VS	S	N	U	VU	N=12	Mean	SD	Remark
Likert scale	**5**	**4**	**3**	**2**	**1**				
Make sure all the required tools and materials are prepared beforehand.	3	7	2	0	0	12	4.08	3.61	S
Make sure you have a source of light nearby.	2	6	3	1	0	12	3.75	3.32	S
Clean your hands. Put on examination gloves.	10	1	0	1	0	12	4.67	4.22	VS
Examine the genitalia.	0	2	3	6	1	12	2.5	2.12	U
Adjust the speculum to get a view of the cervix.	3	5	3	0	1	12	3.75	3.39	S
Securely position the speculum in a position to visualize the cervix.	5	4	2	0	1	12	4.00	3.65	S
Adjust the source for visibility of the cervix.	3	4	4	1	0	12	3.75	3.34	S
Carefully examine the cervix, for any signs of changes.	0	0	3	8	1	12	2.17	1.67	U
To clean the cervix you can use a cotton swab to remove any secretions, blood or mucus.	1	3	1	6	1	12	2.75	2.48	N
Start by locating the SJC and transformation zone (TZ) using your reference point.	0	0	0	5	7	12	1.42	0.91	VU
Take a cotton swab soaked in 3 5% acid (vinegar). Gently apply it to the cervix, for a duration of 2 minutes.	0	0	0	5	7	12	1.42	0.91	VU
• During this time carefully examine the SCJ for any raised patches or thickened areas as acetowhite epithelium.	0	0	0	5	7	12	1.42	0.91	VU
If there is a lesion closely observe its borders. Check if it touches the SCJ. Make note of its size.	0	0	6	5	1	12	2.42	1.96	U
	12	0	0	0	0	12	5.00	4.47	VS
	8	2	1	1	0	12	4.42	4.00	VS
If necessary you can reapply vinegar for a minute. Afterwards use another cotton swab to clear away any mucus or blood that may obstruct your view. Take	2	4	5	1	0	12	3.58	3.16	S

another look, at the SCJ to ensure inspection.	1	9	1	1	0	12	3.83	3.37	S

Likert Scale

1= Very Unsatisfied (VU)
2= Unsatisfied (U)
3= Neutral (N)
4= Satisfactory (S)
5= Very Satisfactory (VS)

5.6 Intervention phase: Effectiveness of VIA and cryotherapy Clinical Training

The participants were taken through 6 days of training at Dallas Dispensary, two days of didactic training and four days of clinical training that took the form of a clinical campaign, where every two participants were allocated one preceptor. WHO recommends ten training days, and ACCP recommends 5-10 training days. It is important to note that Theory training was initially supposed to be three days and clinical training four days, totalling seven days. However, the county could only release the healthcare practitioners for six days; hence the Theory training period was revised to 2 days and clinical training four days, totalling six days. Dallas dispensary CHVs did social mobilization for the 4-day clinical campaign that took the form of a medical camp. This was the form of community mobilization chosen by this study; however, other options can be explored.

5.6.1 VIA and Cryotherapy Clinical Pre/Post-Training Test

During the training session all participants were required to take a test both after the training. In Figure 5.7 you can observe the performance of fourteen healthcare providers who underwent VIA and Cryotherapy clinical training during the theory session. This graph displays how well these healthcare workers were prepared to carry out VIA and Cryotherapy procedures after completing the training. Prior, to the training participants achieved a score of 53.3% with a deviation of 10.18. The lowest score recorded was 41% while the highest reached 76%. However there was an improvement in performance after the training with respondents achieving a score of 90.5%. The standard deviation decreased to 7.43. The lowest score observed was now at 76% while some participants even achieved a score of 100%. The results from both pretraining and

training tests clearly demonstrate that this training had a positive impact, on healthcare workers resulting in improved performance after completing the program.

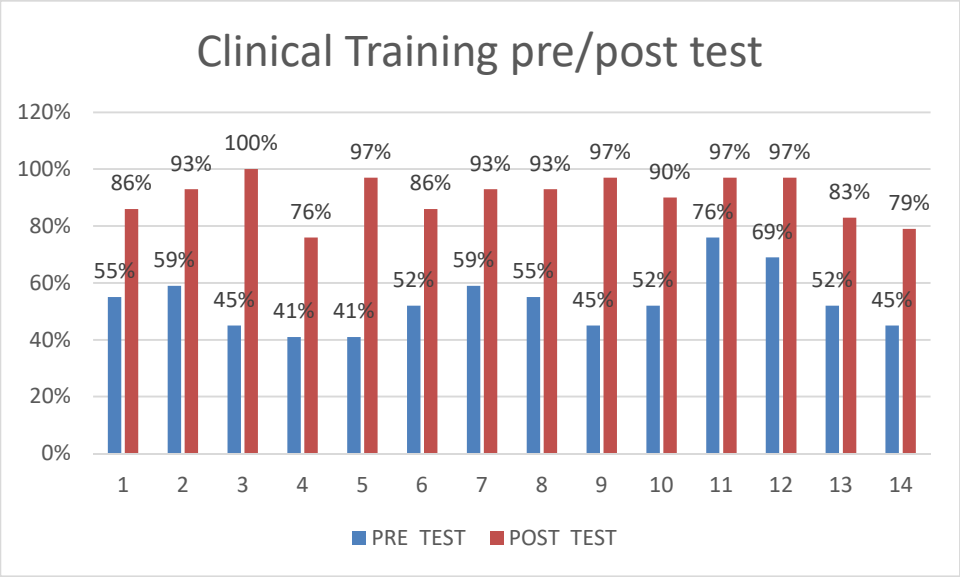

Figure 7: VIA and Cryotherapy Training Pre/Post-Test Performance

5.6.1.2 Pre-test and post-test t-test comparison

To assess the effectiveness of the didactic training paired sample t-test was used to evaluate whether there was a significant difference between the pre-training test and post-training test results using a significance level $a = .05$. The study found that there was a significant average difference between pre-training test and post-training test, with $t_{13} = -13.612$, and $p < 0.001$. The average post-training test score was 37.2 higher than the pre-training test score at 95% confidence interval [-43.12, -3131]. This shows that didactic training had a positive impact on healthcare providers.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PRE-TEST & POST-TEST	14	.358	.209

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE-TEST	53.2857	14	10.17862	2.72035
	POST-TEST	90.5000	14	7.42915	1.98552

Paired Samples Test

		Paired Differences					t	df	Sig.(2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE-TEST POST-TEST	-37.21429	10.22951	2.73395	-43.12063	-31.30794	-13.612	13	.000

Figure 8: t-test for pretest and post-test

5.6.2 Midcourse Image Assessment Score for Midcourse Evaluation

During the intervention stage, the healthcare providers had a midcourse image assessment test where they were to indicate the VIA findings and the management plan. The assessment included looking at images of cervixes with positive, negative and suspicious cancer results, making a diagnosis, and listing the management plan. This assessment was done on day two of the Theory training. Figure 5.9 shows that the respondents had a mean score of 87.9%. According to Jhpiego, a score of 80% in mid-course evaluation is good enough.

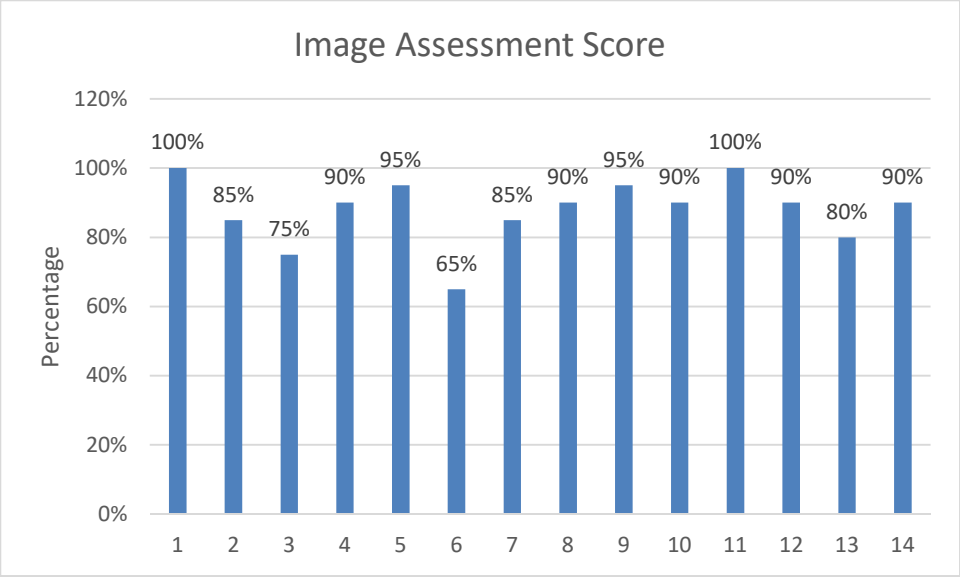

Figure 9: Image Assessment Score for Midcourse Evaluation

5.6.3: Clinical Campaign- practical cervical cancer screening Phase

During the four days clinical campaign intervention phase, cervical cancer screening data were collected from two hundred and sixteen women/clients with a mean age of 33.79 ±6.85, ranging between 20 and 49 years. Clients below 25 years were only screened if they were HIV positive. This clinical campaign had 14 participants screen 216 women for cervical cancer; every two participants had their own screening room and were assigned one preceptor. As shown in Table 5.9, most of the clients for VIA were aged between 25-41 years. The majority of VIA clients were married, at 75.9%. The married women/clients may have been prompted and supported by their husbands to go for cancer screening. Self-reported HIV-negative clients were 75.9%, HIV-positive 7.4%, and those with unknown status were 16.7%. Out of 37 patients who had precancerous lesions, 36 were treated on-site with cryotherapy, with only one having the treatment postponed due to PID. This indicated a treatment rate of 97.3%, which aligns with the 90% recommended treatment rate by WHO.

Table 9:Clinical Campaign Participants' Data

Variables	N=216	Percentage (%)
Age		
Below 25 years	2	0.9
25-32 years	105	48.6
33-41 years	77	35.6
42-49 Years	32	14.8
Type of screening		
Initial screening	151	69.9
Routine screening	65	30.1
Marital status		
Married	164	75.9
Single	27	12.5
Separated	12	5.6
Divorced	13	6.0
HIV status		
Negative	164	75.9
Positive	16	7.4
Unknown	36	16.7
Cryotherapy done		
Yes	36	16.7
No	1	0.5
N/A	179	82.9
Reason for not doing cryotherapy		
Rx PID	1	0.5
N/A	215	99.5
Agree with Preceptor		
Yes	206	95.4
No	10	4.6

5.6.3.1 VIA positivity rate during Clinical Campaign/intervention phase

According to the results in Figure 5.10, the positivity rate of the sampled population was 17.1% (*n*=37), while the suspicious cases were 0.5% (*n*=1). Most participants who tested positive for VIA had cryotherapy done while those who did not (*n=1*) were treated for pelvic inflammatory disease (PID). PID diagnosis was made following a bimanual examination after cervical cancer screening. It is contraindicated to treat women with PID with cryotherapy; they should be put on a PID treatment regime first for two weeks before they can be rescreened and cryotherapy done.

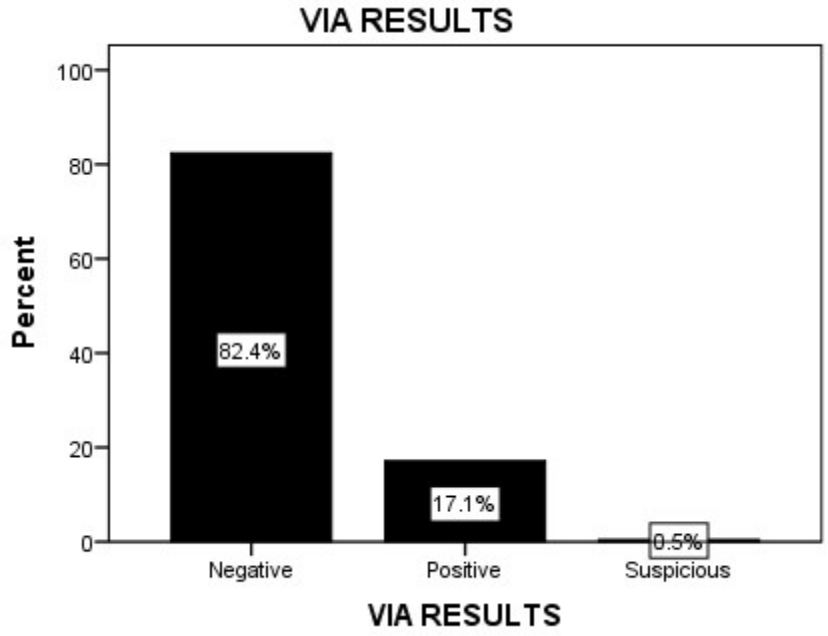

Figure 10: VIA Results for Clinical Campaign

5.6.4 Cohens kappa co-efficiency (K) during the intervention phase

To ensure a correct diagnosis, the participants made an initial diagnosis after the screening, and the preceptor would look at the same cervix to make their own diagnosis. The preceptor would agree with the participants' initial diagnosis or not. The clients, however, were given the correct diagnosis as reached by the preceptor and the participant. The following figures and tables show comparisons of these findings. The findings in Table 5 and 10-13 show that the agreement ranged from moderate to near perfect as the days progressed, with the first day having the least while the fourth day had the near-perfect K value. This strongly shows the effects of clinical training on VIA and the importance of using an expert on cervical cancer screening as a preceptor.

5.6.4.1 Kappa co-efficient of VIA Results for Clinical Campaign

The study used Cohen's Kappa coefficient (k) to evaluate the level of agreement on VIA results between the participants and the preceptor during the intervention stage. The agreement was moderate to perfect (0.5 – 1) for the four days of the clinical campaign, with day one indicating moderate agreement (k=0.5), day two and three having almost perfect agreement (k= 0.8, k=0.9 respectively), while day four had a perfect agreement with k=1.

*Table 10: Cross Tabulation of 'Agree with preceptor' * 'VIA results' (day one)*

AGREE WITH PRECEPTOR * VIA RESULTS Count				
		VIA RESULTS		**Total**
		Negative	**Positive**	
AGREE WITH PRECEPTOR	Negative	34	2	36
	Positive	4	5	9
Total		38	7	45

Probability of agreement (P_o) = 39/45

= 0.87

Probability of random agreement (P_e) = 0.70

Cohen's kappa (K) = 0.54

*Table 11: Cross Tabulation of 'Agree with preceptor' * 'VIA results' (day two)*

Cross Tabulation of 'Agree with preceptor' * 'VIA results' (day two) **AGREE WITH PRECEPTOR * VIA RESULTS Crosstabulation Count**					
		VIA RESULTS			Total
		Negative	Positive	Suspicious	
AGREE WITH PRECEPTOR	Negative	41	1	0	42
	Positive	2	8	0	10
	Suspicious	0	0	1	1
Total		43	9	1	53

Probability of agreement (P_o) = 50/53

= 0.94

Probability of random agreement (P_e) = 0.67

Cohen's kappa (K) = 0.82

*Table 12: Cross Tabulation of 'Agree with Preceptor' * 'VIA results' (day three)*

AGREE WITH PRECEPTOR * VIA RESULTS Crosstabulation				
Count				
		VIA RESULTS		Total
		Negative	Positive	
AGREE WITH PRECEPTOR	Negative	55	0	55
	Positive	1	10	11
Total		56	10	66

Probability of agreement (P_o) = 65/66

= 0.98

Probability of random agreement (P_e) = 0.73

Cohen's kappa (K) = 0.94

*Table 13: Cross Tabulation of 'Agree with Preceptor' * 'VIA results' (day four)*

AGREE WITH PRECEPTOR * VIA RESULTS Crosstabulation				
Count				
		VIA RESULTS		Total
		Negative	Positive	
AGREE WITH PRECEPTOR	Negative	41	0	41
	Positive	0	11	11
Total		41	11	52

Probability of agreement (P_o) = 52/52

= 1

Probability of random agreement (P_e) = 0.67

Cohen's kappa (K) = 1

*Table 14: Cross Tabulation of 'Agree with preceptor' * 'VIA results' (general results)*

AGREE WITH PRECEPTOR * VIA RESULTS Crosstabulation

Count

		VIA RESULTS			Total
		Negative	Positive	Suspicious	
AGREE WITH PRECEPTOR	Negative	171	3	0	174
	Positive	7	34	0	41
	Suspicious	0	0	1	1
Total		178	37	1	216

Over the four days of clinical training, the Cohen Kappa co-efficient average was 0.84 (near perfect agreement, as shown in Table 5.14 above.

Probability of agreement (P_o) = 206/216

= 0.95

Probability of random agreement (P_e) = 0.69

Cohen's kappa (K) = 0.84

5.6.5 Sensitivity and Specificity during Intervention Phase and Post-Training Phase

Figure 5.11 below shows the sensitivity and specificity of VIA during the four days in the intervention phase. From the figure, as the training progressed, the sensitivity and specificity percentages increased, emphasising the importance of preceptors in clinical training.

