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PREVALENCE AND DETERMINANTS OF PRECANCEROUS LESIONS IN HPV-DNA POSITIVE WOMEN IN THE POPULATION SOLUTIONS FOR HEALTH CERVICAL CANCER SCREENING PROGAM IN ZIMBABWE

BY

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Abstract

Globally cervical cancer is the most common neoplastic disease affecting women and second only to breast cancer. In Zimbabwe cervical cancer is the most leading common cancer among black women. Cervical cancer screening in Zimbabwe is opportunistic and cervical cancer remains a considerable health problem with a high proportion of diagnoses in advanced stages. It has become imperative to enhance cervical cancer screening services to reduce cervical cancer related morbidity and mortality as well as other negative consequences to the families and communities. Despite the high incidence of cervical cancer reported in Zimbabwe, population-based studies on the HPV prevalence and correlates distribution are scarce. No information is available on cervical cancer precancerous lesion prevalence among women who test positive for HPV DNA. It is against this background that the researcher is carrying out this study aimed at determining the prevalence and determinants of HPV-DNA positive results in Zimbabwe. The significance of this study was centred on improving treatment outcomes of HPV DNA positive women, as well as helping program managers to identify gaps and mitigate the gaps in the cervical cancer screening program. The scope of the study was delimited to a sample of 385 HPV-DNA positive women who had VIAC done and were selected from the Population Solutions for Health's seven sites database. This is quantitative research which utilised an analytical cross-sectional study and data was entered into Epi info 7 and analysed using STATA version 13. The prevalence of cervical cancer precancerous lesions among HPV positive women was 28.31%. Demographic characteristics which included level of education and employment status were found to be not associated with precancerous cervical lesions [COR: 1.1 (95%CI: 0.9-1.5); p=0.159]. Women who indicated that they used condoms were 1.7 times more likely to have precancerous cervical lesions [COR: 1.7 (95% CI: 1.1-2.8); p=0.022]. This study found that women who were HIV positive and on treatment were 51% less likely to be treated for precancerous cervical lesions [COR: 0.5 (95%CI: 0.3-0.8); p=0.003]. Age at first sexual debut at 18 years was found to be statistically significant at 12% reduced odds of precancerous cervical lesions [COR: 0.9 (95%CI: 0.8-1.0); p=0.010]. Women aged above 40years were 2.8 times more likely to have precancerous lesions. History of STI has a significant contribution to cervical cancer. Screening of HIV positive women for cervical cancer is independently associated with reduced odds of cervical cancer.

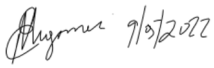
Keywords: Cervical cancer screening, Precancerous lesions, HPV DNA, cervical dysplasia, prevalence.

Declaration Page

I declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted nor will it ever be submitted to another university for the award of a degree.

-Vongai Museza----------  ----05/05/2022--

Student's Full Name Student's Signature

Dr Eltony Mugomeri---------- 

Main Supervisor's Full Name Main Supervisor's signature

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Special thanks to my husband and children for their continued support and encouragement.

Dedication Page

This study is dedicated to all the cervical cancer survivors in Zimbabwe and my late grandmother Shumirai for their courage, continued fighting and endurance. I further dedicate this study to all the healthcare workers who work tirelessly to prevent and treat cervical cancer, including those who offer palliative care services in Zimbabwe.

List of Acronyms and Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
AUREC	Africa University Research Ethics Committee
CD4	Cluster of Differentiation 4
CIN	Cervical intraepithelial neoplasia
DNA	Deoxyribonucleic Acid
HPV	Human Papilloma Virus
HIV	Human Immunodeficiency Virus
LEEP	Loop Electrosurgical Excision Procedure
MOHCC	Ministry of Health and Child Care
PSH	Population Solutions for Health
SPSS	Statistical Package for Social Sciences
VIA	Visual Inspection with Acetic acid
VIAC	Visual Inspection with Acetic acid and Cervicography
WHO	World Health Organisation

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Cervical cancer is the fourth most diagnosed cancer among females worldwide and the first among black women ahead of breast cancer, Kaposi sarcoma, eye cancer and non-Hodgkin lymphoma among others. Global trends show that most cervical cancer high risk countries are in Sub-Saharan Africa, especially Malawi, Mozambique, Zambia, and Zimbabwe.

The cervix is the narrow or constricted inferior part of the uterus, part of which projects into the vagina and it differs histologically from the rest of the uterus. The cervical region around the external os has periodic exposure to the vaginal environment which can cause reprogramming of the epithelial cells, occasionally leading intraepithelial neoplasia (Mamaru, Molla, Abebe, & Menberesbhat, 2020). Cancer is defined as malignant, autonomous, uncontrolled growth and division of cells. The morbidity and mortality of cervical cancer in Zimbabwe is highly due to late presentation of disease and intercurrent diseases including HIV/AIDS and limited access to screening, early detection, and diagnostic and treatment services.

Although cervical cancer incidence continues to decrease throughout the developed world, because of rigorous screening and vaccination campaigns, the disease remains a major cause of cancer-related morbidity and mortality in resource limited regions including Sub-Saharan Africa (Chinn & Tewari, 2020). Zimbabwe is one of the sub-Saharan African countries with a high burden of cervical cancer of 33.2% according to the Zimbabwe National Cancer Registry of 2016 (Registry, Annual Report, 2016),

The Human Papilloma Virus (HPV) is the most common and known cause of cervical cancer. Infection with HPV is necessary for cervical cancer to develop.

Cervical intraepithelial neoplasia (CIN) is a premalignant lesion that may exist at one of three stages CIN1, CIN2 and CIN3 and if left untreated CIN2 and CIN3 (collectively referred to as CIN2+) can progress to cervical cancer (World Health Organisation, 2013). It is estimated that about 1-2% of women have CIN2+ each year and the rate is reportedly higher in HIV positive women at 10%. Oncogenic cell transformation occurs almost exclusively in a discreet cell population, and this enables primary prevention with HPV vaccination as well as secondary prevention by detecting and treating true precancerous lesions (Petry, 2014).

Cervical cancer prevention and control programs are developed and designed to decrease cervical cancer incidence, morbidity, and mortality (World Health Organisation, 2014).Cervical cancer offers a good means for primary and secondary prevention as it takes years from the initial HPV infection to persistent HPV infection, development of precancerous lesions and finally to invasive cancer (Petry, 2014). Infection of the uterine cervix with HPV is very common especially in women in their early 20s with the prevalence declining with age.

Unlike most cancers, cervical cancer can be prevented through early detection of precancerous lesions with the screening and treatment of lesions. The cervical cancer precancerous lesions can be identified by one of the three methods, which are Pap smear, visual inspection with acetic acid (VIA) and human papillomavirus (HPV) DNA test. It is one of the few malignancies that is preventable, as the 10 to 20 year lag between the precancer and the invasive stages gives an opportunity to screen, detect and treat early.

1.2 Background to the study

Cervical cancer is currently a global health concern, and a majority of new cases are found in developing countries including those in sub–Saharan Africa encompassing Zimbabwe. In Zimbabwe cervical cancer is the most leading common cancer among black women accounting for 33.2% of all cancers among the black women (Registry, Annual Report, 2009). Cervical cancer screening in Zimbabwe is opportunistic and cervical cancer remains a considerable health problem with a high proportion of diagnoses in advanced stages. The sexually transmitted HPV (especially subtypes 16 and 18) is now recognised as the principal cause of cancer of the uterine cervix (MOHCC, National Cancer Prevention and Control Strategy for Zimbabwe, 2014-2018). Infection with these viruses is prevalent in young women but the factors that cause it to persist and cause invasive cancer in some cases is still being researched.

VIA is the most common widely used screening test in developing countries and it was adopted in Zimbabwe in 2012 (Gabaza , et al., 2019). VIA allows for a see and treat approach and is usually associated with overtreatment of clients who present with what seems like precancerous lesions after applying acetic acid.