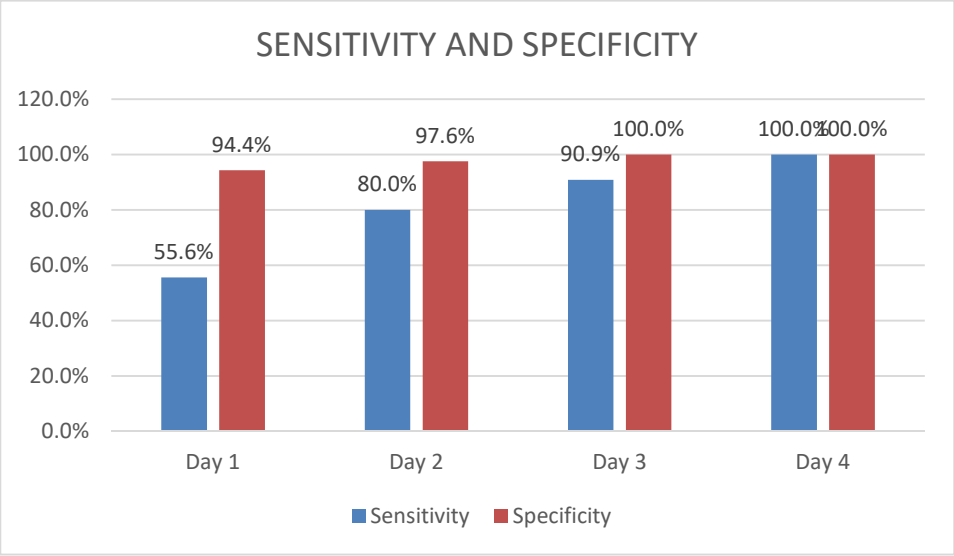

Figure 11: Sensitivity and Specificity during Clinical Training/Campaign Stage

Figure 5.12 below shows that the post-training phase had high sensitivity and specificity than the intervention/campaign/clinical training stage. Due to the subjective nature of VIA, HSPS need to do many screens to master the skill of making a correct diagnosis; this improves confidence in VIA diagnosis over time.

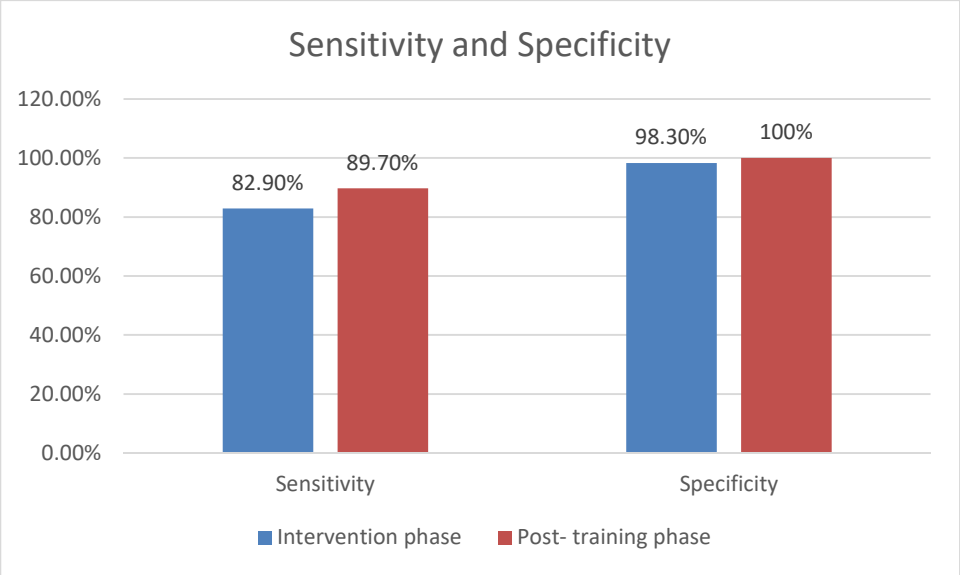

Figure 12: Comparison of sensitivity and specificity in intervention and post-training phase

5. 6.5 Relationship between the VIA Results and HIV Status of the Client

The results in Tables 5.15 and 5.16 below show a significant relationship between VIA results and the HIV status of the client, p = 0.001. The Spearman's correlation inferred a weak positive correlation between the two variables with r_s = 0.121 and p=0.005. The study also revealed a significant relationship between age and VIA results with p= 0.000. However, Spearman's correlation showed no correlation between the variables with r_s = 0.002 and p=0.067.

Table 15: Chi-square Test

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.602[a]	4	.001
Likelihood Ratio	10.509	4	.033
Linear-by-Linear Association	1.905	1	.168
N of Valid Cases	216		

a. Four cells (44.4%) have an expected count of less than 5. The minimum expected count is .07.

Table 16: Spearman's Correlation

Correlations

			VIA RESULTS	HIV STATUS
Spearman's rho	VIA RESULTS	Correlation Coefficient	1.000	.121
		Sig. (2-tailed)	.	.076
		N	216	216
	HIV STATUS	Correlation Coefficient	.121	1.000
		Sig. (2-tailed)	.005	.
		N	216	216

5.7 Effectiveness of clinical training in the identification of precancerous lesions in health facilities

According to Table 5.17 below, after the training, the fourteen healthcare providers collected data from 434 women screened in their respective facilities; 10.1% (*n*=44) from Dallas Dispensary, 25.3% (*n*=110) from Embu provincial hospital, 17.1% (*n*=74) from Ishiara Level Four Hospital, 9.9% (*n*=43) from Kianjokoma Health Centre, 8.8% (*n*=38) Kiritiri Health Centre, 14.3% (*n*=62) from Runyenjes Level Four Hospital, and 14.5% (*n*=63) from Siakago Level Four Hospital. The mean age of the participants was 34.65 ±7.05); the age ranged from 19 years to 49 years old, with 3.0% (*n*=13) being below 25 years and 97.0% (*n*=421) ranging between 25-49 years. On marital status, 71.2% (*n*=309) were married, 24.4% (*n*=106) were single, 3% (*n*=13) were separated, and 1.4% (*n*=6) had divorced.

Table 17: Cervical cancer screening in trained facilities

Variables	n=434	Percentage (%)
Health Facility		
Dallas Dispensary	44	10.1
Embu provincial hospital	110	25.3
Ishiara Level Four Hospital	74	17.1
Kianjokoma Health Centre	43	9.9
Kiritiri Health Centre	38	8.8
Runyenjes Level Four Hospital	62	14.3
Siakago Level Four Hospital	63	14.5
Age		
Below 25 years	13	13
25-32 years	170	39.2
33-41 years	166	38.2
42-49 Years	85	19.6
Type of screening		
Initial screening	320	73.7
Routine screening	111	25.6
Treatment visit	3	0.7
Marital status		
Married	309	71.2
Single	106	24.4
Separated	13	3.0
Divorced	6	1.4
VIA results		
Negative	372	85.7
Positive	61	14.1
Suspicious	1	0.2
HIV status		
Negative	355	81.8
Positive	66	15.2
Unknown	13	3.0
Cryotherapy done		
Yes	48	11.1
No	13	3.0
N/A	373	85.9
Reason for not doing cryotherapy		
No machine	13	3.0
N/A	421	97.0
Agree with Preceptor		
Yes	427	98.4
No	7	1.6

Three types of screening visits were used in this study, with 'initial screening' being mostly applied with 73.7% (320), followed by 'Routine screening' covering 25.9% (*n*=111) and lastly, treatment visits with 0.7% (*n*=3). Initial screening means it was a woman's first time to be tested for VIA. Routine meant it was a subsequent time, and treatment visit meant it was a precancerous lesion referred from elsewhere and had come to be re-screened and treated. The VIA results, as indicated by Figure 5.10, show that the sampled population's positivity rate was low while the negativity rate was high. The majority of the participants were HIV-negative. This study's positivity rate coincides with the WHO VIA positivity rate, which falls between 10-15% in any given population (WHO 2010). The majority of the participants who were VIA positive had Cryotherapy done. Where Cryotherapy was not done since there was no machine in the facility, the clients/women were referred to a facility with functional

5.7.1.VIA positivity rate post-training phase

Post-training phase, the VIA positivity rate was 14.1%. This was from the 434 women whom the participants screened. Suspicious for cancer cases were 0.2%, and 85.7% of clients were negative for VIA. This is illustrated by figure 5:13 below.

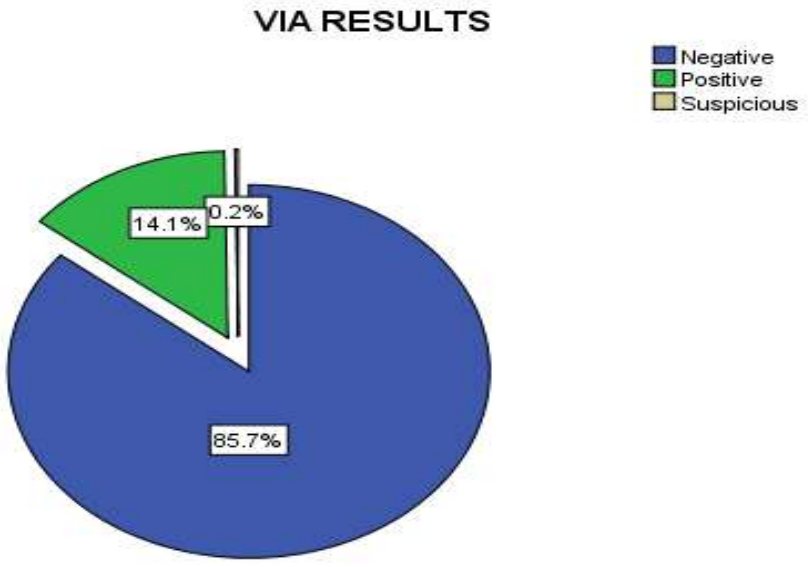

Figure 13: Post-Training VIA Results

5.7.2 Comparison between age and VIA results post-training

Table 5.18 below shows that most VIA clients during the intervention stage were aged between 25-32 years, and most VIA-positive cases were distributed between 25 and 49 years. This shows that HSPs mostly adhered to age-related VIA screening guidelines. Screening below 25 years was only done for the HIV-positive population.

Table 18: Age Groups and VIA Results

		VIA RESULTS			Total
		Negative	Positive	Suspicious	
Age grouped	Below 25 years	12	1	0	13
	25-32 years	143	26	1	170
	33-41 years	141	25	0	166
	42-49 years	76	9	0	85
Total		372	61	1	434

5.7.3 Cohen's Kappa coefficient (K) during the post-training phase

Using Cohen's Kappa coefficient (K), the study investigated the agreement with VIA results between the participants and preceptors during the four-month follow-up period. Using preceptors who have experienced experts in VIA ensured the effectiveness of the diagnosis. Cohen's Kappa statistics showed that the participants and preceptors had a perfect agreement with k= 0.9, as shown in Table 5.19 below.

Table 19: Cross Tabulation of Agreement of VIA Findings between Participants and Preceptors Post Training

AGREE WITH PRECEPTOR * VIA RESULTS Crosstabulation

Count

		VIA RESULTS			Total
		Negative	Positive	Suspicious	
AGREE WITH PRECEPTOR	Negative	365	0	0	365
	Positive	7	61	0	68
	Suspicious	0	0	1	1
Total		372	61	1	434

Probability of agreement (P_o) = 427/434

= 0.98

Probability of random agreement (P_e) = 0.74

Cohen's Kappa (K) = 0.93

5.7.4 Sensitivity and specificity during the post-training phase

The sensitivity post-training phase was 89.71%, and the specificity was 100%, as shown in Table 5:20 below.

Table 20: Tabulation of sensitivity and specificity post-training phase

		VIA RESULTS		Total
		Negative	Positive	
AGREE WITH PRECEPTOR	Negative	365	0	365
	Positive	7	61	68
Total		372	61	433

Sensitivity = (61/68) * 100

= 89.71%

Specificity = (365/365) * 100

= 100%

5.8 Effectiveness of VIA Training on Improving Uptake of VIA in Selected Facilities

The data in the baseline level was collected for one year, the campaign phase data was collected within four days, and the post-training data was collected for four months. Considering the amount of VIA data collected and the period used to collect it, it was clear that training healthcare workers on VIA uptake was positively impacted. In the baseline phase, 239 women were screened over 12 months. In the intervention phase, 216 women were screened in four days; in the post-training phase, 434 were screened over four months. The more confident the healthcare workers are about the VIA screening, the more they are likely to mobilise clients for uptake, and a higher treatment rate could occur. Figure 5.14 shows that the data steadily increased after training. The involvement of CHVs during the campaign phase and post-training phase also improved uptake.

One theme emerged from the key informants:

Theme 1: Training improves staff competency

> *"The more the healthcare providers are trained, they will have the initiative to screen since they feel competent. This way, they do not miss any opportunities to screen for cervical cancer." (Key Informant 2). "Training has a great role in increasing VIA uptake because when the knowledge and skill are there, practising becomes easier and enjoyable." (Key Informant 3).*

This means that training on screening and sharpening screening skills among healthcare workers increases cervical cancer screening uptake.

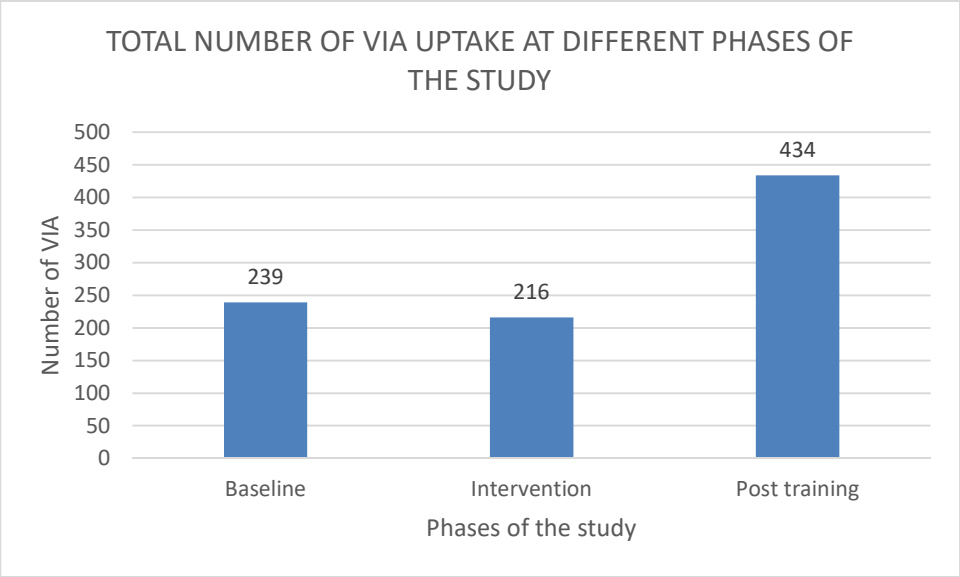

Figure 14: Comparison of VIA Uptake during the Three Phases of Study

5.9 Effectiveness of VIA Training on Adherence to VIA Guidelines

The Participants were also assessed on their ability to follow VIA and Cryotherapy guidelines that influenced their diagnosis.

5.9.1 VIA and Cryotherapy Observational Checklist Evaluation

After completing four days of training the group of fourteen health workers returned to their facilities to put their newly acquired skills into practice. Over the course of four months they were closely monitored by a preceptor as they conducted screenings, for women for VIA. Their ability to adhere to guidelines and diagnose VIA was assessed through the use of checklists for VIA and cryotherapy observations. The participants performances were categorized as either

" satisfactory" or "very unsatisfactory " indicating whether they successfully executed the procedures according to established guidelines and standard protocols for VIA or cryotherapy treatment of lesions. Conversely an "unsatisfactory" classification meant that the test did not meet the required standards, for the procedure.

5.9.1.1 VIA Evaluation

The evaluation checklist, for VIA was divided into two categories; preparation and visual inspection with acid. In Table 5.21 below we can see that there was an improvement in the abilities of health workers to perform VIA after the training compared to their adherence to guidelines, before the training. All participants followed the VIA guidelines at every stage of the procedure.

Table 21: Percentage Performance on VIA Abilities after the Training

VIA Performance Steps	**VS**	**S**	**N**	**U**	**VU**	**N=14**	**MEAN**	**SD**	**Remark**
Likert scale	**5**	**4**	**3**	**2**	**1**				
Preparation									
Ensure that all the required tools and supplies are prepared and readily available.	14	0	0	0	0	14	5.00	4.47	VS
	14	0	0	0	0	14	5.00	4.47	VS
Make sure there is lighting for the examination.	10	4	0	0	0	14	4.71	4.21	VS
	13	1	0	0	0	14	4.93	4.41	VS
Thoroughly wash your hands. Put on examination gloves.	12	2	0	0	0	14	4.86	4.34	VS
	13	1	0	0	0	14	4.93	4.41	VS
Carefully examine the area.	11	3	0	0	0	14	4.79	4.28	VS
	12	2	0	0	0	14	4.86	4.34	VS
Insert and adjust the speculum to obtain a clear view of the cervix.	14	0	0	0	0	14	5.00	4.47	VS
	14	0	0	0	0	14	5.00	4.47	VS
Securely position the speculum in a state to visualize the cervix.	14	0	0	0	0	14	5.00	4.47	VS
•	13	1	0	0	0	14	4.93	4.41	VS
Adjust the source for visibility of the cervix.	10	2	0	0	0	12	4.83	4.32	VS
	14	0	0	0	0	14	5.00	4.47	VS
Conduct an examination of the cervix checking for any signs of cancer.	10	2	0	0	0	12	4.83	4.32	VS
	13	1	0	0	0	14	4.93	4.41	VS

Use a cotton swab to remove any secretions, blood or mucus from the cervix.	13	1	0	0	0	14	4.93	4.41	VS

5.9.1.2 Cryotherapy Evaluation

The Cryotherapy evaluation checklist was subdivided into four major categories: pre-cryotherapy counselling, getting ready, cryotherapy, and finally, post-cryotherapy tasks. Table 5.22 shows that the cryotherapy participants strictly conformed to the set guidelines, with all steps being very satisfactorily performed. This implied the positive effect of training VIA and cryotherapy in didactic and clinical components.

Table 22: Percentage performance on cryotherapy after the Training

VIA Performance Steps	**VS**	**S**	**N**	**U**	**VU**	**N=14**	**MEAN**	**SD**	**Remark**
Likert scale	**5**	**4**	**3**	**2**	**1**				
PRE-CRYO THERAPY COUNSELLING									
First lets discuss why the recommended treatment is necessary and provide an explanation of the procedure. It's important to ensure that she is not pregnant, before proceeding. We should also have a conversation about the side effects of the treatment. Discuss alternative options apart from cryotherapy.	14	0	0	0	0	14	5.00	4.47	VS
	11	3	0	0	0	14	4.79	4.28	VS
Next we need to ask for her consent for the treatment and have her sign the consent form. Lets make sure we are well prepared by checking if we have all the supplies, including the cryotherapy instrument and CO2 gas. If needed assist her in emptying her bladder before helping her onto the examination table.	14	0	0	0	0	14	5.00	4.47	VS
	14	0	0	0	0	14	5.00	4.47	VS
Before beginning it's crucial to wash our hands and put on gloves that are either examination or high level disinfected surgical gloves. Lets									VS

VIA Performance Steps	VS	S	N	U	VU	N=14	MEAN	SD	Remark
Likert scale	**5**	**4**	**3**	**2**	**1**				
arrange all our instruments and supplies on a napkin or a level disinfected tray.									
	13	1	0	0	0	14	4.93	4.41	VS
Now lets move on to the cryotherapy procedure. If required cover the speculum with a lubricated condom by cutting off its tip. Insert the speculum carefully. Adjust it to ensure a view of the entire cervix.	10	4	0	0	0	14	4.71	4.21	VS
	10	4	0	0	0	14	4.71	4.21	VS
Using a swab clean the cervix. Identify areas such as cervical os and SCJ. Apply 3 5% acid to examine any VIA lesions for 2 minutes. Once confirmed that cryotherapy is appropriate for treating these lesions attach the cryotip onto one end of the probe.	14	0	0	0	0	14	5.00	4.47	VS
	14	0	0	0	0	14	5.00	4.47	VS
To test its functionality point the probe towards a direction (like at ceiling). Press freeze button for 1 second followed by defrost button for another second.									
	11	3	0	0	0	0	4.79	4.28	VS
Finally apply pressure with cryotip directly on cervix as, per guidelines.	14	0	0	0	0	0	5.00	4.47	VS
Chill the cervix, for a duration of 3 minutes. Check the cervix to make sure there is a white ice ball formed. Wait until the tip separates from the cervix.	11	3	0	0	0	0	4.79	4.28	VS
Wait for another 5 minutes. Repeat the process. Close the valve on the cylinder.	11	3	0	0	0	0	4.79	4.28	VS
Examine the cervix, for any signs of bleeding. If necessary apply pressure using a clean cotton swab.	14	0	0	0	0	0	5.00	4.47	VS
First lets discuss why the recommended treatment is necessary and provide an explanation of the procedure. It's important to ensure that she is not pregnant, before proceeding.	12	2	0	0	0	0	4.86	4.34	VS

VIA Performance Steps	VS	S	N	U	VU	N=14	MEAN	SD	Remark
Likert scale	**5**	**4**	**3**	**2**	**1**				
We should also have a conversation about the side effects of the treatment. Discuss alternative options apart from cryotherapy.	11	3	0	0	0	0	4.79	4.28	VS
After using the speculum place it in a bucket containing water or a 0.5% chlorine solution, for about 10 minutes to ensure decontamination. Make sure to clean and perform high level disinfection (HLD) on the cryotherapy tip well.	12	2	0	0	0	0	4.86	4.34	VS
Next decontaminate the source, cryo unit, tubing and regulator using either a 0.5% chlorine solution or alcohol.	14	0	0	0	0	0	5.00	4.47	VS
	13	1	0	0	0	0	4.93	4.41	VS
Dispose of your gloves properly. Thoroughly wash your hands before drying them.	10	4	0	0	0	0	4.71	4.21	VS
	13	1	0	0	0	0	4.93	4.41	VS
Before helping the woman sit up get down from the table and dress herself check if she is experiencing cramping.	11	3	0	0	0	0	4.79	4.28	VS
	13	1	0	0	0	0	4.93	4.41	VS

5.10 Thematic analysis from key informants and emerging themes

This study utilised qualitative data from key informant interviews. Three Key informants were interviewed due to their vast knowledge of cervical cancer. They were the County Nursing officer, County non-communicable diseases coordinator and County oncology nurse. They had a set of questions to give an insight into a few study objectives. The themes are as represented in Table 5:23 below.

Table 23: Thematic analysis

Objective one: To determine the proportion of cervical pre-cancer positivity rate in selected facilities in Embu County prior to intervention		
Skills to Perform VIA and Cryotherapy	**Theme**	**Sub-theme**
	Lack of training guidelines	• Lack of VIA and cryotherapy training guidelines • Lack of machines for practical training • Trainers just want to train the theory
	Few trainees on VIA and Cryo	• Few trained nurses • Only 25 out of 2000 are trained
	Inadequate skills to perform VIA	Healthcare professionals lack adequate skills to perform VIA
Objective two: To assess HSP factors influencing the uptake of VIA in selected health facilities in Embu County prior to intervention		
Factors contributing to low VIA uptake	**Theme**	**Sub-theme**
	Staff Competency	Most staffs lack VIA skill
	Inadequate resources	• Lack of supplies that are used in Visual inspection • Machines breakdown • Screening costs
	Low mobilization of clients for VIA	• HCPs do not create awareness in their patients • HCPs' negative attitude towards screening lack of avenues to do social mobilization
Objective six: To assess the effectiveness of VIA training in improving the uptake of VIA in selected facilities in Embu County.		
Effectiveness of VIA Training on improving VIA uptake	**Theme**	**Sub-theme**
	Training improves staff competency	• Trained HCPs are motivated to screen to test their skills • Training increases staff confidence

		hence VIA screening uptake

5.10.1 Main emerging themes

The main themes from the study were: lack of VIA and cryo training guidelines, few healthcare providers, few trainees on VIA, lack of skills to perform VIA, low clients mobilization for VIA and inadequate resources in terms of supplies and machines to do the VIA and cryotherapy procedures.

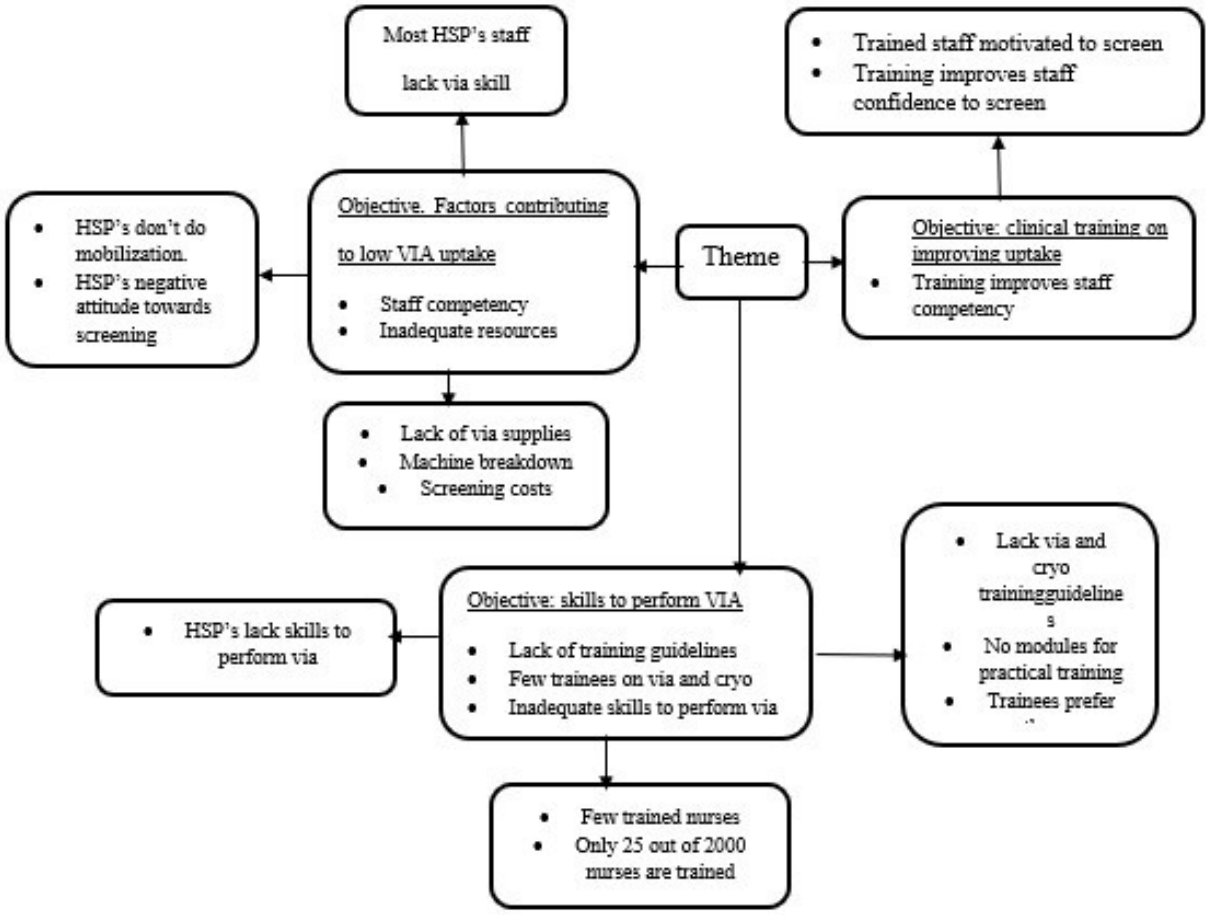

Figure 15: The main themes

Few trained nurses
Only 25 out of 2000 nurses are trained

CHAPTER 6
DISCUSSIONS OF STUDY FINDINGS

6.1 Introduction

This chapter presents discussions of the findings of this study and how they relate to the already existing findings. The discussion of the findings gives an insight into the study in relation to how cervical cancer screening was being done before training and how the same screening was done after training. Findings are presented according to the study objectives.

6.2 Proportion of Cervical Pre-Cancer Positivity Rate in Selected Facilities in Embu County Prior to Intervention

The study sought to determine the cervical precancer positivity rate in Embu County at the selected facilities. Prior to the study, the researcher had taken the overall county positivity rate from DHIS 2016, which was 1%. VIA positivity rate is a gold standard in VIA screening. The ability of the healthcare provider to correctly identify a precancerous lesion and treat it is a skill every cervical cancer screening personnel should have. From the baseline data collected from cervical cancer screening and treatment register one year retrospectively, the precancerous lesions rate was 0.8%, which was way below the 10-15% standard precancer positivity rate in any given population by WHO.

The low positivity rate can be attributed to the VIA skill erosion by healthcare providers. Most HSPs had only undergone on-job training, which was insufficient to pass the necessary VIA skills. The on-job trainers had weak skills, thus passing down ineffective screening techniques. The other factor that could be attributed to the low positivity rate could be the use of supplies that do not meet the standards recommended. This study established that acetic acid that was in use in most facilities did not meet the 3-5% threshold. It was impossible then for this kind of acetic acid concentration to produce any reaction with dysplastic cells of the cervix showing the acetowhite lesions that indicate a positive result of VIA. These findings of low positivity rate contrast those of Rong *et al.* (2015) in their China study, where the precancer positivity rate was 8.07%, which could be attributed to accelerated HPV vaccination compared to Kenya.

The study also investigated the demographic characteristics of the participating healthcare providers. On gender, the majority of the healthcare professionals were female. All 14 participants were nurses, implying that only nurses screen for cervical cancer. There is a need to incorporate other cadres who work in comprehensive care units, e.g. clinical officers. This will

enable screening more women within the eligible population and can help integrate VIA into other services within the healthcare delivery system. In terms of respondent qualifications, the majority were nursing diploma holders. Engaging all practising HSPs in the VIA screening programme is important.

This study showed gaps in filling the MOH cervical cancer screening and treatment register. Most data was missing on the type of VIA visit the clients had. HIV-positive women were not captured in the registers, which has a negative impact on their follow-up care after VIA test. Most women screened were between the ages of 25-49, even though few under 25 and over 50 were also screened. Findings partly agreed with those of Mohammad *et al.* (2017), that indicated that most women who volunteer for cancer screening were aged between 35-40 years. The baseline data further revealed that women between 16-66 years were screened using VIA, yet Kenyan guidelines stipulate this test for the age group 25-49 years unless HIV-positive women. As a woman ages past 49, the SJC recedes to the endocervix making VIA hard or unsatisfactory because the entire SCJ cannot be visualised. There was no woman HIV positive among the under 25 years of age screened. On HIV status self-reporting of the screened clients, this study found that healthcare workers do not indicate the HIV status of women, yet this is an important parameter to determine the management and follow-up of any screened woman. According to MOH VIA guidelines that align with WHO organisation guidelines, HIV-positive women should have a VIA screen at least once yearly. This is because they are more vulnerable to cervical cancer because of their compromised immunity.

All of the participants, in the study had received training, in cervical cancer screening methods, VIA and VILLI. Most respondents had training that had taken place 1-3 years ago by the time of data collection. While two respondents indicated the didactic training lasted for one day, one more indicated less than one day, and the other one more person did not indicate. The study established that prior training took the form of on-job training. On-job training (OJT) is one of the discouraged modes of training for VIA since most trainers are not experts, nor have they gone through a structured model of VIA training; they end up passing their inadequacies to the trainees. Most respondents had the OJT for a day, an insufficient practical experience to learn and master VIA skills. Most respondents did not have a preceptor in the clinical/practical training during this training. All the respondents did not receive any form of follow-up clinical mentorship after the VIA training. Preceptors in VIA are HSPs who have been intensively

trained to train for VIA, and they maintain their skills by continually practising VIA screening. They have VIA theory and clinical training skills and can precisely demonstrate the procedure for VIA and cryotherapy as they mentor new learners. This study established that preceptors are an important component in training for VIA, especially in low-resource setups where confirmation of VIA by cytology tests may not be feasible.

On whether the health professionals gained sufficient skills to practice VIA screening and precancerous lesions treatment, a majority said it was insufficient. OJT is inadequate as a training method; it was not generally enough, and there was a lack of clinical practice after theory training. These findings support those by (Asgary and Adongo 2016), who reported that although there were other training approaches, only a few were used, which did not fully equip health professionals with adequate skills to perform VIA and Cryotherapy. OJT is insufficient to train for VIA, and expert mentors should assist in teaching the VIA skill. However, according to Fouly *et al.* (2019), intensively trained nurses can perform VIA tests with acceptable accuracy regarding most steps of VIA with high sensitivity.

6.3 Health service factors influencing the uptake of VIA in health facilities in Embu County prior to intervention

Previous research has indicated that the uptake of inspection, with acid (VIA) for cervical cancer screening is still low in Kenya and some Sub Saharan countries. This study aimed to identify health service related factors that may influence or decrease the acceptability and utilization of VIA as a screening method. On how often the respondents made it known to clients about the availability of the VIA screening in their facilities, findings showed that most of the HSPs gave the clients this information all the time. In contrast, others did it whenever the opportunity arose. However, many HSPs often forget to inform their clients, which agrees with a study in Kitui by Hiuhu (2015), who established that most HSPs do not voluntarily inform their clients about VIA screening unless the client asks.

Creating VIA screening awareness in the facility needs to be increased as some clients may not know of the existence of such a service if healthcare providers do not make this information available. These findings also agree with Isabirye et al. (2020), which showed that women whom health professionals had sensitised had high knowledge of cancer screening, and uptake would be higher. Based on research conducted by Abiodun et al. (2014) it was found that the number of women who were aware of cervical cancer screening increased significantly rising

from a 2% to a 70%. The main reason, behind women not undergoing screening was their lack of awareness about it. Therefore raising awareness about cervical cancer screening plays a role, in motivating women to undergo the screenings.

The findings revealed that a majority of participants including both themselves and their female partners had indeed undergone cancer screenings. This suggests an acceptance level and self-awareness among healthcare providers regarding the importance of cervical cancer screening. However it was observed that a few facilities prominently displayed information about the availability of cervical cancer screening in their service delivery charters. Utilizing service delivery charters can be a way to create awareness among clients attending healthcare facilities about the availability of this service. Surprisingly more than half of the participating facilities had not utilized this method.

Additionally it was found that only half of the participants reported receiving counseling on VIA screening procedures until they were fully satisfied with their understanding. Proper counseling is crucial for VIA screenings as it allows clients to comprehend and address any misconceptions or rumors they might have heard about the procedure. The arrangement of VIA clinics should prioritize privacy to ensure client comfort and acceptance. Respondents also emphasized that creating a welcoming and visually appealing environment, within healthcare facilities can positively impact satisfaction. According to the majority of participants (78.6%) it was noted that women are more likely to be attracted to healthcare providers who maintain an polished appearance when it comes to screening.

The results align, with the findings of Ichimanya (2016) who discovered that trained healthcare service providers (HSP) showed improvement in grooming equipment usage and maintaining a conducive environment. Consequently patients expressed levels of confidence in them. The majority of respondents used aids during counselling sessions although 35.7% did not utilize aids. Visual aids play a role in VIA counselling as they help clients understand what to anticipate recognize the appearance of a negative cervix and differentiate it from an abnormal positive cervix or one that is suspicious for cancer. This visual representation facilitates. Ultimately enhances acceptance among clients. The use of cervical images when counselling a client on the expected results also arrays the anxiety created by misconceptions that precancerous lesions mean suspicion for cancer diagnosis.