Several countries have implemented a transition to HPV testing for cervical cancer in response to the introduction of the HPV vaccine and evidence indicating that HPV screening is more effective than cytology (Simms , et al., 2017). The causal relationship between high-risk HPV infection and precancerous lesions or cervical cancer led to the development of strategies to increase screening performance and prevent cervical cancer. The increased sensitivity of HPV-DNA testing compared to cervical cytology favours HPV-DNA testing as a primary screening test (Teixeria, et al., 2020). Molecular HPV testing methods are based on the detection of DNA from high-risk HPV types in vagina and or cervical samples.

The WHO recommended primary HPV testing as a preferred method where resources are available, as HPV testing is more sensitive and effective in identifying women at risk of precancerous and cancerous lesions (WHO, 2013). HPV-DNA testing was introduced in Zimbabwe in 2019 by a not for profit making organisation Population Solutions for Health through their New start centre clinics which are in Harare, Mazowe, Chitungwiza, Mutare, Chipinge, Masvingo, Gweru and Bulawayo.

Zimbabwe introduced HPV-DNA testing as a screening method for cervical cancer, followed by Visual Inspection with Acetic Acid and Cervicography (VIAC) for those clients who test positive for HPV-DNA. The program targets HIV negative women aged 30 plus in at least 5 to 10-year intervals and HIV positive women from age 25 every 3 to 5 years, as well as providing an opportunity for post-menopausal women.

Despite testing positive for HPV-DNA, a great number of women test negative for cervical cancer. Since the introduction of HPV testing, a significant number of women have tested positive, and their immediate outcomes are not known. The proposed study is aimed at determining the prevalence of HPV-DNA positive pre-cancer cases in Zimbabwe.

1.3 Statement of the problem

HPV infection is the most common and known cause associated with cervical cancer and is necessary for the cancer to develop. It is anticipated for young women in their early 20s to have HPV infection and it is expected to clear as someone reaches their late 20s. In Zimbabwe, HPV-DNA testing is aimed at women of 30 years and above and a great number of them still test positive for HPV-DNA and still test negative for cervical cancer. There is no tangible evidence on the factors that determine the prevalence and correlation of being HPV-DNA positive and having cervical cancer.

With routine HPV testing women often transition in and out of HPV detectability raising concerns to the provider and the client on regarding the source of the positive result, its prognosis, and effective strategies to prevent future recurrence. Despite the high incidence of cervical cancer reported in Zimbabwe, population-based studies on the HPV prevalence and correlates distribution are scarce. Alternative studies and analytic frameworks have been proposed to better understand the frequency and determinants of this transition pathway. It is against this background that the researcher is carrying out this study aimed at determining the prevalence and determinants of HPV-DNA positive results in Zimbabwe.

1.4 Research Objectives

1.4.1 Broad Objective

To determine the prevalence and determinants of pre-cancerous cervical lesions among HPV DNA positive women.

1.4.2 Specific Objectives

i) To identify gaps in the cervical cancer screening program that affect reduction in incidence.

ii) To determine the sociodemographic characteristics associated with cervical pre-cancer lesions in HPV DNA positive women.

iii) To evaluate treatment outcomes of HPV DNA positive women.

1.5 Research Questions

i. What are the socio-demographic characteristics associated with HPV DNA positive results?

ii. What are the treatment outcomes of HPV DNA positive women?

iii. What are the gaps in the cervical cancer screening program that affect reduction in incidence?

1.6 Justification of the study

In the past cervical cancer screening was being done using Pap smear which did not provide instant results and poor result follow up has been cited as one of the major challenges that prompted the recommendation of VIAC as a preferable test due to the instant results. HPV-DNA testing does not provide instant results and will require the client to make a follow up of their results after some weeks of the initial test. It is against this background that the researcher wanted to determine the prevalence and determinants of HPV DNA positive clients.

1.7 Significance of the Study

The study looked at establishing critical information on the prevalence of pre-cancer among women who test positive to HPV. The researcher looked at the significance of the study to different stakeholders.

i) The Researcher. This study is significant to the researcher as it is a requirement for partial fulfilment of the requirements of a master's degree in Public Health with Africa University. The study allowed the researcher to gain research skills and analytical skills that are required in the effective management public health programs and provide academic proof that is needed to inform strategic decision making.

ii) HPV DNA positive women. This study will help to improve treatment outcomes of HPV DNA positive women and help identify those lost to follow up.

iii) Program managers and policy makers. The research will help program managers to identify gaps and mitigate in the cervical cancer screening program. This will also be significant to inform policy and guideline

makers on the best strategies of cervical cancer screening in developing countries.

iv) Ministry of Health and Child Care. The study will help in guiding health authorities with planning and intervention strategies like tailormade and client centered health education and promotion cervical precancerous lesions care.

v) Donors and funders. This study will assist NGOs and other humanitarian organizations in deciding the form and level of intervention necessary to ensure the appropriate secondary prevention strategies needed to ensure daily adjusted life years for HPV DNA positive women.

1.8 Delimitation of the Study

Research delimitations focus on pre-selected scenarios made by the researcher to create a boundary which restricts the addressing of non-relevant issues with respect to the study topic and problem statement. The scope of the study was delimited to HPV-DNA positive clients who were selected from a list of clients who already had a VIAC screening test done. The population study was delimited to those women who accessed HPV DNA testing through the Population Solutions for Health New Start Centres; hence the researcher had no control over the study participants regarding person, place, and geographical attributes.

1.9 Limitation of the study

The study was limited to a small sample size from a uniform entry point which might not be a true representation of the Zimbabwean population. The study participants

were drawn from sites that are operating from urban sites, though they offer outreach services in rural settings, a true representation of the attributes of the rural population might be inadequate. The study was conducted at PSH new start centers only; hence it limits the generalization of the findings. The study included mostly women in urban settings, and who were HPV DNA positive from the registers, hence no randomization of respondents was conducted. As a cross-sectional study, the researcher could not conduct causal inferences. Rather it focused on associations.

1.10 Chapter Summary

This chapter served as the basis and introduced the foundation of the research. It looked at the background of the study, the problem statement, research objectives and research question. The chapter also examined the significance of the study, delimitation of the study and limitation of the study. The next chapter reviews related literature.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

Relevant literature reviews which will construct the theoretical framework for the research are discussed. According to (Hart, 2011) this chapter outlines the work that has been carried out by other researchers. It is the ideas and work of others that will provide the researcher with the framework for their own work. (Fisher, 2010), posits that literature review is a critical and evaluative account of published work on a chosen research area. It seeks to summarise, synthesise, and analyse arguments, knowledge that exists and identify gaps. (Matthews & Ross, 2010), argues that literature review reveals similarities and differences, consistencies and inconsistences and controversies in previous research.

Review of related literature enables the researcher to familiarise with the latest developments in the research area, identify gaps in knowledge as well as weaknesses in previous studies. This is particularly important in order not to duplicate previous efforts, to widen and deepen them. The literature reviewed in this chapter provides an overview of what has been said, who the key writers were, the prevailing theories and hypotheses, what questions are being asked and what methods and methodologies are appropriate and useful and a critique of empirical literature.

Chapter two explores current literature on the burden and distribution of HPV DNA and cervical cancer around the globe and in Zimbabwe. The researcher will present available literature on the possible risks of HPV DNA infection in women and its impact on the affected as well as risky groups will be discussed. Special focus will be given to what other studies have reported as determinants and prevalence factors for HPV DNA positivity.

2.2 Theoretical framework

Cancer incidence and prevalence patterns reflect trends in behaviours associated with cancer risk and changes in medical practice, such as the use of cancer screening tests (Siegel, Miller, & Jemal, 2019). Lower socioeconomic status, whether measured at the individual or area level, is associated with numerous health disadvantages and higher cancer incidence, prevalence, morbidity and mortality across race and ethnicity. A recent study estimated that approximately 34% of cancer deaths in America could be averted with the elimination of socioeconomic disparities (Siegel, Miller, & Jemal, 2019).

The theoretical framework in Figure 1, below shows the gaps and factors that affect cervical cancer prevalence and client follow up. These can be grouped as preventive, socio-demographic, reproductive, behavioural, clinical, and treatment factors.

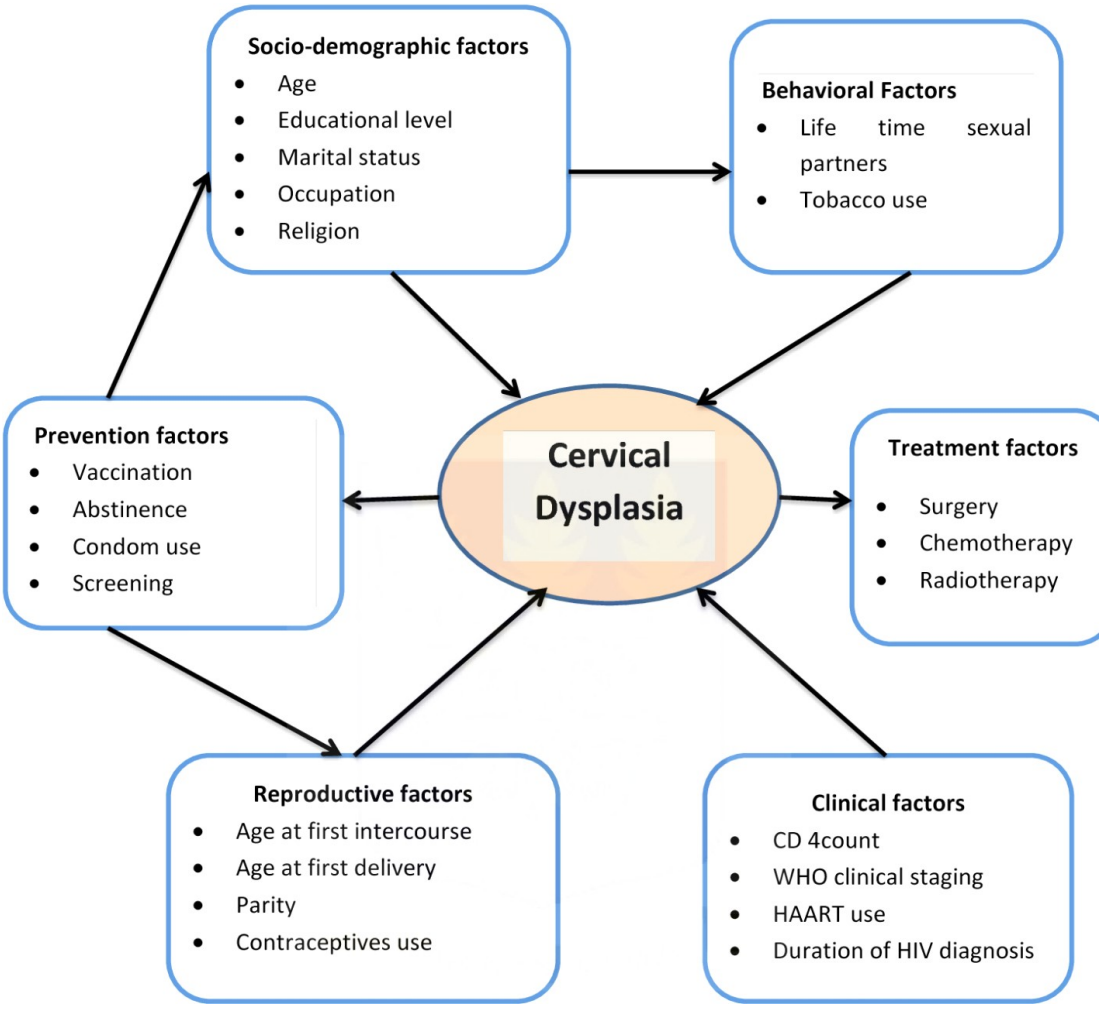

Figure 1 Cervical dysplasia and associated risk factors.

2.3 Relevance of the Theoretical Framework to the Study

The theoretical framework highlights and brings into account the different key variables that determine the prevalence of HPV and in turn the development of cervical cancer and these are discussed as below. It looks at the influence and connectivity of factors that are known and existing for precancerous cervical cancer in other countries. The prevalence of cervical cancer is attributed to sociodemographic, reproductive, behavioural and clinical factors.

A diagnosis of cancer can necessitate changes in both lifestyle behaviours and mental health outcomes and these changes are based on changes in specific risk behaviours depending on the amount of information one gets. Knowledge on the contributory factors like lifetime sexual partners, condom use, and knowledge of HIV status can trigger some people to engage in positive behaviour as preventive measures. Parents can support national programs like HPV vaccination after getting enlightened through theoretical frameworks.

The framework will help and guide the researcher on reviewing relevant literature for the study.

2.4 Prevention factors and gaps in the cervical cancer screening program

Cervical cancer screening is the systematic application of a test to identify cervical abnormalities in an asymptomatic population and women targeted for screening may feel perfectly healthy and see no reason in visiting a health care facility (World Health Organisation, 2013). The aim of a screen and treat program is to reduce cervical cancer incidence, related morbidity, and mortality with relatively few adverse events. The programme includes a screening test which will be linked to appropriate treatments for CIN and provide referrals for women with invasive cervical cancer.

Challenges and gaps in the health care delivery system affects women's access to cervical cancer primary, secondary and tertiary preventive services and this in turn increases the prevalence and incidence rates of cervical dysplasia. The screening tests requires expect knowledge at one stage of the test or another which makes it difficult for ordinary citizens to get help on time.

Common recommended screening tests that are widely used include testing for the human papilloma virus (HPV DNA), unaided Visual Inspection with Acetic Acid and Cervicography (VIAC) and cytology (Pap test). These tests can be used as a single test or in sequence. When using a single test, a positive result indicates the need for treatment and when using a sequence, those who test positive will receive another test and only those who test positive for the second test receive treatment.

In Zimbabwe, like most developing countries, access to health is limited and screening for cervical cancer is either non-existent or it reaches a few of the women who need it. In a study in Nigeria, spatial access was proved to pose challenges and impact those seeking screening services and follow through on appointments (Stewart, et al., 2020).

Shortage of specialised staff in developing countries has been cited as one of the contributory factors to the gap in cervical cancer programs. This was supported by the findings from a study in Ondo estate in Nigeria by (Stewart, et al., 2020), where key gaps reported were lack of physicians and trained staff and the necessary diagnostic and treatment equipment at hospitals causing clients to travel further to other locations for care. In the past decades, the Zimbabwean health care system has been robbed by a continuous brain drain which left most of its rural health facilities with skeleton staff and no specialised health care providers. This compromises the

provision of screening services as providers tend to focus more on curative services. This is consistent with the findings in a Malawi study (Maseko, Chirwa, & Muula, 2014), which asserts that insufficient workforce and unequal distribution of staff are gaps that need to be addressed.

HPV DNA does not provide instant results and requires client review or follow up and with the staff challenges this might take time and the delay might cause treatable lesions to become difficult to treat.

In the health care system clients must pass through different levels of care (primary, secondary, and tertiary) before getting final diagnosis and treatment and they a lot of practitioner and system delays. Some patients lose a lot of time due to misdiagnosis; this is consistent with the findings of a study at Tikur Anbessa Hospital (Tadesse, 2015).

While HPV is a necessary precursor for cervical cancer, a positive result does not mean that a woman has pre-cancer, it only confirms presence of an HPV infection. In Zimbabwe, HPV testing is used as sequential test followed by VIAC in cases of a positive HPV DNA test. Not all facilities are offering VIAC which makes it difficult for some women to easily access the sequential test.

2.5 Socio-demographic characteristics associated with pre-cancer and cervical cancer

Sexual behaviour of both men and women is a risk factor for cervical cancer (Mapanga , Girdler-Brown, & Singh, 2019). The progression of cervical lesions is affected by additional co-factors such as early sexual debut, multiple sexual partners, early menarche, late menopause, use of hormonal contraceptives, smoking and high incidences of HIV and other immunosuppressing conditions (zur Hausen, 2009).

As it happens in most developing countries, some socio-demographic factors could be related to the high HPV prevalence, especially lack of education, multi-parity and the prevalence of attitudes, misconceptions and beliefs that limit people from discussing diseases of the genital tract (Tabora, et al., 2009)

According to a study in Brazil, women in urban areas and single women were more frequently infected with HPV due the behavioural characteristics and the data showed differences in the sexual behaviour of younger women. A higher number of pregnancies were found to be inversely associated with HPV infection (Miranda, et al., 2012). These data were consistent with the findings of previous reports by (Laczano-Ponce, et al., 2001; Burk, et al., 1996; Bauer, et al., 1993) but different from those in which pregnancy was positively associated with HPV infection (Bauer, et al., 1993).