The study revealed that 57.1% of nurses primarily raise awareness about VIA screening while addressing health concerns of their clients. This indicates emphasis on cervical cancer screening awareness across healthcare facilities. One facility employed CHVs to create awareness about VIA screening—an approach that could be leveraged to effectively mobilize communities within the hospitals population and increase, VIA uptake. The findings align with a study conducted by Hiuhu (2015) in Kitui County. In that study it was reported that 55% of healthcare providers seldom inform women about VIA/VILLI services. Moreover it's often the case that healthcare providers do not proactively provide cervical cancer screening services unless specifically requested by the client.

Regarding community mobilization outside of healthcare facilities it was observed that cervical cancer screening primarily occurs through the efforts of CHVs. This can be achieved through word of mouth recommendations, from clients who have already been screened or a combination of CHV efforts and referrals. While some facilities offer VIA and cryotherapy services of charge most respondents mentioned that there is a cost associated with these procedures. This cost has been identified as one of the barriers to the uptake of VIA screening. Since cervical cancer screening is a service aimed at promoting health many women may question the need to pay for it when they are not experiencing any symptoms. Interestingly it was found that approximately half of the participants mentioned the cost when discussing VIA services with their clients. In about 35.7% of cases CHVs were involved in creating awareness and providing education, on cervical cancer screening, at both facility and community levels. However in contrast 64.3% did not rely on CHVs for this purpose.

Furthermore the study revealed that only a small proportion of CHVs had received training related to VIA cervical cancer screening and mobilization efforts. On the hand a majority of them had not received any training in this area.

Acquiring knowledge about the subject is crucial as it helps individuals build confidence. This in turn can enhance the effectiveness of community health mobilizers in their efforts to engage both the community and healthcare facilities. By doing we can address any myths and misconceptions, within the community that might discourage people from undergoing cervical cancer screening.

The cost of the VIA procedure was another factor affecting uptake. When a woman must pay for a screening service, this may reduce the uptake because the woman is not sick or feeling

generally ill. This concurs with Hiuhu (2015), who stated that the availability of information on the cost of VIA and related costs affects the uptake of VIA is a known fact, and confounding financial implication of VIA and other opportunity costs lead to attrition. In countries like Bolivia, screening for cancer of the cervix for women aged 25 years to 49 years is at no cost, which has improved access to services by 200% in some regions, although many women did not know that the VIA screening was free (Hiuhu 2015). The cost as a barrier to screening also agrees with DeGregorio *et al.* (2017), who studied the strengths and barriers of a women's health programme in Cameroon. The authors noted that screening charges discouraged many rural women from seeking screening services. The VIA uptake rates increased from 6-25% daily when offered free screening services. The health providers provided education and the importance of seeking cancer screening services, especially for women of childbearing age. Women who required treatment were offered the services and allowed to pay later, which motivated other women in the community to turn out for cervical cancer screening.

Various factors played a role in the adoption of VIA including challenges like supplies for the screening program concerns about undergoing speculum examination misunderstandings about cervical cancer screening and a lack of awareness among women regarding screening services. These findings are consistent with Hiuhus (2015) research, which also highlighted barriers to VIA uptake such as a shortage of trained personnel, inadequate materials and equipment insufficient support, from authorities, heavy workloads and uncooperative patients. Mugassa and Frumence (2020) found that the unavailability of adequate tools and low-skilled and incompetent staff influenced the uptake of cervical screening services in Tanzania. Other factors that led to clients having low uptake, as opined by the HSPs, were cost, myths and misconceptions, fear of speculum examination by women and lack of awareness about the VIA service in the facility. These findings concur with Wardle *et al.* (2019), who found that participants were feeling ashamed, experienced pain or anxiety related to findings as obstacles to screening. Furthermore Kieti (2016) highlighted challenges faced by screening services including a lack of dedicated facilities for screening in healthcare centres nurses perceptions and fears regarding screening techniques, feelings of embarrassment or stigma associated with the process, social influences impacting decision making around screening participation financial costs involved in accessing services and limited sources of information. Shiferaw *et al.* (2018)

found that women were willing to be screened but had no means of paying for screening in private hospitals since they feared bad treatment by healthcare professionals in public hospitals.

6.4 The extent to which VIA guidelines are adhered to in selected health facilities in Embu County prior to intervention

To ensure standardization in VIA cervical cancer screening and treatment procedures within Kenyas Ministry of Health guidelines have been developed. These guidelines serve as operating procedures that every skilled VIA provider should adhere to. During the research process observational checklists were utilized to observe healthcare providers performing the screening service for clients. Performance, against prescribed steps was evaluated using a Likert scale. Additionally questionnaires were utilized containing questions aligned with these guidelines. It's worth mentioning that in a facility they didn't have any screening reagents, particularly vinegar so they didn't use the checklist. It is worth noting that during the data collection stage we did not use a cryotherapy checklist. This was due, to the lack of trained healthcare providers who could effectively treat lesions using cryotherapy. Additionally the cryotherapy machine at the facility of providing such treatment Embu County Referral Hospital was out of order.

To evaluate participants knowledge of standards for conducting VIA we utilized a questionnaire to assess their adherence to guidelines. Regarding the choice of acid brand most participants favored Zesta. However it's important to note that this specific brand does not meet the required acid concentration threshold for eliciting a reaction with cells and indicating the presence or absence of precancerous acetowhite changes. Another used brand was cloves, which also fell short of meeting the recommended concentration range of 3 5%. In contrast a few facilities opted for American Garden brand, which does adhere to the recommended threshold for concentration in cervical cancer screening. The choice of brand can potentially impact the positivity rate as weaker concentrations may fail to react with cells and accurately reflect VIA results.

Interestingly most respondents mentioned that their chosen bottle clearly indicated the percentage of acid present. For screening purposes it is crucial that brands prominently display their manufacturers acetic acid concentrations. Additionally our study examined whether participants were aware of the recommended amount of acid for VIA screening. The findings showed that a significant proportion (64.3%) of participants believed that a 2% concentration of

acid was suitable, for VIA even though the recommended range is between 3 5%. It was evident from the knowledge assessment that most participants were unfamiliar with the recommended acid concentration for VIA screening. When asked about the application of a cotton swab soaked in acid to the cervix respondents mentioned durations ranging from one to three minutes. Simply applying it randomly.

As per the guidelines for cervical cancer screening and treatment in Kenya it is advised to apply acid for a duration of 2 minutes. However most survey respondents believed that one minute was sufficient. Regarding the size of the cotton applicator stick required for applying acid to the cervix respondents suggested either covering the opening (os) or adequately covering the junction between columnar cells (SJC). Ideally a larger cotton swab would be able to cover the SJC. In terms of eligibility criteria for VIA cervical cancer screening based on age 92.9% of respondents indicated that all women, between 15 and 49 years old who are capable of reproduction should be eligible. However according to Kenyas VIA screening guidelines VIA screening is recommended between ages 25 and 49. These findings compare to a cytology-based screening done in the USA, which stated that cervical cancer screening age guidelines and adherence to them were key factors affecting the number of pap tests done. However, full compliance with the guidelines was expected to reduce pap tests from 75 million to 34 million in 2010 (America Cancer Society 2012). Adherence to screening guidelines prevents unnecessary tests done on women who are not eligible and those done tests at intervals not recommended by guidelines. When women outside the eligible population are screened, testing unnecessarily increases. This is ultimately a waste of resources.

During the assessment of why participants believed that women, above 50 years are not screened for cancer using the VIA method it was found that half of them mentioned that their SCJ is not easily visible. Others stated that according to Kenyas cervical cancer screening guidelines for VIA women above 50 should undergo a pap smear instead. This indicates that only half of the participants were aware of the reasons behind the ineligibility of women above 50 for VIA screening. The hormonal changes caused by menopause can make the SCJ less apparent in women above 50. National Cervical Cancer Prevention Programme (2012) stipulates. The screening age should be between 25 and 49 years unless, for HIV-positive women, screening starts as early as 18 years. Many people believe that it is crucial to visualize the SCJ before using acid.

While conducting the checklist on the procedure it was observed that there were deviations from procedural guidelines for VIA. The performance generally was satisfactory in verifying that necessary instruments and supplies were ready. Although participants were aware of the supplies and instruments some had limited quantities available. For example they had small cotton applicator swabs that couldn't adequately cover the SCJ. Additionally some participants had acid with concentrations. When the size of a cotton swab used on the cervix to apply acetic acid was asked in the questionnaire, most respondents noted that the cotton swab should be big enough to cover the SCJ. However, in practice, this was not the case. Regarding lighting sources used during the procedure many lights were worn out and unstable but functional on their stands. Some participants relied on their gadgets or natural lighting for illumination. Most respondents followed infection prevention measures by washing their hands before starting the procedure. However there were concerns about inspection of genitalia, among some respondents. 25% of the participants demonstrated a technique when it came to inserting and adjusting the speculum in order to view the cervix.

The primary observations revealed that there was a lack of skill when it came to inserting the speculum leading to discomfort for the clients. However the respondents showed skills in positioning and illuminating the speculum to obtain a clear view of the cervix. Regrettably after the speculum was inserted most clients did not thoroughly inspect the cervix, for indications of cancer leading to a lack of effectiveness. Additionally none of the participants were able to locate the SCJ and transformation zone using any reference material. The researchers noticed that while respondents were searching for the SCJ they struggled with visualizing it. It's crucial to identify the SCJ as it plays a role in VIA screening, interpreting results and determining eligibility for treatment if precancerous lesions are found. The process of using a cotton swab soaked in 3 5% acid and applying it to the cervix, for two minutes showed results. Interestingly none of the participants relied on a watch or clock to time themselves; instead they estimated the duration. It's worth noting that some participants were able to interpret their findings within seconds after treating their cervix.

Upon examination of the cervix the observer noticed that healthcare providers lacked an understanding of what they were supposed to look for in order to make a diagnosis. They did however perform adequately when it came to removing the speculum and placing it in a chlorine solution, for decontamination. However there were issues when it came to explaining the results

and discussing follow up plans with clients. Sometimes results were casually given as clients got up from the examination table without communication or guidance.

Most of the respondents had challenges filling out the available MOH forms and registers. The VIA procedural guidelines were unsatisfactorily performed. The poor adherence to guidelines agrees with Selmouni *et al.* (2016), who assessed healthcare providers' compliance with cancer screening guidelines with a visual acetic acid (VIA) inspection. Findings showed that only 14.2% of the health professionals followed all practices and compliance with the guidelines. These findings align with those of Teoh et al. (2012) who also highlighted how inadequate training can lead to non compliance with screening guidelines. The research highlighted the importance of Visual Inspection, with Acetic Acid (VIA) as an efficient test for detecting cancer especially in areas with limited resources. Experienced health workers play a role in conducting this test, which can potentially save lives. These findings align with the WHO (2012) report emphasizing that the absence of guidelines, for VIA screening and treatment may lead to inaction and the potential misdiagnosis of patients. Consequently there is an increased risk of overlooking individuals who require screening, further examinations and appropriate treatment.

6.5 Intervention phase: effectiveness of visual inspection with acetic acid clinical training

The intervention phase took the form of didactic training for two days, followed by clinical practice for four days. The clinical practice was a clinical Campaign at the Dallas dispensary. The CHVs attached to the Dallas dispensary were used to mobilise the community. This was to inform the community of the scheduled VIA clinical campaign to encourage attendance. The participants were allocated a preceptor at a ratio of 2:1. Each preceptor had two participants each day, and the preceptors and participants rotated in terms of grouping over the four days of clinical training. Before the didactic/theory training, the healthcare providers were subjected to a pretest assessing their knowledge and skills on VIA and cryotherapy before training. They were subjected to a post-test at the end of the two-day theory training. The mean scores for the pretest and post-test showed a significant improvement which can be used to demonstrate that learning occurred.

During the second day of the theory training, the participants were subjected to midcourse image evaluation, where twenty images were projected, and each participant was supposed to indicate VIA diagnosis and management plan. The images had positive, negative

and suspicious for cancer cervixes. The mean score was 87.9%, within the 80% score recommendation by JHPIEGO to show that learning had taken place. This midcourse evaluation emphasises the need for using picture and cervix images with various VIA findings. Still, it is important to note that these cervix images cannot replace clinical practice with real-time patients. The findings support those of Jhpiego (2015) that when the training materials are varied and diverse, the learners are less bored or feel astounded by lots of information. Still, despite their useful role in aiding learning, photos and other teaching aids cannot substitute the real human beings play in reinforcing learning. Jhpiego has developed images of various cervixes in VIA to support VIA training.

To ensure correct diagnosis, the participants made initial diagnoses after the screening, and the preceptor would look at the same cervix to make their own diagnosis. The preceptor would agree with the participant's initial diagnosis or not. The clients, however, were given the correct diagnosis as reached by the preceptor and the participant. Overall general performance during the clinical campaign phase was a sensitivity of 82.92% and a specificity of 98.25%. Post training, sensitivity was 89.7%, and specificity was 100%. These findings differ of Vu *et al.* (2018), who studied community-based screening for cervical cancer using VIA in Vietnam. The study showed that all the healthcare workers effectively performed VIA with Acetic Acid after intensive training. The VIA had 100% sensitivity and 67% specificity.

These findings agree with those of Bhattacharyya *et al.* (2015), that indicated that the presence of preceptors again ensures that reliable results are given to the clients who get screened for cervical precancers. The clinical campaign had a total of 216 women screened in the course of four days. Women who tested positive for precancer lesions were 17.1%. This is higher than WHO positivity standards for any given population but still within ranges of various studies on cervical cancer screening positive lesions done across various countries. However, this is still in agreement with WHO, which state that the proportion of positive screens identified by newly trained healthcare providers ranges between 25 and 35 % in various previous studies reported to date. However, a decline has been observed lately, i.e. to 10-18% in most study setups and instances (WHO 2010), which could be attributed to the tendency to classify any white changes in the cervix as positive at the beginning.

Nonetheless, with experience, they identify the deep white acetowhite changes originating from SCJ with defined margins as true positives. These findings concur with The

findings also agree with Gad *et al.* (2019), who evaluated visual inspection of the cervix with acetic acid as a cancer screening test. The assessment involved 379, and 65 tested positive for VIA (17.1%). The sensitivity was 91.3%. These findings, however, slightly differ from an assessment of Optical examination as the primary diagnosis method in countryside China by Rong *et al.* (2013). The overall test positivity rate was 8.07% (1495/18532) for VIA. However, these findings concur with the same study, which established that VIA was a simple, achievable and actual primary cervix cancer diagnosis technique in a poor, marginalised community that does not get access to advanced laboratory test methods.

Cohens Kappa Coefficient (K) was 0.5-1 over the four clinical training days. This was a moderate to near-perfect agreement between the preceptors and the participants. The average Cohens Kappa coefficient was 0.84. These findings concur with those of Veena's study in 2012, which had a Cohens Kappa coefficient of 0.5-0.95 in cervical cancer screening.

6.6 Effectiveness of VIA training on identification of pre-cancerous lesions in selected facilities in embu county post-training phase.

After the training, the fourteen healthcare providers returned to their facilities to practice VIA. The recorded VIA for this study was then done by a preceptor who provided technical support on VIA screening. The results were collected over a period of 4 months. CHVs and nurses did community mobilization at the facility level. A total of 434 women were screened. Of these, 14.1% had positive results, meaning they had precancerous lesions. The positivity rate of precancerous lesions agrees with WHO, which states that the standard positivity rate in any given population is 10-15% (WHO 2010). These findings agree with WHO, which states that a useful VIA training benchmark is the proportion of women diagnosed with acetowhite lesions and proportion of aceto white lesions diagnosed with dysplasia. With sufficient skills gained after the training, 10-20% of women examined by healthcare providers will have acetowhite lesions.

At least one of five VIA-positive results will lead to dysplasia of cervical intraepithelial neoplasia of any grade being diagnosed (WHO 2010). These results are similar, to a demonstration project conducted in six countries (Malawi, Madagascar, Nigeria, Uganda, Tanzania and Zambia) from September 2005 to May 2009. During that project they screened 19,579 clients across those countries. The overall percentage of VIA results was 10.1% and 1.7% of the clients had suspicious lesions that could indicate cancer upon inspection (WHO 2012). Out

of the clients who tested positive for VIA and had lesions sixty percent received cryotherapy treatment. However this treatment rate fell short of the WHO recommended goal of treating ninety percent of all lesions (WHO 2021). The low treatment rate can be attributed to some participating facilities lacking a "screen and treat" approach. Additionally the inadequate treatment rate was due to a lack of cryotherapy machines in facilities and issues related to PID (Pelvic Inflammatory Disease). This study aligns with Nooh et al' s findings (2015) which indicated that VIA training allows healthcare professionals, in resource limited countries to effectively screen for cancer. However it partially differs from Fouly et al' s study (2019) which reported that nurses with VIA training achieved results through intensive training and performed VIA tests with acceptable accuracy. This research has found that extensive training, in VIA can assist individuals, with HSP in mastering VIA skills resulting in improved accuracy when performing the procedure.