These regional disparities might also be related to other factors such as cultural differences in sexual life (early marriages, early sexual exposure, polygamy), that have an influence on sexually transmitted viruses such as oncogenic HPV and finally on the burden of cervical malignancies in sub-Saharan Africa. In contemporary times, the prevalence of behaviours that increase cancer incidence and mortality are vastly higher among residents of the poorest countries compared to wealthiest countries. Poverty is also associated with lower cancer screening prevalence, late-stage diagnosis, and a lower likelihood of optimal treatment (Siegel, Miller, & Jemal, 2019).

Even though the racial gap in cancer mortality is slowly narrowing, socio-economic inequalities are widening, with the poorest countries recording an increasingly disproportionate burden of the most preventable cancers (Siegel, Miller, & Jemal, 2019).

2.6 Cervical Cancer Screening methods and Treatment options

Prevention is the most cost-effective intervention especially in limited resource settings such as Zimbabwe. Diagnosis of cancer at an earlier stage of the disease can enhance chances of successful treatment outcomes and greatly increases the chances of a successful cure (MOHCC, National Cancer Prevention and Control Strategy for Zimbabwe, 2014-2018). Screening services for cervical cancer include Pap smear, HPV DNA and VIAC.

2.6.1 Pap Test

This is also known as the Papanicolaou smear which has been the mainstay of most of the screening programs for many decades (Pankaj, et al., 2018). This is done through use of a cervical speculum to hold the vaginal walls apart to clearly see the cervix and a sample of cervical cells is collected using a small cone-shaped brush and a plastic spatula. The sample is sent to the laboratory for cytology. This is usually recommended for sexually active women aged 21 to 65 and is repeated every 3 years. It can be used in combination with HPV testing and if in combination it is repeated after every 5 years.

The global standard is to screen women using cytology (Pap test) and when the result is positive the diagnosis of CIN is based on subsequent colposcopy, biopsy of suspicious lesions and then treat only when CIN2+ has been histologically confirmed (World Health Organisation, 2013). This traditional method of screening requires a specialised personnel and laboratory equipment, which makes it unsustainable in middle- and low-income countries. Screening using cytology is very costly and it led to a low coverage, which prompted the introduction of alternative screening methods. This gave rise to the screen and treat approach in which the treatment decision is based on a screening test not a histologically confirmed diagnosis of CIN2+, and

treatments is provided soon or ideally immediately after a positive screening test (World Health Organisation, 2013).

2.6.2 Visual Inspection with Acetic Acid (VIAC)

Is a simple inexpensive test with moderate sensitivity and specificity for screening that can be combined with simple treatment procedures for early cervical lesions (Google Scholar, 2009). VIA is feasible in many low-resource set areas where it is difficult to get and sustain high quality cytology programs. It is conducted by trained nurses and healthcare workers at primary health care centres. VIA is appropriate to use in women whose transformational zone is visible, typically those younger than 50 years, thus the target group is 30 to 49 years. It is repeated annually for HIV positive women and after 3 to 5 years in HIV negative women. Once menopause occurs, the transformational zone where most precancerous lesions occur, frequently recedes into the endocervical canal making it invisible or partially visible (World Health Organisation, 2013). Women above the age of 50 but below the age of 65 are recommended to have a Pap test done.

2.6.3 HPV DNA Test

Molecular HPV testing methods are based on the detection of the HPV from the high-risk HPV types from vaginal or cervical samples. This HPV test provides individual results on the highest risk genotypes of HPV 16 and HPV 18. This is crucial because HPV is the responsible cause for nearly all cases of cervical cancer and is highly sensitive for detecting HPV infection in women. HPV testing targets women who are 30 years and older who are HIV negative and women of all age groups if HIV positive.

While HPV is a necessary precursor for cervical cancer, a positive result does not mean that a woman has pre-cancer, it only confirms presence of an HPV infection. Further screening tests need to be done to confirm cervical cancer status. In Zimbabwe, HPV testing is used as a sequential test followed by VIAC in cases of a positive HPV DNA test. HPV DNA based tests proved to be more effective in preventing cervical cancer than commonly used methods (WHO, 2013). This test is less prone to human error than relying on visual inspection.

Figure1 and figure 2 below shows the algorithm for cervical cancer screening for HIV negative and HIV positive clients respectively. In essence the procedures are as follows:

Figure 1: - HIV negative women with a negative HPV DNA test are instructed to repeat test after a minimum of 5 years. If their HPV DNA result is positive, they go for VIA and if it's negative, they rescreen after a year. If VIA is positive, they either get treated by cryotherapy or LEEP and if suspicious of cancer, they are referred to appropriate diagnosis and treatment.

Figure2: - HIV positive women with a negative HPV DNA test will be rescreened within 3 years. If positive for HPV DNA, VIA is done and if negative, VIA will be repeated after a year. If VIA is positive, they either get treated by cryotherapy or LEEP and a post treatment follow up must be done after a year. If VIA reveals lesions suspicious of cancer, they are referred to appropriate diagnosis and treatment.

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Algorithm for HIV negative clients

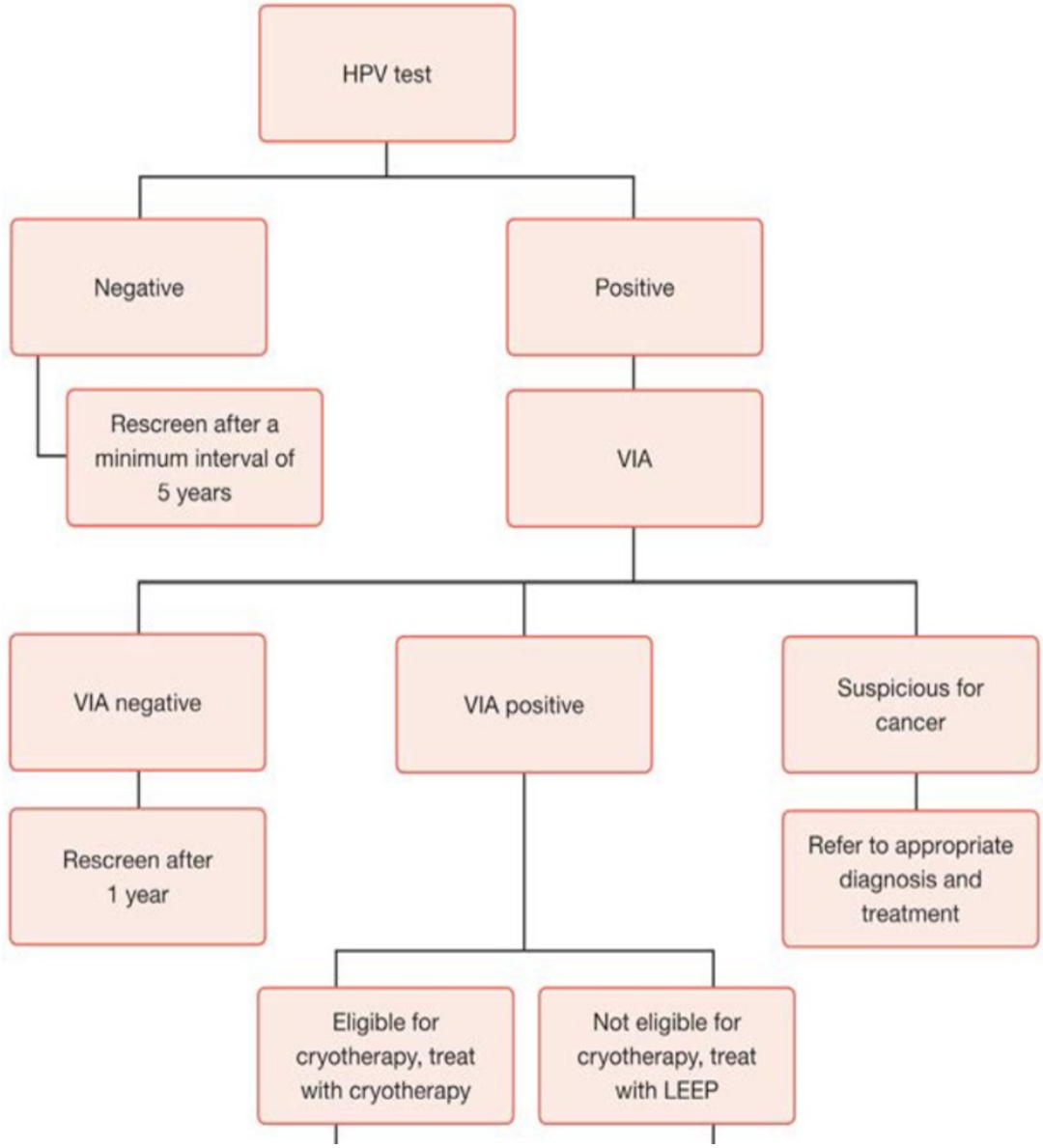

Figure 2: Extracted from the WHO Guidelines for cervical cancer screening 2013**.**

Algorithm for HIV positive clients.

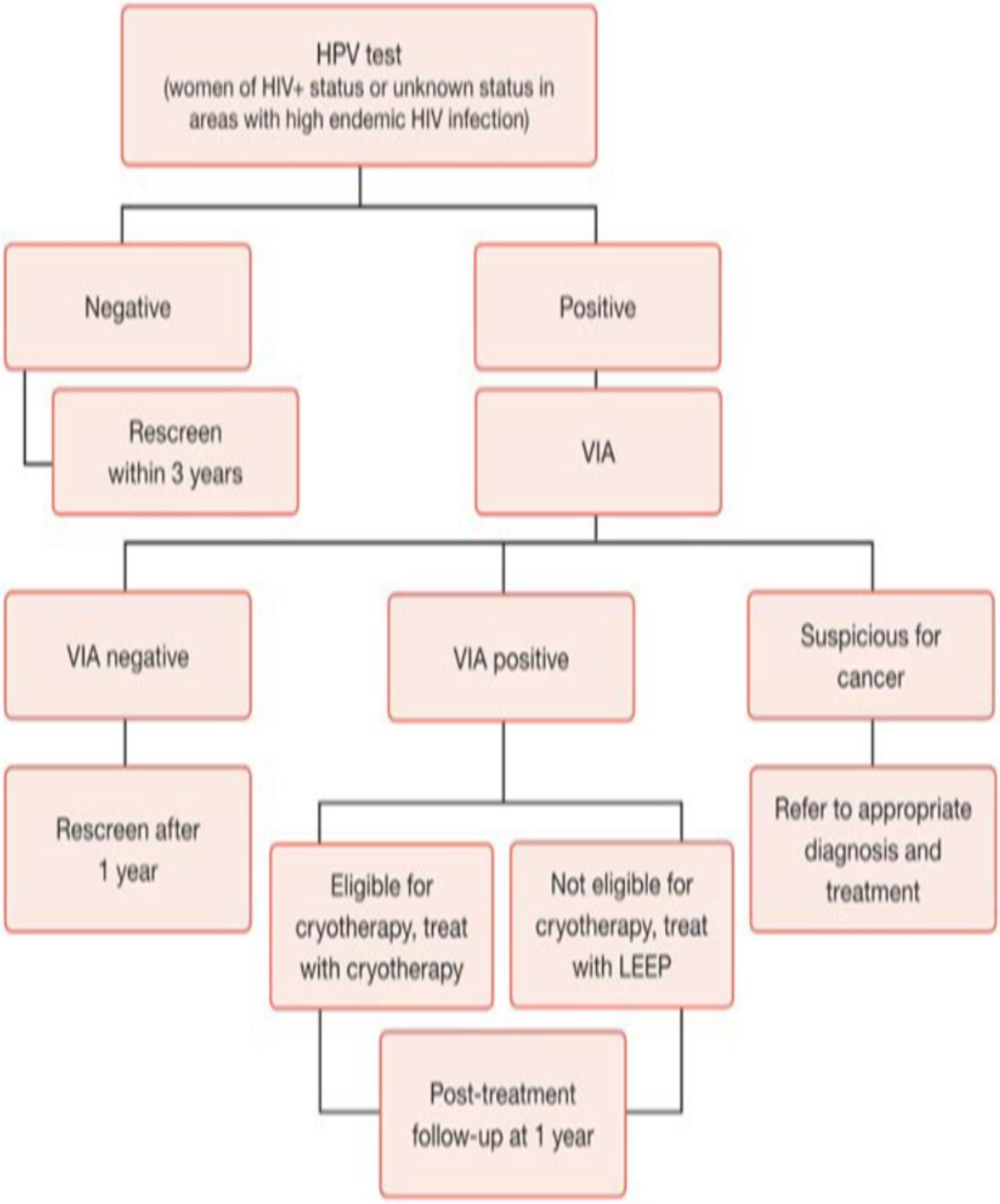

Figure 3 Extracted from the WHO Guidelines for cervical cancer screening 2013

2.6.4 Cervical Cancer Treatment

Following a positive single or sequential cervical cancer screening test result, treatment follows and is determined by the type of lesions detected. According to the WHO, the technology of choice in the treatment of precancerous lesions is Loop Electrosurgical Excision Procedure (LEEP) (World Health Organisation, 2014). Recent WHO guidelines recommend cryotherapy as a good alternative for eligible VIA positive lesions in settings where LEEP cannot be performed. In high resource settings procedures such as cold knife conisation can be used.

Cryotherapy eliminates precancerous areas on the cervix through freezing; it is an ablative method accomplished using compressed carbon dioxide or nitrous oxide gas. It can be performed at all levels of the health care system by trained doctors, nurses, or midwives.

LEEP is the abnormal removal of abnormal areas from the cervix using a loop made of thin wire powered by an electrosurgical unit. The loop tool cuts and coagulates at the same time and is followed using a ball electrode to complete the coagulation (WHO, 2013)

2.7 Global Epidemiology of Cervical Cancer

Cervical cancer is the most common type of cancer in women worldwide accounting for more than 270 000 women's deaths every year with more than 85% of these deaths occurring in low- and middle-income countries (World Health Organisation, 2013). 8 in 10 of these deaths are recorded within the sub-Saharan region. It is largely preventable but one of the leading causes of death in women. Cervical cancer occurs worldwide but the highest incidence rates are found in Central and South America,

South and South-East Asia and East and sub-Saharan Africa (World Health Organisation, 2014).

Global trends show that high-risk countries for cervical cancer in Africa are especially Malawi, Mozambique, Zambia, and Zimbabwe. Cervical cancer has impacts on gender inequality and maternal and child health (Sustainable Development goals 3 and 5); since only women are affected. Like Human Immunodeficiency Virus (HIV), cervical cancer is a disease of gender and other inequalities, and these countries have a high burden of HIV. These two interconnected diseases starkly expose the links between inequity and health and social injustice (UNAIDS, May 2019). For example, in Eastern and Southern Africa, women are ten times more likely to die of cervical cancer than they are in Western Europe.

The primary cause of cervical pre-cancer and cancer is persistent or chronic infection with one or more of the high risk or oncogenic types of Human Papilloma Virus (HPV) (World Health Organisation, 2014). Human Papilloma Virus is a Deoxyribonucleic Acid (DNA) virus with oncogenic potential that is sexually transmitted and is the most common viral infection of the reproductive tract. HPV has a causal relationship with cervical cancer depending on the virus type and load, the characteristics of the infection, the virus physical status-integrated or episomal (Miranda, et al., 2012). The sexually transmitted infection, genital warts that are caused by various HPV subtypes have shown to be present with a 99% chance of progressing to cervical cancer (International Agency for research on cancer, 2012).

Cervical cancer is preventable and curable if diagnosed and treated early. Effective methods of primary and secondary prevention, like, HPV vaccine and screening are

available, but not to everyone. An effective way of detecting cervical cancer before its signs and symptoms manifest is cervical cancer screening. Cervical cancer prevention and treatment efforts and scaling up have shown dramatic results in areas where programs have been rolled out at full scale (UNAIDS, May 2019). Australia is set to become the first country in the world to eliminate cervical cancer by successfully implementing a combined approach to HPV vaccination and cervical cancer screening and early treatment at a wide scale. (UNAIDS, May 2019).