6.7 Effectiveness of VIA Training on Improving Uptake of VIA in Selected Facilities

The study compared the number of VIA screenings done on baseline, on campaign during clinical training (Intervention phase) and data collected within four months after participants were trained (post-training phase). The data steadily increased, showing that training on the importance of screening and sharpening screening skills among healthcare workers positively impacted increasing cervical cancer screening uptake. The data in the baseline level was collected for one year, within four days for the campaign phase and four months during post-training. Hence, by taking into consideration the number of data collected and the period used to collect that data, there is a positive impact of training healthcare workers on VIA uptake. Thus, the more confident the healthcare workers are about the VIA screening, the more they are likely to mobilise clients for uptake.

Similarly, whereas 239 women had been screened in 1 year during the baseline phase, in the intervention phase, 216 women were screened within four days, while 434 women were screened within four months during the post-training phase. Consequently, the variation between these numbers can be attributed to training and increased social mobilization because of the training. In support of this finding, Teoh *et al.* (2012) asserted that adequately trained nurses show improved performance on cancer screening using VIA. Ichimanya (2016) also found that when a healthcare provider is adequately trained, she improves their presentation regarding personal grooming, equipment, and environment. The patient is more confident in them. This, in

turn, improves VIA uptake. Linde *et al.* (2016) found that perceived benefits of cancer screening emanate from the healthcare provider's persistence and encouragement of attendance. The results are, in line with the findings of Awolude et al. (2018) who discovered an improvement in healthcare professionals knowledge about cancer and its prevention. Prior to training the knowledge stood at 52.4%. After training it rose to 91.5%.

These findings also support the research conducted by Shastri et al. (2014) which suggests that healthcare workers who have confidence in VIA screening are more likely to encourage clients to undergo the screening leading to treatment rates. Additionally these results align with a study conducted by Adsul et al. (2017), on cervical cancer screening using VIA in India.The study identified factors such as training for test providers, collaboration with community based organizations that train community health workers and implementing the screen and treat approach, as facilitators for implementation of cancer screening programs and improved clinic adherence rates.

Training healthcare providers increase the uptake of VIA services. This also agrees with Adsul (2017), who noted that 75% mobilization with trained healthcare providers increases cervical cancer screening rates. Raifu *et al.* (2017) recommended that healthcare professionals should be trained on VIA and VILLI to improve the uptake of VIA and VILLI.

6.8 Effectiveness of VIA Training on Improving VIA Adherence to Guidelines Selected Facilities

The healthcare providers were subjected to VIA and cryotherapy observational checklists as they performed the procedures. It was established that the healthcare providers followed the steps per the guidelines and could perform the key steps either very satisfactorily or satisfactorily. The healthcare providers were able to have the right equipment assembled for the VIA procedure, used wall clocks to time the duration of application of acetic acid to the cervix, used the right strength acetic acid and were able to interpret the findings of actetowhite raised lesions, which had clearly defined borders and originated from SCJ as positive precancerous lesions. According to a study conducted in Morocco by Selmouni et al. (2016) it was found that after receiving training 83% of healthcare professionals followed the guidelines, for cervical cancer screening. These results align with a study conducted by Poli et al. (2015) on VIA screening programs in rural south India, which demonstrated the effectiveness of detection of cancer and pre cancers.

It has been shown that trained healthcare workers under supervision can perform cervical screening, cryotherapy and follow up care effectively even with limited resources. Fouly et al. (2019) demonstrated that nurses with knowledge, about cancer and junior clinicians who received proper intensive training were able to perform VIA tests accurately for most steps of the procedure.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1 Conclusions

The baseline data collection for one year retrospectively showed a very low positivity rate for precancerous lesions and low uptake of VIA. For instance, in one level 4 hospital, they had just screened two clients in a year, despite the facility being one of the VIA screening sites identified by the county health department. This study established that most HSPs providing cancer screening services had undergone on-job training. However, most did not get the didactic component of the training or experience clinical training with real-time clients in the presence of a preceptor. Most participants had one day of OJT observing fellow nurses, who were not necessarily VIA screening experts, perform the procedure and then take over as qualified VIA screeners.

VIA clinical training improves adherence to VIA screening guidelines and ensures proper supplies are used. When VIA observational checklist was used to determine adherence to VIA screening guidelines prior to intervention, this study established that the vinegar being used in most facilities did not meet the acetic acid percentage recommendations and that the HCPs were not using the “2 minutes timing” in the application of vinegar to the cervix. Further, they could not identify the SJC or the characteristic acetowhite lesions interpreted as precancerous lesions. This study also found that before the intervention there was no "screen and treat" approach, in the county. This could be because the healthcare workers lacked the skills for treatment or because there were issues with the cryotherapy machine at the hospital. This is despite the WHO recommendation of a “screen and treat” approach in low resource settings to avoid increment of loss to follow up on clients. There is a general assumption that the one time you screen a patient for VIA might be the only chance she will ever get screened.

The use of acid, in training has been found to enhance the accuracy of VIA outcomes leading to more precise diagnoses. During the intervention phase the Kenya Ministry of Health (MOH) followed VIA screening guidelines. Supplemented them with images and illustrations from sources. These additional resources, the JHPIEGO cervical cancer flashcards helped participants understand outcomes of VIA treatment even before encountering actual cervixes.

While the MOH training curriculum for VIA is adequate it is crucial to emphasize training under the guidance of preceptors within this curriculum. This study highlights that a combination of training, clinical experience and mentorship can effectively equip healthcare workers in resource limited settings with essential VIA screening skills. Additionally VIA screening is subjective in nature; hence healthcare service providers delivering this service require support and ongoing screening programs to maintain their expertise. Nevertheless with training and mentorship healthcare service providers can accurately diagnose VIA cases. This approach ensures detection and treatment of precancerous lesions before they progress into cancerous conditions thereby reducing the burden of cervical cancer, in Kenya. To maintain healthcare facilities it is crucial to implement a screen and treat strategy, for VIA. This approach guarantees that women receive treatment after being screened which helps minimize cases of individuals not completing their treatment or losing contact, with follow ups. In the scheme of things implementing screening and treating precancerous abnormalities will significantly decrease the occurrence and severity of cervical cancer related complications and deaths.

This study also concludes that preceptors are vital to any clinical training and should be utilised to ensure correct VIA skill learning during clinical/practical cervical cancer screening training. This study informs a standardised method of delivering the MOH VIA training to ensure effective outcomes of hands-on clinical experience among HSPs. The study also discourages the current widely practised training mode for VIA: on-job training. Evidence has shown that OJT is an ineffective method of training for VIA.

Regarding positivity rates, it was 0.8% at baseline, 17.1% during the intervention phase and 14.1% during the post-training follow-up phase. The Cohens Kappa coefficient was also a near-perfect agreement between participants and preceptors. This indicates that the correct VIA diagnosis improved cervical cancer screening outcomes. This study concludes that intensive VIA training improves the ability of HSPs to make the correct VIA diagnosis. VIA clinical training improves VIA screening uptake. In terms of factors affecting VIA uptake in facilities before the intervention, this study has concluded that cost was a barrier to access since most women needing screening were not sick, so they would rather forfeit the chance to screen where it is charged.

Lack of community and client awareness of VIA service in their facility has also influenced the low uptake. The less utilization of community and facility mobilization avenues

for VIA has also resulted in low service uptake. Hence, Nurses providing micro-teaching on VIA can help in facility-based awareness. On the contrary, CHVs can mobilise and create VIA awareness within the community and the facility. Likewise, lack of supplies and frequent outages of stock were other factors that reduced the uptake of VIA. The study observed that training healthcare service providers (HSPs) in VIA not boosts their confidence in performing the procedure but also raises awareness about screening within their facilities. This in turn increases the uptake of VIA. The researchers findings indicate that training, in VIA leads to adherence to VIA and cryotherapy guidelines. This improvement is evident through the observation of each step involved in these procedures ultimately enhancing their effectiveness and reliability.

7.2 Recommendations

This study recommends the following:

POLICY

i. The Ministry of Health (MOH) should offer cervical cancer screening and treatment at level 1 and 2 healthcare facilities, similar to reproductive health services.

ii. The MOH should allocate funds for training healthcare providers on cancer prevention and treatment using VIA.

PRACTICE

iii. To ensure the implementation of cervical cancer screening and treatment activities it is recommended that funds be allocated to county governments for the purchase of equipment and supplies needed for VIA and cryotherapy as part of the health strategic plan.

iv. Additionally MOH should collaborate with County health departments to expand VIA capacity building by training HSPs.

v. Healthcare facilities offering VIA screening should receive job aids, from the MOH or supporting partners. These aids will help VIA providers explain the procedure and potential outcomes to clients effectively leading to increased client understanding and acceptance of VIA.

vi. The existing facilities that currently conduct VIA screenings and provide treatment should be transformed into centers of excellence, for VIA and treatment.

vii. The Ministry of Health (MOH) and county health departments should ensure that healthcare workers trained on VIA receive support supervision at once every three months.

viii. It is important to develop and implement campaigns to raise community awareness, about cervical cancer, its prevention and the available services. Utilizing mainstream media and print media can be a way to carry out this campaign.

ix. CHVs should be trained on VIA recruitment of clients in the facility, social mobilization, and the procedure to ensure they correct myths as well as misconceptions in the community about VIA while at the same time increasing awareness of the screening and importance of it.

EDUCATION

x. There is a need to review and update the MOH VIA training guidelines and curriculum to include the use of images during training. Additionally it is recommended to extend the duration of VIA training to 6 7 days. The didactic training component should take 2 3 days while clinical practice should span four days. These adjustments can be made by county reproductive health policymakers.

xi. To increase the number of healthcare providers trained in VIA and cryotherapy it would be beneficial to establish trainers who can then train a generation of providers. It is advisable for teams from facilities offering cancer prevention services to undergo this training together.

xii. Incorporating training on cervical cancer screening using VIA and treatment with cryotherapy into preservice medical education curriculum would be a cost approach in ensuring a pool of cervical cancer prevention providers, in each country.

xiii. Preceptors play a role, in training as they guide and support trainees in developing the necessary VIA skills to effectively assist participants.

RESEARCH

xiv. There is a need for more intervention studies of this nature for comparison purposes.

xv. Qualitative studies on health service provider experiences with structured VIA training delivery model

xvi. Replication of study in similar settings to study the generalizability of study variables on a larger scale

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APPENDICES

Appendix 1: Informed Consent

This Informed Consent form will be administered to healthcare providers in Embu County who will participate in the study. The title of the research project is "effectiveness of clinical training in influencing the outcome of VIA for cervical precancer screenng in selected facilities in Embu County"

Name of researcher: EVAH M MAINA.
Name of Organisation: UNIVERSITY OF NAIROBI
Title of Proposal: Effectiveness of clinical training in influencing the outcome of VIA for cervical precancer training in selected facilities in Embu County.

This consent form consists of two sections;

- Information Sheet (providing details, about the research)
- Certificate of Consent (for signing if you agree to participate).

You will receive a copy of the Informed Consent Form.

PART I; Information Sheet

Introduction

My name is Evah Maina. I am currently pursuing a Doctor of Philosophy degree in Nursing Sciences at the University of Nairobi. As part of my degree requirements I am conducting a study in Embu County, Kenya focusing on the impact of training on the effectiveness of inspection with acetic acid for pre cancer detection. In this document I will thoroughly explain the research. Invite you to participate. Please take your time to decide whether or not you would like to take part in this study. Feel free to ask any questions or seek clarification during or, after data collection using the contact information provided at the end of this document.

Purpose of the research

To demonstrate the critical role effective clinical training plays in the effective transfer of VIA screening skills ensuring confident decision making in interpreting the outcome of VIA screening test. This information is necessary in identifying training gaps towards VIA screening

and devising ways of sealing them. This will in turn lead to the necessary policy makers and stakeholder's sensitization on the role effective training can play in reducing cervical cancer morbidity and mortality.

Benefits

As an individual you may not directly experience any advantages through your participation, in this research. However your involvement will play a role in uncovering answers to the research question outlined in the research proposal. Although there are no benefits for you future generations within the community can benefit greatly from the findings published in the document resulting from this study.

Risks

Rest assured that there are no risks associated with participating in this research. Your well being and safety are of importance to us.

Voluntary Participation

Your decision to take part in this study is entirely voluntary. The choice is up to you. It will not have any impact, on you whatsoever. If at any point you change your mind or decide to discontinue your participation after agreeing, that is perfectly fine and respected.

Confidentiality

We want to assure you that as a participant your identity will be kept confidential. Your name or ethnicity will not be. Shared with anyone involved in the study. To ensure confidentiality data collection forms will utilize a study code number known by researchers. All collected data and information obtained during the course of this study will be used solely for meeting the objectives of this research and securely stored under lock and key.

Duration

You will only need to allocate 35 minutes to an hour for the data collection process. During this period your task will solely involve responding to the provided questions as instructed. You will also undergo a six day didactic and clinical practice training on VIA and cryotherapy and thereafter be followed closely for VIA screening services for a period of four months

I have read and agreed to take part in the study

Signature of the participant: …….

Date: …….

Contacts

Questions are welcome at the moment or later, even when the study is in progress. If later use the contacts below.

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Appendix 2: Questionnaire.

This questionnaire is for research purposes. Anonymity will be maintained and the information contained here will be treated with confidentiality. Tick and answer by writing where appropriate.

SOCIO-DEMOGRAPHIC DATA

1. What is your gender
    a) male
    b) female
2. What is your cadre?
    a) Nurse
    b) Clinical officer
    c) Doctor
3. What is your highest education qualification?
    a) Diploma
    b) Higher national diploma
    c) Bachelor's degree
    d) Master's degree
    e) Doctorate degree
4. How long have you been in this health facility?
    a) Less than 1 year
    b) 1-5 years
    c) More than 5 years
5. What is your religion
    a) Protestant
    b) Catholic
    c) Muslim
    d) Hindu
    e) Others

VIA TRAINING

6. Have you ever been trained on VIA and Cryotherapy?
    a) Yes
    b) No
7. If yes to question 6 above: when was the training done?
    a) less than one year ago
    b) 1-3 years ago
    c) 4-6 years ago
    d) More than 6 years ago
8. Was there component of didactic training (theory training) in that VIA training?
    a) Yes
    b) No
9. If yes to question 8 above, how long did the didactic training take…….
10. Did the VIA training comprise of practical training will real-time clients?
    a) Yes
    b) No
11. If Yes to question 10 above, how long did the practical clinical training on VIA take? …….
12. If yes to question 10 above, were there preceptors in the practical training of VIA?
13. Was there technical support after VIA training?
    a) Yes
    b) No
14. If yes to question 13 above, how often is the technical support done?
15. Do you feel you gained suffient skills to perform VIA and cryotherapy from that training?
    a) Yes
    b) No
16. If no to question 15 above, why?.....

VIA PROCEDURE , SUPPLIES AND GUIDELINES

17. Which brand of acid do you typically use for performing VIA?.....

18. Does the brand of acid you use for performing VIA contain any percentage of acetic acid?

a) Yes

b) No

19. What is the recommended percentage of acid, for performing VIA?

a) 2%

b) 3%

c) 5%

20. What size of cotton on the applicator stick is recommended to apply acid to the cervix?

a) Enough to cover the os

b) Enough to cover the SJC

c) Any size can be used

21. How long should the acetic acid be applied to the cervix?

a) 1 minute

b) 2 minutes

c) 3 minutes

d) Bathing the cervix with acid is sufficient

22. Why do you believe women above 50 years are not eligible, for VIA?

a) The Kenya guidelines recommend they should not be screened.

b) Their SJC is not clearly visible.

c) At that stage, in life it is recommended for women to undergo a papsmear test.

d) Cervical cancer is frequently found in women who're over 50 years old.

23. Who falls under the age group for VIA in Kenya? Please mark the option;

a) Women, between the ages of 15 and 49 who're of reproductive age.

b) Women aged 25 49.

c) Women aged 30 49.

17. Is it important to visualise SJC before applying acetic acid? Tick where appropriate
    a) Yes
    b) No

18. What is the screening interval in various categories. Tick all appropriate.
    a) Every 3 years negative VIA test in HIV negative woman
    b) Every 5 years negative VIA for HIV negative woman
    c) Every 6 months VIA positive for HIV positive woman
    d) Every 1 year for VIA positive HIV positive women
    e) After one year for every Woman who is treated for pre-cancerous lesion
    f) After six months for a woman treated for pre-cancerous lesion.

FACTORS INFLUENCING UPTAKE OF VIA

19. How often do you tell the eligible clients about availability of VIA in your clinic?
    a) I tell them all the time
    b) I tell only the MCH/FP clients
    c) I tell only Comprehensive Clinic clients
    d) Most of the times I forget to tell them
20. Have you (if female)or your partner (if male) ever been screened for cervical cancer by VIA?
    a) Yes
    b) No
21. If No to question 24 above, why……
22. Is cervical cancer screening in your service charter board outside the facility?
    a) Yes

b) No

23. How long do you take to Counsel a woman in need of cervical cancer screening?
    a) About 5 minutes
    b) About 10 minutes
    c) Long enough till I am satisfied she has understood
24. Do you think the appearance of health facility and VIA clinic arrangement determines if clients take up the service?
    a) Yes
    b) No
25. Do you think a well groomed healthcare provider attracts women to screening?
    a) Yes
    b) No
26. Do you use Visual Aids to counsel clients?
    a) Yes
    b) No
27. Who creates VIA awareness within the facility? Tick all where appropriate.
    a) Nurses during morning health education
    b) Nurses when attending clients other healthcare needs
    c) Community health workers
28. Do you charge VIA and cryotherapy?
    a) Yes
    b) No
29. Do you inform the clients of cost of VIA screening or lack of it when informing them about the service?
    a) Yes
    b) No
30. How is VIA screening awareness created outside the facility? Tick all appropriate
    a) CHVs in their community units
    b) In churches by community health workers
    c) In schools by community health workers

d) Word of mouth by clients already screened

31. Do you use CHVs to create VIA awareness in the facility and at the community?
    a) Yes
    b) No
32. Have the CHVs in your facility gone through any form of VIA/VILLI training and awareness creation
    a) Yes
    b) No
33. From your experience screening cancer, why do you think VIA uptake is low? Tick all appropriate.
    a) Women fear speculum examination
    b) Women need consent from husbands
    c) There are many myths in the community about cervical cancer
    d) There are no supplies to sustain VIA programme
    e) Most women are not aware of VIA screening
    f) Shortage of trained personnel
    g) Shortage of staff and competing workload
    h) Lack of support from relevant office
    i) Lack of cryotherapy for treatment of lesions
    j) Lack of specific room for screening VIA

Appendix 3: VIA checklist

Evaluation of Clinical Abilities in VIA(Updated October, 2015)

Name: _____ Date: _____

√ **- Satisfactory:** S/he completed the step or task conforming to the guidelines/standard procedures.