2.8 The Prevalence of Cervical Cancer in Zimbabwe

Comparable with worldwide statistics, cervical cancer is the most frequent occurring cancer in women of all races and ages in Zimbabwe with a burden of 19% (Kaguyo, et al., 2017). It is estimated that 3043 women are diagnosed with cervical cancer annually in Zimbabwe with a crude incidence rate of 39.2% (Ferlay, et al., 2020). The Zimbabwean cervical cancer crude mortality rate in women stands at 25.4% and an age-standardised mortality rate of 43% (Ferlay, et al., 2020). It is anticipated that the burden and mortality rate of cervical cancer is most likely to be higher than those recorded in the national cancer registry because some cases go unreported in areas that have poor access to health care facilities like rural areas.

The burden of cervical cancer is still very high in Zimbabwe, and it is compounded by the high incidence of Human Immunodeficiency Virus (HIV). In 2020, Zimbabwe had 1.4 million people living with HIV, with a prevalence of 11.8 % among adults and 14.8% prevalence among women (MOHCC, National Health Strategy, 2021-2025). Cervical cancer is the most common cancer among people living with HIV and the likelihood that a woman with HIV will develop cervical cancer is five times higher than for a woman not living with HIV (UNAIDS, May 2019). In addition, the overall risk of HIV acquisition among women is doubled if they have had an HPV infection.

According to UNAIDS, (2019), despite their increased risk of cervical cancer, women living with HIV do not receive screening or treatment for cervical cancer even with the recommended simple, low-cost visual inspection or effective simple early treatment methods. According to the World Health Organisation (WHO) recommendations, Zimbabwe is putting efforts to integrate cervical cancer screening and treatment services into HIV and sexual reproductive health services. HIV platforms are ready entry points for low-cost cervical cancer services and wider health for young women.

2.9 Summary

This chapter gave an in-depth focus on related literature about the study. Different factors that affect cervical cancer prevalence and HPV positive outcomes were discussed. Previous studies on HPV prevalence and determinants were also reviewed. The chapter introduced the theoretical framework that the study is based on. Chapter two therefore provided the foundation for data collection and analysis as discussed in the following chapter.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter presents the methodology detailing procedures used in data collection and analyses in line with the research objectives. The study was conducted using a purely qualitative research approach in data collection and analysis; hence, the researcher opted for interviews and document review to collect data.). This section will present approaches of the research methodology giving insight and justification on the adopted research design and other supporting instruments for the successful undertaking of the research study.

It will focus on the study design, study setting and population, sample size and sampling technique, data collection instruments and procedure, pretesting of tools and how data was analysed.

3.2 The Research design

According to Yin (2003) research design guides the researcher in the process of collecting, analysing, and interpreting observations, allowing them to draw inferences concerning causal relations among the variables under investigation (Yin, 2003). In addition, (Saunders, Phillip, & Thornhill, 2019) defined research design as the general plan of how research questions are answered. Quantitative research utilising an analytical cross-sectional study was used at the 7 New start centres in Zimbabwe, that is Harare, Chitungwiza, Bulawayo, Gweru, Masvingo, Mutare and Chipinge. A cross-sectional survey was conducted from January to March 2022 to assess the prevalence of HPV positive clients who turn out to have pre-cancer or cancer of the cervix. The research design was chosen for its strength in determining the association

between variables and it is cheap and less time consuming. The research design used both quantitative and qualitative methods in data collection.

3.3 Population and Sampling

The target population, sample size and sampling procedures are explained in the following sections

3.3.1 Target population

The source population for this study were women who tested positive for HPV DNA at the 7 new start centres in Zimbabwe between January 2022 and March 2022. The inclusion criterion is that the woman has had an HPV DNA test with a positive result and they know their HIV status. The exclusion criterion includes those who test negative for HPV DNA and those who test positive for HPV DNA with an unknown HIV status.

3.3.2 Study Setting

The study was carried out using data from 7 New start centres across Zimbabwe that are situated in Harare, Chitungwiza, Bulawayo, Gweru, Masvingo, Mutare and Chipinge. The centres are situated in Manicaland, Masvingo, Harare, Bulawayo, Mashonaland East, and Midlands provinces.

3.3.3 Sample and sampling procedure

A multistage sampling method was used in selecting participants from the HPV test positive clients from the 7 new start centres. The 7 centres were intentionally selected, and the sample was randomly selected from HPV DNA positive women. The women were randomly selected from the list of HPV DNA positive clients. In each New Start Centre, every n subject was systematically selected and enrolled in the study upon satisfaction of the above criteria.

The sample size was calculated using Cochran's formula

$$\ldots n = \frac{z\,2\,pq}{e\,2}$$

$$\frac{(1.96)\,2\,(0.5)\,(0.5)}{(0.05)\,2}$$

$$= 385$$

3.4 Data Collection Instruments

The researcher used a semi structured questionnaire to collect information on demography, socio status, knowledge on cervical cancer and factors associated with HPV DNA positive results and other relevant information using the interviewer administered questionnaire. Semi-structured interviews presented the best choice for this study because it gave the researcher the freedom to ask questions to gather as much information as possible.

3.5 Pretesting of Instruments

Pretesting of instruments was done at North-eastern Medical Centre New start in Mazowe district in Mashonaland central province with a 5% of the population. North-Eastern Medical Centre was selected because it was not part of the study setting. Pretesting helped the researcher to check if the women were able to comprehend the questions and assess the validity of the questionnaire.

3.6 Data collection procedure

Details for the randomly selected clients were obtained from the Population Solutions for Health (PSH) database and the interviewer contacted selected clients to book an appointment for an interview. The researcher used PSH data entry clerks to do the interviews. Interviews were of a hybrid nature, mixing face to face and

telephone interviews. Data was collected by mainly administering the semi-structured questionnaire (Appendix 1). All data was collected within a space of a month and a half. The services of research assistants were sought to assist with data collection in the different geographical sites.

3.6.1 Quality assurance

An online training on data collection was conducted for the data collectors. Seven qualified data entry clerks working for the PSH evidence department were assigned to collect data, with the student supervising the process. The questionnaire was first prepared in English and then translated to Shona. Pretesting of the questionnaire was done on 20 women who accessed services at North-eastern Medical Centre in Concession, Mazowe district.

3.6.2 Data Collection funding

The study was self-funded, and the student's expenditure was as tabulated in table 1 below.

Table 1 Budget

Item	Quantity	Unit Cost	Total Cost
Bond Paper (Rim)	2	$5	$10
Toner black	1	$20	$20
Pens	10	$.10	$1
Fuel	20	$1.6	$32
Lunch allowance for 7 research assistants	5	$10	$350
TOTAL			$413-00

3.7 Analysis and Organisation of data

(Creswell & Creswell, 2017) posits that the researchers need to protect the anonymity of participants by assigning either numbers or letters to use in the process of analysing and reporting data. Initially the data was checked for completeness and consistency and then coded and entered in the computer using Epi data. The data was analysed using STATA version 13.

3.8 Ethical Considerations

According to (Cohen, Manion, & Morrison, 2007), the first stage of a research project involved obtaining official permission to undertake the research in the target community through contacting, in writing, the appropriate governing official or authority. Permission to carry out the study was sought from the Evidence Director of Population Solutions for Health. The investigator sought ethical approval from Africa University Research Ethics Committee (AUREC). The researcher observed the clients' rights to informed consent using consent forms which the participants read, understood, and signed before participating in the study. Privacy and confidentiality were maintained throughout the process and no names were recorded on the questionnaire and or researcher's database.

3.9 Chapter Summary

The chapter focused on the study methodology, outlining the design, the study setting, study population, sampling and sampling procedure, data collection and analysis together with ethical considerations that were observed in this study. This chapter looked at the study methodology in which the analytical cross-sectional study design was employed. The research design is defined and justified by showing its relevance to the research problem. The rationale for such preference was outlined.

CHAPTER 4 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

The study sought to determine the prevalence and determinants of precancerous lesions among HPV DNA positive women in the Population Solutions for Health cervical cancer screening programme. The study endeavoured to understand the characteristics of women who are suspected of cervical cancer post a positive HPV DNA result. Data was therefore analysed in line with the key contextual evidence raised in the literature. Data analysis was mainly quantitative with a heavy reliance on the clients' specific responses pointed out by participants during interviews. Participant's responses were therefore categorised, grouped and joined to form themes, which allowed triangulation of responses given. The chapter presents data as captured during the research study to bring out relevant discussion of the findings. The discussion of the findings was done in light of the literature review discussed in chapter 2. The interviews were premised on the following objectives:

- To determine the socio-demographic characteristics associated with HPV DNA positive results.
- To evaluate the treatment outcomes of HPV DNA positive women.
- To assess knowledge levels on cervical cancer among HPV DNA positive women.

4.2 Data Presentation and Analysis

This chapter presents the findings of the data analysis done among women who accessed cervical cancer screening services at PSH, the statistical analysis done and meaning derived from the results. Tables, figures and graphs will be used where

necessary to give a clearer picture of the findings. Statistical analysis was done by the researcher using STATA.

Table 2: Socio-Demographic Characteristic of Respondents

Demographic Characteristic		(N=385) n (%)
Education	None	2(1)
	Primary	54(14)
	Secondary	262(68)
	Tertiary	67(17)
Province of Origin	Bulawayo	55(14)
	Masvingo	56(15)
	Gweru	57(15)
	Chitungwiza	55(14)
	Harare	55(14)
	Masvingo	54(14)
	Mutare	53(13)
Employment status	Self employed	93(24)
	Formally employed	148(38)
	Unemployed	137(36)
	Student	7(2)
Marital Status	Married	237(62)
	Separated/Divorced	76(20)
	Single	56(15)
	Widowed	16(4)
Number of Children	0	1(0)
	1 to 3	32(8)
	4 to 6	251(65)
	More than 6	101(26)
Cancer Treatment	No	279(72)
	Yes	106(28)
Age groups	18-24	8(2)
	25-29	34(9)
	30-34	102(28)
	35-39	94(26)
	40-44	73(20)
	45-49	24(7)
	50-54+	24(7)
Age of Respondents	**Mean (38) ±8 SD**	

The prevalence of cervical cancer precancerous lesions among HPV DNA positive women was at 28%. The mean age of the respondents was at an average of 38 ±8 SD years. The average age at first menstrual period was at 14±2SD years. Age at first

sexual debut was 18 years with a minimum age of 12 years and a maximum of 30 years. More than 60% of the women have had more than 1 sexual partner in their lifetime and 36% of these tested positive for precancerous lesions.

The prevalence of precancerous lesions according to marital status was average among the single, divorced and widowed and married were 28% more likely to get cancer. Figure 4 below shows the prevalence by marital status;

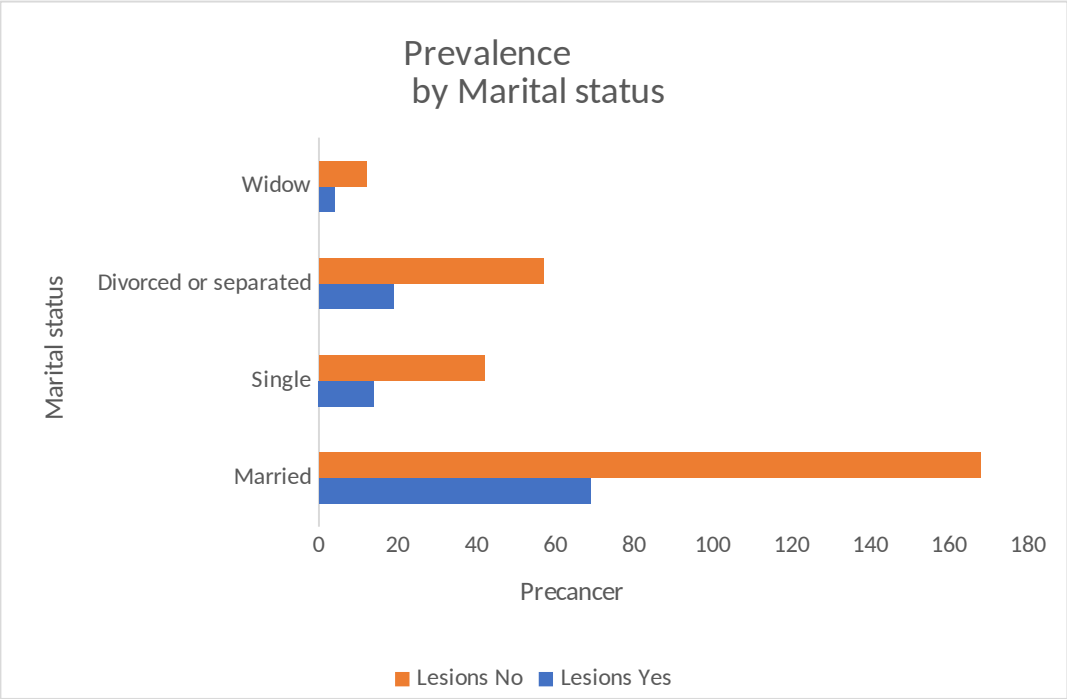

Figure 4 Prevalence by marital status

The odds ratio and confidence intervals of the demographic and behavioural characteristics of the respondents are tabulated in table 3 below:

Table 3 Odds Ratio for demographic and behavioural characteristics

Demographic Characteristic		Yes(N-106) n(%)	No(N-279) n(%)	Total(N=385) n(%)	Sig(p-Value) -	COR(95%CI) -
Education level	None	2(1)	0(0)	2(1)		ref
	Primary	16(15)	38(14)	54(14)	-	-
	Secondary	76(72)	186(67)	262(68)	-	-
	Tertiary	14(13)	53(19)	67(17)	0.378	0.84(0.57-1.23)
Marital Status	Married	69(65)	168(60)	237(62)	-	Ref-
	Single	14(13)	42(15)	56(15)	0.830	0.97(0.70-1.33)
	Divorced/separated	19(18)	57(20)	76(20)	-	-
	Widowed	4(4)	12(4)	16(4)	-	-
Employment	Unemployed	41(39)	96(34)	137(36)	-	Ref-
	Formally employed	49(46)	99(35)	148(38)	0.159	1.19(0.93-1.54)
	Self Employed	15(14)	78(28)	93(24)		
	Student	1(1)	6(2)	7(2)		
Children No	Zero	1(1)	0(0)	1(0)		Ref
	1 to 3	8(8)	24(9)	32(8)		
	4 to 6	66(62)	185(66)	251(65)	0.272	1.24(0.84-1.20)
	More than 6	31(29)	70(25)	101(26)		
Use vaginal herb	No	88(83)	251(90)	339(88)		Ref
	Yes	18(17)	28(10)	46(12)	0.063*	1.8(0.97-3.48)
Use of Condom	No	32(30)	120(43)	152(39)		Ref
	Yes	74(70)	159(57)	233(61)	0.022*	1.7(1.08-2.81)
HIV Status	No	74(70)	148(53)	222(58)		Ref
	Yes	32(30)	131(47)	163(42)	0.003*	0.49(0.30-0.79)

Significant at $p<0.001$, Ref=Reference Group, COR-Crude Odds Ratio

4.2.1 Bivariate Logistic Regression Analysis

Bivariate analysis was conducted to identify risk factors associated with cancer acquisition. Some of the demographic characteristics which included level of education and employment status were found not to be associated with cervical cancer acquisition [**COR: 1.19 (95%CI: 0.93-1.54), p=0.159].**

Women who indicated that they used condoms were 1.7 times more likely have cervical cancer [**COR: 1.7(95% CI: 1.08-2.81), p=0.022].** This study found that women who were HIV positive and are on treatment were 51% less likely to have cervical cancer **[COR: 0.49(95%CI: 0.30-0.79), p=0.003].**

Age at first sexual debut at 18 years was found to be statistically significant at 12% reduced odds of cervical cancer **[COR: 0.88(95%CI: 0.81-0.97), p<0.010]**.

4.3 Discussion and Interpretation

This section discusses and interprets the findings and analysis presented above under the specific objectives.