X - Unsatisfactory: S/he did not completed the step or task in a manner that follows the guidelines/standard procedures.

Steps/Tasks	**Cases**				
The first steps before beginning the screening with VIA are to greet the woman, explain the test and ask the patient if she has questions or doubts. Afterwards, ask her to disrobe below the waist and take a seat on the examination table.					
PREPARATION					
Verify that the necessary instruments and supplies are ready.					
Assure that a light source is available.					
Wash hands and put on examination gloves.					
VIA					
Begin by examining the genitalia.					
Insert the speculum and make necessary adjustments, for a clear view of the cervix.					
Keep the speculum open to have a complete visual of the entire cervix.					
Adjust the light source to ensure a clear visibility of the cervix.					
Carefully examine the cervix for any signs that might indicate cancer.					
Use a clean cotton swab to remove any secretions, blood or					

mucus from the cervix.					
With your light source, locate and identify areas such as the os SCJ and transformation zone.					
• Dampen a clean cotton swab, with 3 5% acetic acid (vinegar) and apply it to the cervix for approximately 2 minutes.					
Pay attention to any raised and thickened plaques or areas of aceto white epithelium when inspecting lesions. Note their size. Whether they have borders or touch the SCJ.					
• If necessary reapply vinegar for a minute. Afterwards use another cotton swab to remove any mucus or blood that may obstruct your view before inspecting SCJ					
• Take out the speculum. Place it in a bucket containing water or a 0.5% chlorine solution, for about 10 minutes to ensure proper decontamination.					
• If necessary proceed with an examination. Remember to remove gloves and dispose of them afterward.					
Clinical Trainer's Initials:					

(Source: Jhpiego, 2005)

Appendix 4: Cryotherapy Checklist

Evaluation of Clinical Abilities in Cryotherapy(updated April 2015)

Name: _____ **Date:** _____

√ **-Satisfactory:** S/he completed the step or task conforming to the guidelines/standard procedures.

X -Unsatisfactory: S/he did not completed the step or task in a manner that follows the guidelines/standard procedures.

PRE-CRYOTHERAPY COUNSELLING					
Please provide an explanation as, to why the recommended treatment's necessary and describe the procedure involved.					
It is essential to confirm that she is not currently pregnant.					
It is important to have a conversation with her about the side effects that may occur during the treatment well as discuss alternative options to cryotherapy.					
Request her consent, for the treatment. Ensure she signs the consent form.					
GETTING READY					
Check that cryotherapy instrument, gas (CO_2) and necessary supplies are ready to use.					
Make sure the woman has used the restroom if necessary and assist her in getting onto the examination table.					
Thoroughly wash your hands. Dry them properly.					
Put on gloves, for examination or surgical purposes after ensuring they are either level disinfected or clean.					
Organize the instruments and supplies on a tray that has been properly disinfected or on a napkin.					
CRYOTHERAPY					

Cover the speculum with a new non-lubricated condom if needed by cutting off the condom tip.					
Start by inserting a speculum and adjusting it to get a view of the cervix.					
Take a swab to clean the cervix and locate the os and SCJ. Use a cotton swab to apply 3 5% acid on the cervix for 2 minutes. Look for VIA lesions. Make sure they are suitable, for cryotherapy treatment.					
Attach the cryotip to the end of the probe. Point it towards the ceiling. Test its function by pressing the freeze button for 1 second followed by the defrost button for 1 second.					
Now apply the cryotip onto the cervix. Freeze it for 3 minutes. Check that there is a frozen ice ball present on the cervix before removing it.					
Wait for 5 minutes then repeat the procedure if necessary. Close the master cylinder valve after completing all tasks.					
Inspect the cervix for any bleeding. If needed apply pressure using a clean cotton swab.					
Once done, remove and place the speculum in a bucket containing water or a 0.5% chlorine solution for least 10 minutes to ensure proper decontamination. Perform high level disinfection (HLD) of the cryotherapy tip according to established protocols.					
POST-CRYOTHERAPY TASKS					
After completing these cryotherapy tasks decontaminate all equipment including light sources, cryo unit, tubing and regulator using either a 0.5% chlorine solution or alcohol.					
Dispose of used gloves properly, before washing your hands with soap and water. Make sure to dry them well.					
Make sure to confirm that the woman is not experiencing cramping before assisting her in sitting up getting off the table and getting dressed.					
Provide the woman with guidance, on treatment care and any necessary					

follow up instructions.					
Document the details of the treatment and follow up plan, in her record.					
It is important for the woman to wait at the clinic for 15 minutes before being allowed to go home.					
Clinical Trainer's Initials:					

(Source: Jhpiego, 2005)

Appendix 5: Key Informant Interviews Consent Form

Only one consent form for each of the key informant interviews. This form will be signed by the researcher to show that each the participant has accepted to take part in the study.

Identification of the Key informant by job title…….

Date of the KII_____/____/_______ Place of the KII_____

Interviewers's name_____

All the participants have reviewed the information sheet thoroughly. I have also personally discussed the details mentioned in the information sheet with them. They have confirmed their comprehension and willingness to participate in the study. They are aware that they can withdraw from the interview at any point, without facing any consequences. Additionally they understand that the interview will be recorded on tape.

The participants have willingly agreed to be a part of this study.

Name of the researcher_____

Signature_____ Date_____

Appendix 6: Key Informant Structured Interview Questions

1. What is cervical cancer mortality rate in Embu County?
2. Which organisations support cervical cancer screening in Embu County?
3. Do you have any standard training guidelines on VIA?
4. How many healthcare providers have been trained on VIA and cryotherapy?
5. Do you think clinical practice training is important after didactic training in VIA?
6. If yes, how would you recommend the clinical training to be carried out?
7. Who does cervical cancer screening support supervision and how often?
8. How many facilities in Embu County are doing screen and treat on same day?
9. What do you think are healthcare provider factors influencing the uptake of VIA in Embu County
10. Do you think VIA training has a role in increasing cervical cancer screening uptake?
11. Why do you think the positivity rate of precancerous lesions in Embu County is low?

Appendix 7: Work plan

YEAR 2018/2020

Month/activity	**April 2018**	**Aug 2018**	**May 2019**	**June— September 2019**	**October-January 2020**	**February-April 2020**	**May2020-June 2023**
Creating the project proposal							
Submitting, getting approval and obtaining clearance, for the proposal							
Conducting a test of tools and collecting data							
Cleaning the collected data entering it into a system and analyzing it							
Writing the thesis preparing manuscripts and submitting them for review.							

Appendix 8: Budget and Justification

Item	Quantity	Price per unit	Total
Preparation of data collection tools	50 questionnaires 6 tape recorders Writing materials	@150 @300 @10,000	7500 1800 10,000
Data collection and communication	Airtime	@20000	20,000
Three day didactic training and four day practical training (14 participants)	-lunch -stationery - Clinical practice supplies -Mobilization for clinical practice		650,000
7 Clinical preceptors transport and facilitation	4 days	@5000	140,000
Personnel training and hiring(research assistants) (Meals, refreshments, Lodging +water).	5 data collectors	@10000	50,000
Pilot study	Printing, binding and fare	-	3,000
Printing and binding	Printing Binding	Printing @ 25000 Binding @ 25,000	50,000
Cost of publication	1	50,000	50,000
Data management and analysis	Writing materials Buying software	@5,000 @10,000	15,000
Contingence			20,000
Total			1,017,300

BUDGET JUSTIFICATION

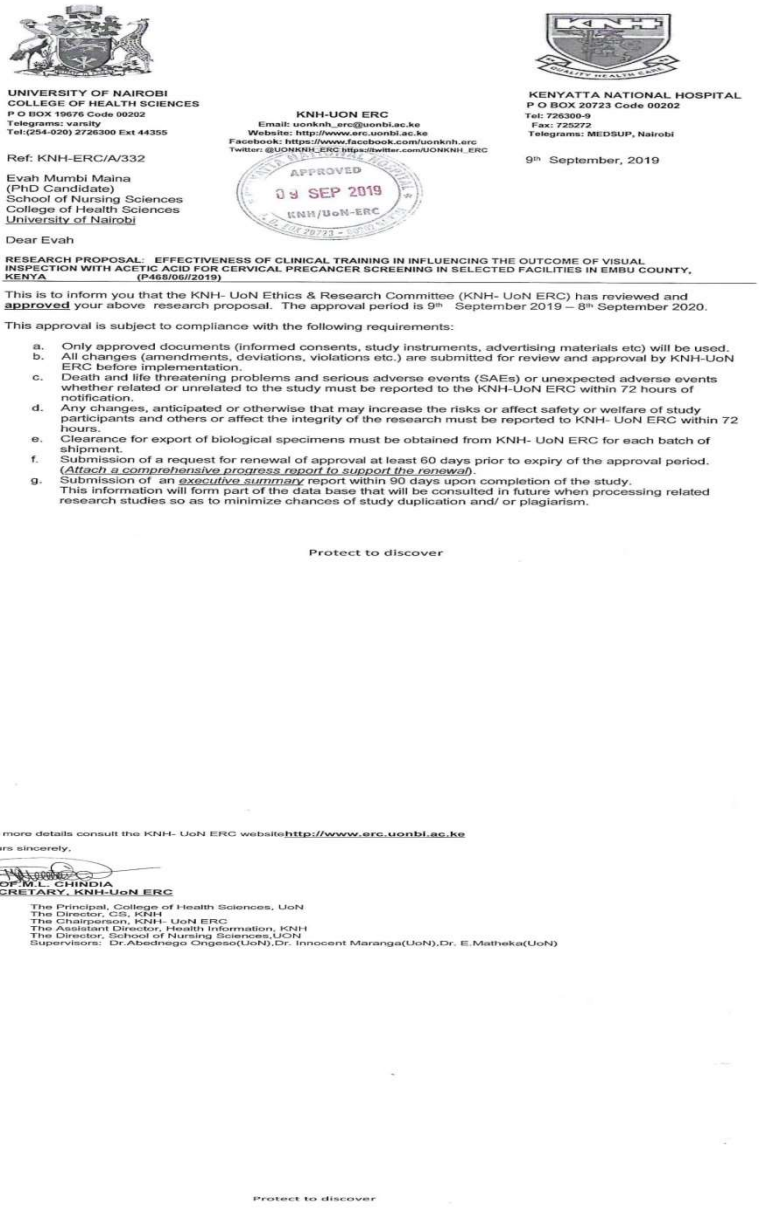
There will be need to reproduce data collection tools by way of photocopying and printing where necessary. The didactic and clinical training carry most expense because the participants who are 14, and two trainers need a well lit classroom set up which will be a hired conference facility, wit projectors, food will be needed for each of the three days in terms of 10 O'clock tea, lunch, water and refreshments, this will be provided by an outside caterer. The researcher will need to reimburse transport to the participants at a cost of 1000 per person per day. There will be need to reproduce training materials, which are manuals, pre-test and post-test, training guides and visual study guides.

On clinical training, this will take a form of cervical cancer screening campaign, mobilization has to be done to get required clients, data collection tools will need to be reproduced- cervical cancer screening registers, cervical cancer screening and treatment register, cervical cancer referral forms, observational checklists. Preceptors who will be seven, will need to be reimbursed of transport and facilitation at 5,000 per person per day, Lunch, tea, refreshments will need to be provided at the Campaign site by an outside caterer for the four days the didactic training will be carried out.

Personnel training and hiring research assistants: these will be five in number; they are experts in cervical cancer screening using VIA. They will assist collect data before intervention and after intervention by way of following up the healthcare providers for the four months. Transport reimbursement will be done for each at 8,000 to cover the period of data collection and further 2,000 to cover the training expenses per person.

Pilot study, printing and binding of final study manuscript are all important parts of the study. The researcher will disseminate her findings in one way by publishing the study in peer referred journals, hence the cost of publication. The contingences have been budgeted for incase of any unforeseen expenses.

Appendix 9: KNH-UON Research Authorization



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/332

9th September, 2019

APPROVED
09 SEP 2019
KNH/UoN-ERC

Evah Mumbi Maina
(PhD Candidate)
School of Nursing Sciences
College of Health Sciences
University of Nairobi

Dear Evah

RESEARCH PROPOSAL: EFFECTIVENESS OF CLINICAL TRAINING IN INFLUENCING THE OUTCOME OF VISUAL INSPECTION WITH ACETIC ACID FOR CERVICAL PRECANCER SCREENING IN SELECTED FACILITIES IN EMBU COUNTY, KENYA (P468/06/2019)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 9th September 2019 – 8th September 2020.

This approval is subject to compliance with the following requirements:

a. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
c. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
e. Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
f. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
g. Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

Protect to discover

For more details consult the KNH- UoN ERC website **http://www.erc.uonbi.ac.ke**

Yours sincerely,

PROF WILLIS OKINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information, KNH
The Director, School of Nursing Sciences,UON
Supervisors: Dr.Abednego Ongeso(UoN),Dr. Innocent Maranga(UoN),Dr. E.Matheka(UoN)

Protect to discover

Appendix 10: NACOSTI Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **291817**

Date of Issue: **10/October/2019**

RESEARCH LICENSE

This is to Certify that Ms.. EVAH MUMBI of University of Nairobi, has been licensed to conduct research in Embu on the topic: EFFECTIVENESS OF CLINICAL TRAINING IN INFLUENCING THE OUTCOME OF VISUAL INSPECTION WITH ACETIC ACID FOR CERVICAL PRECANCER SCREENING IN SELECTED FACILITIES IN EMBU COUNTY, KENYA. for the period ending : 10/October/2020.

License No: **NACOSTI/P/19/1931**

291817

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix 11: Embu County commissioner Research Authorization

REPUBLIC OF KENYA

THE PRESIDENCY

MINISTRY OF INTERIOR AND CO-ORDINATION OF NATIONAL GOVERNMENT

Telephone: Embu 0202310839
FAX 30040
Email: ccembu@gmail.com
When replying please quote

COUNTY COMMISSIONER
EMBU COUNTY
P.O.BOX 3-60100
EMBU

Ref: EBU.CC/ADM/3/37/VOL.111/ (51)

14th October, 2019

All Deputy County Commissioners
EMBU COUNTY

RE: RESEARCH AUTHORIZATION

Please be informed that **Evah Mumbi Maina, Permit No. NACOSTI/P/19/1931** of **University of Nairobi** has been authorized to carry out research in your Sub County for a period ending **10th October, 2020.**

Her research is based on **"Effectiveness of clinical training in influencing the outcome of visual inspection with acetic acid for cervical precancer screening in selected facilities in Embu County".**

Kindly accord her the necessary assistance.

AMBROSE K. NJERU
FOR: COUNTY COMMISSIONER
EMBU COUNTY.

Copy to;
Evah Mumbi Maina

Appendix 12: Embu County Ministry of Education Research authorization

MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING AND BASIC EDUCATION

Telegrams: "Provedu". Embu
Telephone: Embu 31711
Fax: 30956
E-mail: cde.embu@yahoo.com
When replying please quote:

OFFICE OF THE
COUNTY DIRECTOR OF EDUCATION
EMBU COUNTY
P. O. BOX 123-60100
EMBU

Ref. No: EBC/GA/32/VOL.IV/137

14th October, 2019

Evah Mumbi Maina
University of Nairobi
College of Health Sciences
P. O. Box 19676-00202
NAIROBI

RE: RESEARCH AUTHORIZATION

Reference is made to NACOSTI/DM/002 dated 18th September, 2019.

This office acknowledges receipt of your research authorization to carry out research on "**Effectiveness of clinical training in influencing the outcome of visual inspection with Acetic Acid for cervical precancer screening in selected facilities in Embu County,**" for a period ending **8th September, 2020.**

This office has no objection and therefore wishes you success in this undertaking and requests prospective participants/respondents to accord you cooperation or support you may require.

Grace W. Mugu
For: COUNTY DIRECTOR OF EDUCATION
EMBU COUNTY

Copy to: The Principal Secretary, MOE, NAIROBI

The Secretary/CEO, NACOSTI – NAIROBI

The County Coordinator of Health, EMBU COUNTY

The Sub-County Director of Education, EMBU WEST

Appendix 13: Embu County director of health Research Authorization to Subcounty MOH's.

EMBU COUNTY GOVERNMENT

OFFICE OF COUNTY DIRECTOR OF HEALTH

Mobile: +254 771 204 003/+254 707 192 924 Tel: 254 68 30686/30656
Address: P. O. Box 36 – 60100 Embu Town House Email: Info@embu.go.ke Web:www.embu.go.ke

Our Ref No: ECH/ADM/VOL.I Date: 27th November, 2019

TO:

- All SCMOH's
- ✓ **Manyatta**
- ✓ **Runyenjes**
- ✓ **Mbeere South**
- ✓ **Mbeere North**

Att: Nursing Services Managers

RE: RESEARCH AUTHORIZATION – EVAH MUMBI MAINA.

This office has received a request from the above named to conduct data collection for a research from the below named facilities:

1. Kiritiri Health Centre
2. Siakago Level 4 Hospital
3. Runyenjes Sub County Hospital
4. Ishiara Level 4 Hospital
5. Dallas Dispensary
6. Kianjokoma Level 4 Hospital

Name of study: "Effectiveness of Clinical Training in Influencing the outcome of Visual Inspection with Acetic Acid for Cervical Pre-cancer Screening in selected facilities –.Embu County".

Research period: Between October 2019 ending June, 2020.

Kindly accord her the necessary assistance.

COUNTY DIRECTOR OF HEALTH
EMBU COUNTY
P. O. Box 273 - EMBU
Fax: 068 - 31791
Tel: 068 - 31883 / 31081
Email: cdh embu@gmail.com

DR. STEPHEN KANIARU
COUNTY DIRECTOR OF HEALTH
EMBU COUNTY

C.C

- CECM – HEALTH
- COH

Appendix 14: Embu County director of health research Authorization to Embu level 5 Hospital.

EMBU COUNTY GOVERNMENT

OFFICE OF COUNTY DIRECTOR OF HEALTH

Mobile: +254 771 204 003/+254 707 192 924 Tel: 254 68 30686/30656
Address: P. O. Box 36 – 60100 Embu Town House Email: Info@embu.go.ke Web:www.embu.go.ke

Our Ref No: ECH/ADM/151/VOL.I Date: 14th October, 2019

TO:

- **Ag: CEO**
  Embu Level 5 Hospital

RE: RESEARCH AUTHORIZATION - EVAH MUMBI MAINA .

This office has received a request from the above named to conduct data collection for a research from your facility.

Name of study: "Effectiveness of Clinical Training in Influencing the outcome of Visual Inspection with Acetic Acid for Cervical Pre-cancer Screening in Selected Facilities in Embu Level 5 Hospital - Embu County".

Research Period: between **October 2019** ending **June, 2020.**

Kindly accord her the necessary assistance.

Thank you.

COUNTY DIRECTOR OF HEALTH
EMBU COUNTY
P O Box 273, EMBU
Fax: 068 - 319791
Tel: 068 - 31883 31081
Email: ech embu@gmail.com

DR. STEPHEN KANIARU
COUNTY DIRECTOR OF HEALTH
EMBU COUNTY

- CEC – Health
- Chief Officer Health

Appendix 15: Map of Embu County

Appendix 16: Originality Form

UNIVERSITY OF NAIROBI

Declaration of Originality Form

This form must be completed and signed for all works submitted to the University for examination.

Name of Student: EVAH MUMBI MAINA

Registration Number: H80/5504/2019

College: HEALTH SCIENCES

Faculty/School/Institute: SCHOOL OF NURSING

Department: MIDWIFERY

Course Name: PhD (NURSING SCIENCES)

Title of the work:

Effectiveness of clinical training in influencing the outcome of visual inspection with Acetic acid for cervical Precancer Screening in selected facilities in Embu County, Kenya.

DECLARATION

1. I understand what Plagiarism is and I am aware of the University's policy in this regard
2. I declare that this _____ (Thesis, project, essay, assignment, paper, report, etc) is my original work and has not been submitted elsewhere for examination, award of a degree or publication. Where other people's work, or my own work has been used this has properly been acknowledged and referenced in accordance with the University of Nairobi's requirements.
3. I have not sought or used the services of any professional agencies to produce this work
4. I have not allowed, and shall not allow anyone to copy my work with the intention of passing it off as his/her own work
5. I understand that any false claim in respect of this work shall result in disciplinary action, in accordance with University Plagiarism Policy.

Signature: _____

Date: 5/05/2020

Appendix 17: Turnitin Report Signed

CLINICAL TRAINING OF VISUAL INSPECTION WITH ACETIC TO INFLUENCE THE ACCURACY OF OUTCOME IN CERVICAL PRECANCER SCREENING IN SELECTED FACILITIES AT EMBU COUNTY, KENYA.

ORIGINALITY REPORT

15%	13%	5%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	ecommons.aku.edu Internet Source	3%
2	www.ajol.info Internet Source	1%
3	ir-library.ku.ac.ke Internet Source	1%
4	Submitted to Kenyatta University Student Paper	1%
5	pdf.usaid.gov Internet Source	1%
6	www.researchgate.net Internet Source	<1%
7	erepository.uonbi.ac.ke Internet Source	<1%
8	repository.unam.edu.na Internet Source	<1%

DEPARTMENT OF NURSING
CHAIRMAN
31 JUL 2023
UNIVERSITY OF NAIROBI
P.O. Box 30197, NAI

Dr Emmah K. Mathek — 31/07/2023 — 1st Supervisor & Departmental head.

Appendix 18: pretest/ Post test

Name: _____ Date: _____

VIA AND CRYOTHERAPY CLINICAL TRAINING
Pre/Post Test

1. What is the name of the virus that causes cervical cancer?

2. How many years does it take for cervical pre-cancer to develop into cervical cancer?

3. Only women who have many partners will get HPV.

   True ☐ False ☐

4. Women with HIV are at an increased risk of developing cervical cancer.

   True ☐ False ☐

5. All women between the ages of 30 and 49 should be screened at least once.

   True ☐ False ☐

6. What is the name of the place on the cervix where the columnar epithelium meets the squamous epithelium?

7. Where on the cervix do most pre-cancers of the cervix develop? The ectocervix, the SCJ, the endocervix or the cervical os?

8. Name two things you might see on a normal cervix that you could mistake for an abnormal lesion.

9. When performing VIA, vinegar or acetic acid should be 2-3% in strength.

   True ☐ False ☐

10. What do you want to make sure you can see on the cervix before performing VIA?

11. A VIA positive lesion can be pale white and far away from the SCJ.

    True ☐ False ☐

12. Name two safe and effective methods of treatment for cervical pre-cancer.
    a.

    b.

13. Name three things a woman should be told before she has cryotherapy.
    a.

    b.

    c.

14. How long should the cryotherapy probe be held on the cervix during treatment?

15. A lesion that extends onto the vaginal wall can be treated safely with cryotherapy.

    True ☐ False ☐

16. A woman should expect to have heavy bleeding for up to two weeks after cryotherapy.

    True ☐ False ☐

17. Name three reasons a woman should return to a health centre after cryotherapy.
    a.

b.

c.

18. Disinfection of instruments requires having access to an autoclave.

    True ☐ False ☐

19. Why is the Single Visit Approach (SVA) helpful in reducing the chances of a woman developing cervical cancer?

20. Name two symptoms of invasive cervical cancer.
    a.

    b.

21. How often should women without HIV return for screening if their VIA was negative?

22. A woman with a VIA positive lesion who has symptoms of PID (pelvic inflammatory disease) can still be treated that day with cryotherapy.

    True ☐ False ☐

Appendix 19: Classroom Training Schedule/Timetable

HSP Training in VIA and Cryotherapy

Agenda

DAY ONE – 8:30 AM to 5:00 PM

8:30 AM - Welcome and Introductions– (30 min)- Facilitator 1

9:00 AM - Objectives, Logistics, Icebreaker -(30 min)- Facilitator 1
- Activity - Two Truths and a LIe

9:30 AM - Pre-Test – (15 min)- Facilitator 2

10:00 AM - Cervical Cancer Overview – (15 min)- Facilitator 1

10:15 AM - Tea – (30 min)

10:45 AM - Female Anatomy - (15)- Facilitator 2
- Activity - Label normal female anatomy pictures in pairs

11:00 PM - The Human Papilloma Virus – (45 min)- Facilitator 1
- Activity - Pass it around

11:45 PM - Anatomy of the Normal Cervix – (30 min)- Facilitator 2

12:15 PM - Lunch – (60 min)

1:15 PM - Variations of the Normal Cervix – (45 min)- Facilitator 1
- Activity - Cards, drawing exercises with grid (endocervix, ectocervix, SCJ)
- Activity - Matching of key vocabulary

2:00 PM - Screening for Cervical Pre-Cancer and Cancer – (30 min) – Facilitator 1

2:30 PM – VIA - (2 1/2 hours)- Facilitator 1&2
- Medical Aid Film
- Activity - VIA demonstration and stations using clean technique
- Activity - Flip cards in small groups (positive vs negative)

5:00 PM - Closure

DAY TWO – 8:30 AM to 5:00 PM

8:30 AM - Welcome - (30 min)- Facilitator 2

- Energizer; The Human Knot
- Review of Material from Day 1

9:00 AM - Treatment of Cervical Pre-Cancer - (15 minutes)- Facilitator 2

9:15 AM - Cryotherapy – (45 min) –Facilitator 1

10:00 AM - Screen and Treat (15 minutes)- Facilitator 1

10:15 AM - Tea - (30 min)

10:45 AM - Counselling for VIA and Cryotherapy – (60 min) Facilitator 1&2

- Activity - Practice counselling role plays in small groups

11:45 AM - Management of Cervicitis and PID– (30 min)- Facilitator 2

12:15 PM - Infection Prevention; high-level disinfection– (30 min) Facilitator 1

12:45 PM - Community Engagement - (15 min)- Facilitator 2

1:00 PM - Lunch – (60 min)

2:00 PM - Small Groups (60 min) - 3 groups of 20 minutes each- Facilitator 1&2

- Activity - Review of VIA and Cryo forms and logs
- Activity - Review of clean technique
- Activity – More VIA card review

3:00 PM – Mid Course Review (30 minutes) Facilitator 2

Activity – In large group with test of cervical images

3:30 PM - Interactive Game with Questions (30 minutes)- Facilitator 1

- Press the Button/Ring the bell

4:00 PM - Parking Lot Review and Post-test (45 minutes)- Facilitator 1&2

4:45 PM - Logistics for Clinical Training (15 min)- Facilitator 1

5:00 PM - Closure

Appendix 20: Counselling checklist

COUNSELLING CHECKLIST

STEPS TO GOOD COUNSELLING	Participant 1	Participant 2	Participant 3
Greets woman respectfully			
Asks if she understands purpose of visit			
Explains important points about cervical cancer and describes exam/procedure			
Asks if she has questions and if she agrees			
Gives time for her to respond			
Explains rights to privacy and confidentiality			
Ensures she feels safe to express herself			
Encourages her participation throughout			
Addresses her concerns			
Uses simple language she can understand			
Does not prescribe solutions			

Appendix 21: Couselling overview for cervical cancer screening

Counselling Overview for Cervical Cancer Screening

Counselling is a conversation and exchange of information between a woman and her provider that creates a PARTNERSHIP. By using skills of good communication you will provide an accepting environment for your clients. Your clients will be able to ask questions, voice concerns, and participate in their care with understanding of what is being done, why they are having screening and possibly treatment. They will be more likely to comply with instruction and to get better, and will be more likely to return for care in the future.

Counselling takes place through the entire visit: before, during and after all procedures.

How to be a "good counselor" for your client:

- Create a private place where you can both talk without being overheard or interrupted
- Greet the woman warmly by name, introduce your self, and invite her to sit down
- Assure her that your conversation is kept private and not repeated to other women, CBDA, or family members without her permission
- Use simple clear language and words the woman can understand
- Encourage her participation by nodding, making eye contact, smiling and staying engaged in what she is saying to you
- Listen *to* the woman more than talk *at* the woman
- Support her so she can express her circumstances, concerns and special needs
- Respond to her questions and concerns directly
- Explain options available and respect the decisions she makes
- Explain procedures before they are done and while they are being done
- Verify she understands what is being discussed by having her repeat the directions or information you have provided
- Invite her to return if she wishes, and tell her how she can arrange for a return visit
- Allow enough time for the visit

ALL CLIENTS HAVE THE RIGHT TO:

Privacy **Confidentiality**

Information **Discussion**

Dialogue **Refuse Treatment**

When a good counselor has a bad day. Here are some behaviour s to avoid as a counselor.

Do NOT:

- Appear distracted by a cell phone, watch, or paperwork
- Look at a pad of paper or write notes the entire time a woman is speaking or answering questions
- Allow interruptions during the visit: leave the room, or answer questions from coworkers (unless a clear emergency)
- Provide large amount of technical or detailed or irrelevant information
- Use a harsh tone of voice or act impatient
- Tell a woman what she should do, or force her to do something she is hesitant about

(Adapted from Chapter 3 of Comprehensive Cervical Cancer Control, WHO, 2006)

Appendix 22: Counselling role play scenarios

COUNSELLING ROLE PLAY SCENARIOS

Instructions:
Practice in groups of 3.
One person should play the role of the patient, another the medical provider and the third is the observer.
Change roles with each of the scenarios below.
Use the counselling checklist. Give each other feedback after each scenario.

VIA COUNSELLING SCENARIOS

With each of these, practice the counselling before VIA. Use the scenario to guide your post VIA counselling.

1. The woman's exam was VIA negative.
Her exam was completely normal. She does not have HIV. Inform her of the results of her exam and any follow-up. When should she return to be screened?

2. The woman's exam was VIA negative.
Her exam was completely normal. She is HIV positive. Inform her of the results of her exam and any follow-up. When should she return to be screened?

3. The woman's VIA test was positive.
Her lesion is appropriate for treatment with cryotherapy. How do you inform her of her test results?

4. The woman's VIA test was positive.
But her lesion is too big to treat. How do you counsel her about the results?

5. The woman's exam was suspicious for cancer.
How do you counsel her about the results of her exam? Practice telling her that she might have cancer. Explain that you will refer her for a biopsy or take it now. Explain what a biopsy is and when the results will be available.

CRYOTHERAPY COUNSELLING SCENARIOS

1. You are seeing a client whose lesion is appropriate for treatment with cryotherapy.

- Explain the procedure in detail and expected side effects
- Explain the benefit and the risks of the procedure.
- Ask the woman if she consents to have the treatment.
- Have her sign the consent form.

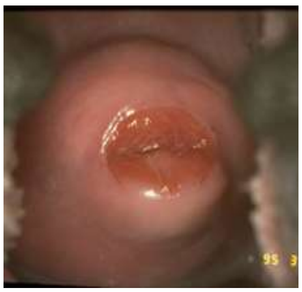
2. You have performed cryotherapy. Prior to sending the woman home, review the key post-cryotherapy messages.

- Review self care (sexual relations, condoms, when she should return for her next visit)
- Review normal side effects of cryotherapy.
- Review the danger signs and what action she should take if she experiences them.

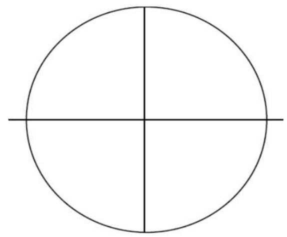
Appendix 23: Level one training VIA and Cryotherapy homework/ cervical quiz

Level 1 Training in VIA and Cryotherapy Homework

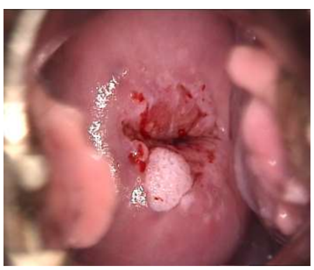
- **Instructions: 1) Answer the questions**
  2) Draw and label anything of note visualised in the cervical picture
  3) Select a diagnosis: VIA positive, VIA negative, VIA unsatisfactory or suspicious for cancer



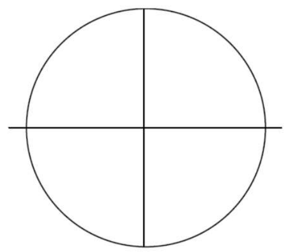
	YES	NO
Suspicious for cancer?		
Can you see the entire SCJ?		
VIA positive?		
Is she a candidate for cryo?		
Lesion smaller than the cryo tip?		



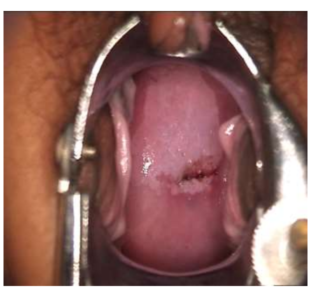
☐ VIA negative
☐ VIA positive
☐ VIA unsatisfactory, SCJ not visible
☐ Suspicious for cancer



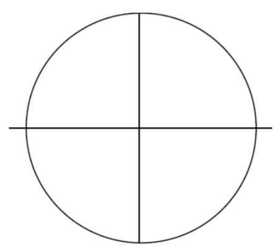
	YES	NO
Suspicious for cancer?		
Can you see the entire SCJ?		
VIA positive?		
Is she a candidate for cryo?		
Lesion smaller than the cryo tip?		



☐ VIA negative
☐ VIA positive
☐ VIA unsatisfactory, SCJ not visible
☐ Suspicious for cancer



	YES	NO
Suspicious for cancer?		
Can you see the entire SCJ?		
VIA positive?		
Is she a candidate for cryo?		
Lesion smaller than the cryo tip?		



☐ VIA negative
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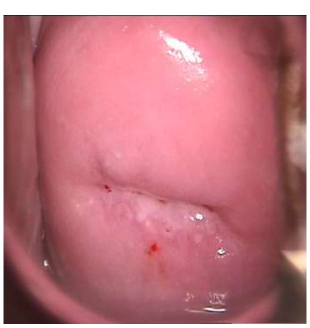
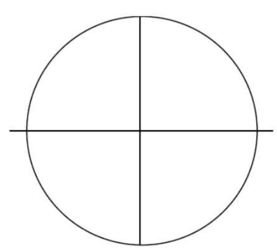
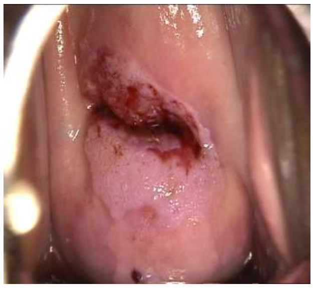
☐ VIA unsatisfactory, SCJ not visible
☐ Suspicious for cancer



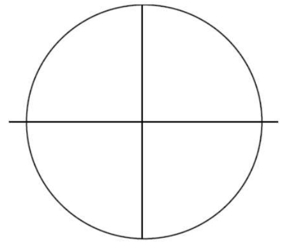
	YES	NO
Suspicious for cancer?		
Can you see the entire SCJ?		
VIA positive?		
Is she a candidate for cryo?		
Lesion smaller than the cryo tip?		



☐ VIA negative
☐ VIA positive
☐ VIA unsatisfactory, SCJ not visible
☐ Suspicious for cancer

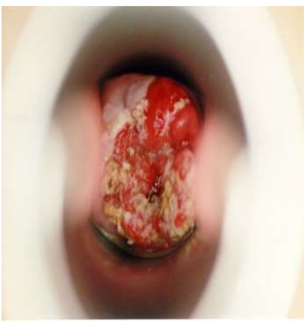


	YES	NO
Suspicious for cancer?		
Can you see the entire SCJ?		
VIA positive?		
Is she a candidate for cryo?		
Lesion smaller than the cryo tip?		

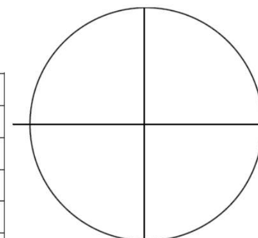


- ☐ VIA negative
- ☐ VIA positive
- ☐ VIA unsatisfactory, SCJ not visible
- ☐ Suspicious for cancer

→



	YES	NO
Suspicious for cancer?		
Can you see the entire SCJ?		
VIA positive?		
Is she a candidate for cryo?		
Lesion smaller than the cryo tip?		



- ☐ VIA negative
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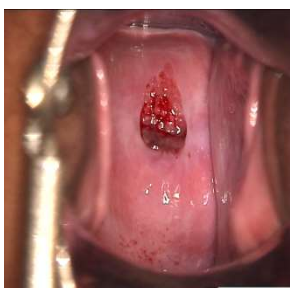
- ☐ VIA unsatisfactory, SCJ not visible
- ☐ Suspicious for cancer



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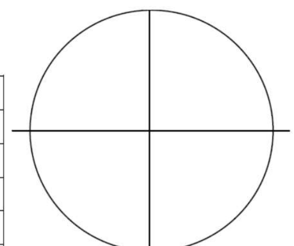
Can you see the entire SCJ?		
VIA positive?		
Is she a candidate for cryo?		
Lesion smaller than the cryo tip?		



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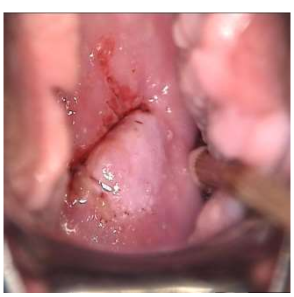

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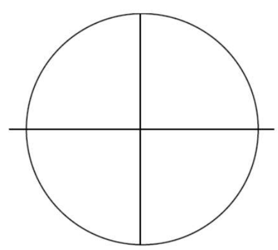
VIA positive?		
Is she a candidate for cryo?		
Lesion smaller than the cryo tip?		



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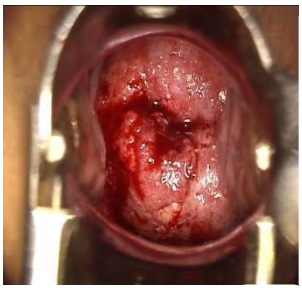
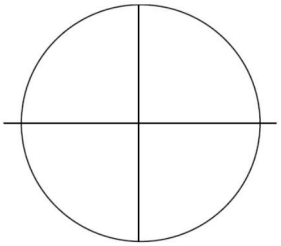
- ☐ VIA unsatisfactory, SCJ not visible
- ☐ Suspicious for cancer



	YES	NO
Suspicious for cancer?		
Can you see the entire SCJ?		
VIA positive?		
Is she a candidate for cryo?		
Lesion smaller than the cryo tip?		

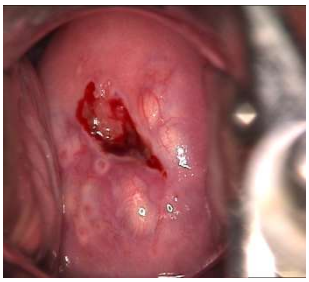


☐ VIA negative

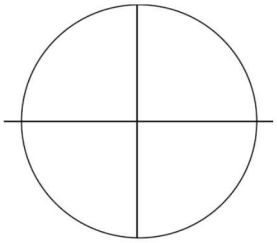
☐ VIA positive

☐ VIA unsatisfactory, SCJ not visible

☐ Suspicious for cancer



	YES	NO
Suspicious for cancer?		
Can you see the entire SCJ?		
VIA positive?		
Is she a candidate for cryo?		
Lesion smaller than the cryo tip?		



☐ VIA negative

☐ VIA positive

☐ VIA unsatisfactory, SCJ not visible

☐ Suspicious for cancer

(Photo credits: Jhpiego, Jose Jeronimo, IARC, PATH, *R. Sankaranarayana et al.)*

Appendix 24: Press the button game questions

"PRESS THE BUTTON/RING A BELL" GAME QUESTIONS

1. Name four potential barriers to a woman being screened for cervical pre-cancer.
2. Name three normal findings on the cervix.
3. Is it harmful to perform VIA if a woman is pregnant? Please explain your answer.
4. Why is counselling important. Name 2 reasons.
5. Why is getting a woman's consent important? Name 2 reasons.
6. Why is it important to see the SCJ?
7. What is the virus that causes cervical cancer and how common is it?
8. What is the most common side effect of cryotherapy treatment?
9. After cryotherapy treatment, how long should a woman wait to have sex?
10. Between what ages should women be screened for cervical cancer?
11. For how long do you apply vinegar to the cervix?
12. How long does it take cervical pre-cancer to develop into cervical cancer?
13. At what age should women with HIV be screened for cervical cancer?
14. Name one risk factor for cervical cancer.
15. Why are screen and treat programmes important?
16. If a woman is treated with cryotherapy when should she return for VIA testing again?
17. What are the 3 questions you must answer while doing VIA?
18. What are the 4 questions you must answer to do cryotherapy?
19. List 3 signs of invasive cervical cancer
20. What are the 3 methods of treatment for pre-cancerous lesions of the cervix?

Appendix 25: Midcourse Image Assessment Answer sheet

Midcourse Image Assessment Answer Sheet

For each image, assume that acetic acid has been applied for 2 minutes and the cervix evaluated. Identify your VIA finding and management plan.

Possible VIA Findings:	Possible Management Options:
Negative	No treatment
Positive	Cryotherapy
Suspicious for Cnacer	Refer for treatment **or** Refer for diagnosis and management

Image Number	VIA Finding	Management Plan
(1)		
(2)		
(3)		
(4)		
(5)		
(6)		
(7)		
(8)		
(9)		
(10)		
(11)		
(12)		
(13)		
(14)		
(15)		
(16)		
(17)		
(18)		
(19)		
(20)		

Appendix 26: vocabulary matching game

Vocabulary Matching Game

- **Ectropion/Ectopy**
- **Squamous Epithelium**
- **Nabothian Cyst**
- **Columnar Epithelium**

- **Cervical Polyp**
- **SCJ**
- **Endocervix**
- **Ectocervix**

Common normal finding on exam. Small growth that starts in the cervical canal and extends to the outer portion of cervix.

Mucus glands in the columnar epithelium that are covered over by squamous cells. They collect mucus secretions because they are covered.

When the red and bumpy columnar cells are visible far out on the cervix.

This is the area where the red columnar epithelium meets the pink squamous epithelium.

Lines the inner portion of the cervix. Part if it is visible on the outer portion of the cervix from adolescence to menopause. Appears red and bumpy. It is normal.

Found on the outer portion of the cervix.
It is smooth and pink.

The outer portion of the cervix.

The inner portion of the cervix.

Appendix 27: Cervical cancer referral form

MINISTRY OF HEALTH

Facility Referring: _____

_____ Facility Tel. No. _____

_____

Date of Birth (dd /mm /yyyy) / /_____

_____ CECAP Client No. _____

Date of Screening: (dd /mm /yyyy) / / _____

CERVICAL CANCER REFERRAL FORM

County Name:

Client Name:

Client Tel. No.

Results of Screening: *(tick as appropriate)*

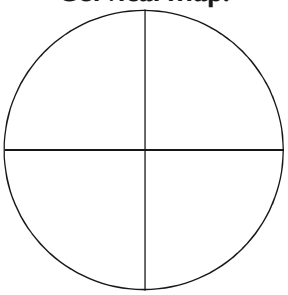
VIA Test: ☐ VIA Negative ☐ VIA Positive **VILI Test:** ☐ VILI Negative ☐ VILI Positive ☐ Suspicious for Cancer **Pap Smear:** ☐ Normal

ASCUS/ASC-H ☐ LSIL ☐ HSIL/CIS ☐ AGUS ☐ Invasive Cancer Other *(Specify):*

_____

HPV Test: Negative Positive

Cervical map:



Intermediary Tests: *(tick as appropriate)*

Colposcopy: ☐ Satisfactory ☐ Unsatisfactory ☐ Normal ☐ Acetowhite
☐ Leukoplakia ☐ Punctuation ☐ Abnormal Vessels ☐ Mosaicism

Cervicography: ☐ Satisfactory ☐ Unsatisfactory ☐ Normal ☐ Acetowhite
☐ Leukoplakia ☐ Punctuation ☐ Abnormal Vessels ☐ Mosaicism

Reasons for Referral: *(tick as appropriate)*

☐ No Cryotherapy Equipment ☐ Lesion Not Eligible for Cryotherapy ☐ Suspicious for Cancer Other Gynecological Problem *(specify):*
_____

Referred to which Facility: _____

Provider's Name: _____ Cadre: _____ Signature _____

Cervical Cancer Screening and Treatment Form

Ministry of Health

Appendix 28: Cervical cancer Screening and Treatment form

Client Number: / /

Visit Date (dd/mm/yyyy) ____ ____ ____

Client Name: _____

Treatment Supporter's Name: _____

Facility Name: _____ DOB (dd/mm/yyyy) / ____ /____ Phone No:

Service Point: ☐ MCH/FP ☐ CCC ☐ GOPC ☐ Outreach Other (Specify) _____

Relationship: _____ Phone No: _____

County: _____ Sub County: _____

_____

Referred in: ☐ Yes ☐ No **If yes**, from _____ Reason for Referral: _____

Profiling: Is the client Pregnant

Yes No If Yes, Gestational Age: _____

Visit Type: *(pick only one visit type and mark with a tick in the appropriate box)*

☐ Initial Screening ☐ Routine Screening ☐ Treatment Visit ☐ Post-Treatment Screening ☐ Post-Treatment Complications

Screening Method and Results:

VIA Test: ☐ VIA Negative ☐ VIA Positive **VILI Test:** ☐ VILI Negative ☐ VILI Positive ☐ Suspicious for Cancer **Pap Smear:** ☐ Normal ☐ ASCUS/ASC-H ☐ LSIL ☐ HSIL/CIS ☐ AGUS ☐ Invasive Cancer

Other *(Specify):* _____

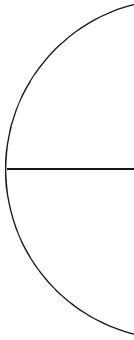
HPV Test: ☐ Negative ☐ Positive

Intermediary Tests:

Colposcopy: ☐ Satisfactory ☐ Unsatisfactory ☐ Normal ☐ Acetowhite ☐ Leukoplakia ☐ Punctuation ☐ Abnormal Vessels ☐ Mosaicism

Cervicography: ☐ Satisfactory ☐ Unsatisfactory ☐ Normal ☐ Acetowhite ☐ Leukoplakia ☐ Punctuation ☐ Abnormal Vessels ☐ Mosaicism

Cervical M



Pre-Cancer Treatment: Screening today, Cryotherapy performed today (Single Visit Approach - SVA) ☐ Postponed Cryotherapy

Other pre-cervical cancer specific treatment performed today (e.g. LEEP): _____

Other pre-cervical cancer specific treatment postponed (e.g. LEEP)

Screening today, Cryotherapy postponed; *Reason*

HIV Status: Negative Positive Known Positive Unknown	Post-Treatment complications related to: Cryotherapy LEEP Other (s
Follow up Date / Next Appointment: _____/_____/_____	Other Cervical cancer-related treatment (*Advanced Care Sites only*), Specify
Treatment for other ailments (specify):	

Referral Out *(If Applicable, fill the **Cervical Cancer Referral Form**)* referred to: _____

Provider's Name: _____ Cadre: _____

ASCUS – Atypical Squamous Cells of Undetermined Significance **ASC-H** – Atypical Squamous Cells-High grade lesion not excluded
AGUS – Atypical Glandular cells of Undetermined

Appendix 29: Notice of a free cervical cancer screening medical campaign.

Notice for cervical cancer screening Campaign at Dallas Dispensary.

TANGAZO!! TANGAZO!!

FREE CERVICAL CANCER SCREENING

WATAALAMU WA CERVICAL CANCER SCREENING, WAKISHIRIKIANA NA IDARA YA AFYA YA EMBU COUNTY, WANAWATANGAZIA CERVICAL CANCER SCREENING NA MATIBABU YA PRE-CANCER BILA MALIPO KWA KINA MAMA WOTE WA UMRI WA 25-49YRS. TAREHE 24/2/2020 HADI 27/2/2020 (JUMATATU HADI ALHAMISI) DALLAS DISPENSARY. KUANZIA SAA MBILI NA NUSU HADI SAA KUMI KILA SIKU(8:30AM- 4:00PM).

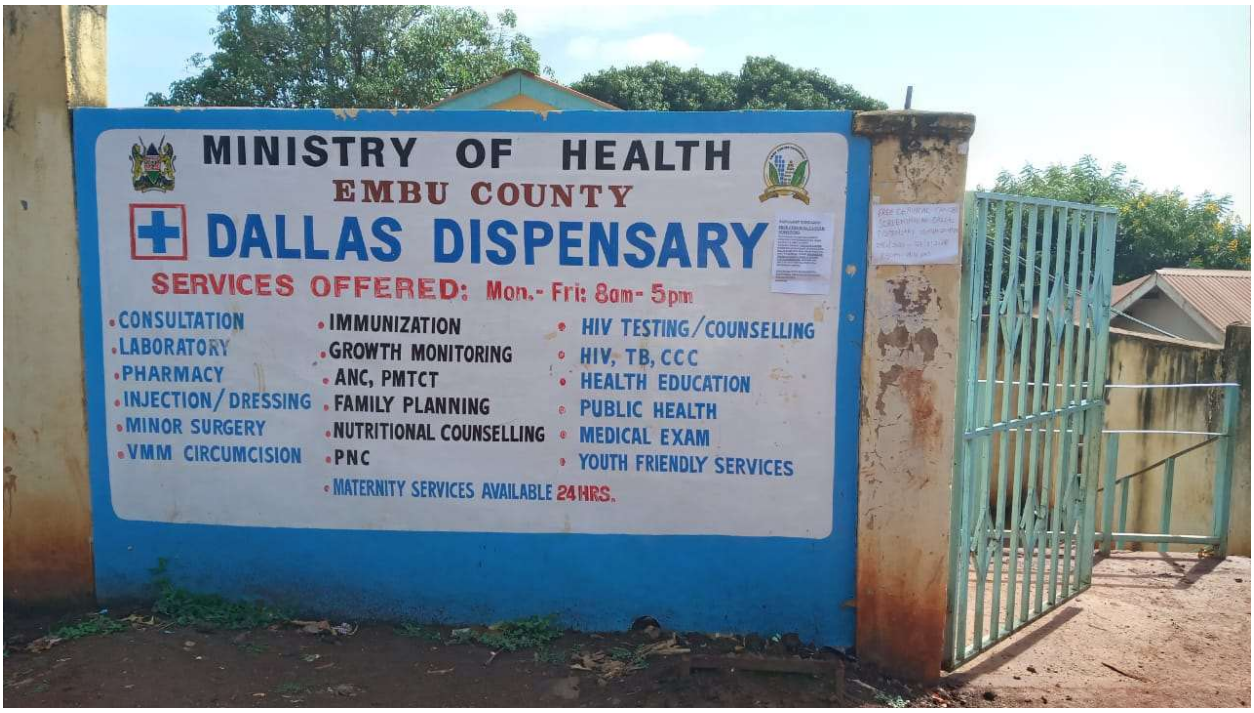
KINA MAMA WOTE WANAHIMIZWA KUJITOKEZA, KWANI KUZUIA NI BORA KULIKO KUTIBU!

KARIBUNI!!

Evah Maina

Principal investigator

Appendix 30: Training and clinical campaign photos



Dallas dispensary Main gate

Mr Patrick facilitating one of the classroom/Theory training sessions.

A VIA screening room with a cryotherapy machine

Women/clients waiting for VIA screening services during clinical training.

A preceptor looks on as trainee fills in client's details in the screening register.

A group of trainees participating in one of the small class group discussions.