4.3.1 Gaps in the cervical cancer screening program

28 (26.4%) women out of the 106 who had cervical cancer precancerous lesions required further investigations and possible treatment services which are not provided within the PSH program. They were referred to central hospitals and 70% of these 28 were still to access services at referral centres. Figure 5 below illustrates the gap in outcomes for screened clients.

Figure 5 How clients were treated

4.3.2 Socio-Demographic Characteristics

A total of 385 respondents were recruited into this study and they were females. On the level of education, the majority 262(68%) had attained up to secondary level, two percent were students. The majority of the respondents were married 237(62%). Most of the respondents were formally employed (68%). Most of the women 251(65%) had four to five children. Table 2 above shows the demographic characteristics of the interviewed population.

4.3.3 Analysis of Treatment outcomes

Out of the 386 HPV DNA positive women, 106(28.31%) had cervical cancer precancerous lesions that required treatment as a preventive or curative measure. 48 (45%) of these were treated by cryotherapy, 30 (28%) were treated by LEEP and the remaining 28 (26%) had lesions suspicious of cancer which required specialised care and were referred for further management.

4.4 Multivariate logistic Regression of cervical Cancer

The following independent risk factors of having a positive HIV status and Age at first sexual debut were associated with reduced odds of cervical cancer. Herbal use, history of having STIs and condom were associated with cervical cancer although they were not statistically significant at 0.05% level. Table 4 shows the Multivariate logistic regression of cervical cancer.

Table 4 Multivariate logistic regression

	AOR	**Std.Err**	**z**	**p>|z|**	**(95% CI) for (AOR)**
Herbal Use	1.7	0.58	1.51	0.130	(0.85-3.33)
Hx of STIs	1.4	0.40	1.43	0.151	(0.86-2.50)
Condom Use	1.0	0.29	0.05	0.956	(0.57-1.80)
HIV Status	0.5	0.14	-2.35	0.019*	(0.29-0.89)
Age at 1st Sex	0.90	0.04	-2.04	0.042*	(0.82-0.99)
Constant	2.53	2.44	0.96	0.33	0.38-16.82

4.5 Summary

Chapter 4 presented the data, analysed and interpreted it which leads to the discussions, conclusions and recommendations in the next chapter.

CHAPTER 5 SUMMARY, CONCLUSIONS AND RECOMENDATIONS

5.1 Introduction

Based on a cross sectional study conducted in the seven centres representing each province in the country this is a summative analysis of the prevalence of precancerous lesions among HPV-DNA positive women and the factors associated with cervical cancer. Study findings presented in the last chapter will be discussed in this chapter under conclusions, implications and recommendations.

5.2 Discussions of Findings

5.2.1. Prevalence of precancerous lesions among HPV DNA positive women

This study observed a high prevalence of cervical cancer precancerous lesions among HPV DNA positive women at a crude incidence rate of 28.31%. According to (Ferlay, et al., 2020) it was estimated that Zimbabwean women diagnosed with cervical was at 39.2%. A study by (Siegel, Miller, & Jemal, 2019) found that cancer deaths were at 34%. This difference in the incidence rate can be attributed to cluster of respondents as our research looked at risk group of women with HPV DNA positive results and were from PSH screening clinics only.

PSH clinics are in urban settings, and this concurs with (Ferlay, et al., 2020), that the burden and mortality rate of cervical cancer is most likely to be higher than recorded because some cases go unreported in areas that have poor access to health care facilities like rural areas. This finding is contrary to (Mamaru, Molla, Abebe, & Menberesbhat, 2020)'s findings in Ethiopia which presented that, women in rural areas were 2.04 times more likely to develop cervical precancerous lesions compared to urban dwellers.

(WHO, 2013), indicated that the challenges and gaps in the health delivery system were contributing to non-screening of cancers due to shortage of manpower. A study in Nigeria reported that women were making appointment to be screened for cervical cancer in their institutions (Stewart, et al., 2020). This manpower shortage of doctors is being experienced in Zimbabwe; hence screening services are not being provided in most health primary care facilities. A study in Malawi indicated that inadequate workforce and unequal distribution of staff were gaps that needed to be addressed (Maseko, Chirwa, & Muula, 2014)

5.2.2 Gaps in the cervical cancer screening program

70% of women who were suspected as having cervical cancer were still to access services at the referral sites which are government institutions due to various reasons ranging from appointment booking system, shortage of staff and unclear procedures at the referral centres. This agrees with a study conducted in Ondo estate in Nigeria where they cited the shortage of specialised health care staff and spatial access that proved to pose challenges and impact those seeking screening services and follow through on appointments (Stewart, et al., 2020).

The main goal of cervical cancer screening is early which leads to early intervention and prevention of related morbidity and mortality. The delayed access to specialised care derails the gains of the national cervical cancer screening programme. It looks like the active involvement of PSH ends at handing the client referral slips which makes it difficult for most of the referred women to access continuum of care.

5.2.3. Socio-demographic factors

The study also assessed socio-demographic factors associated with precancerous cervical lesions and the findings revealed that respondents aged 45 to 49; having a

history of an STI, having 2 or more lifetime sexual partners and living with an HIV infection were more likely to have precancerous lesions. Women aged above 40 were 2.8 times more likely to have precancerous lesions as those aged less than 35years.

Marital status of being single and employment status of being formally employed and having children between one and three was a risk factor although it was not statistically significant [COR: 1.19(95% CI: 0.93-1.54), p=0.16]. Other researchers found that cervical cancer prevalence was related to lack of education (Tabora, et al., 2009). This is in tandem with a study in Brazil which indicated that women living in urban areas and single women were at high risk of developing cervical cancer (Miranda, et al., 2012). This research found this association as the PSH centres were located in urban centres hence there was no confounder of location.

Level of education was found to have a no significant contribution to the induction of precancerous lesions of the cervix contrary to a study in Ethiopia as higher education relates to better information, knowledge and health seeking behaviour. Women with lesions that needed extensive treatment were mostly of tertiary education level.

5.3 Conclusions

The prevalence of precancerous lesions among HPV DNA positive women was very high at 28% in these urban PSH new start centers. This indicates that screening for cervical cancer in these women is preventing cervical cancer in this population. This cervical cancer screening program was found to benefit the women from preventing cervical cancer if implemented effectively in all eligible populations.

5.3.1 Behavioural factors

This study found that use of vaginal herbs, use of contraceptive especially condoms were 2 times more likely associated with cervical cancer among HPV DNA positive women [**COR: 1.7(95% CI: 1.08-2.81), p<0.022]**. These results are consistence

with what was reported by (zur Hausen, 2009) that contraceptives, multiple sexual partners and use of vaginal herbs increased the incidence of HIV and other immunosuppressant conditions.

This study found that age at first sexual debut of 18 years **[COR: 0.88(95%CI: 0.81-0.97), p<0.010]**, were less likely to have cervical cancer. Early sexual debut has been identified as a major risk factor for cervical cancer. This research found that sexual debut at 18 years has a protective effect of developing cervical cancer. Many researchers have reported this sexual behaviour both in men and women as a risk factor for cervical cancer (Mapanga , Girdler-Brown, & Singh, 2019) (zur Hausen, 2009) (Miranda, et al., 2012).

This study concluded that HIV positive women on treatment were less likely to have cervical cancer in their lifetime, as cervical cancer screening is part of their integrated services package. This finding proves that most of the clients who were HIV positive among HPV DNA positive women benefited from the screening as precancerous lesions were being detected before they develop into cervical cancer hence preventive treatment commenced.

Mean age of first sexual intercourse (17.8) is close to the mean age at first marriage (18.1) which suggests that most women start sexual intercourse at the time of their first marriage.

Women with a history of an STI were 3.2 times more likely to have precancerous cervical lesions as those with no such history and this gives a conclusion that STIs are a high-risk factor for cervical cancer. This concurs with a study done in North-eastern Ethiopia were the odds those with a history of an STI were 3.4 times more (Mamaru, Molla, Abebe, & Menberesbhat, 2020)

5.3.2 Prevention factors

The study concluded that abstinence was a major independent factor which was associated with reduced risk of having cervical cancer ($p<0.04$). This finding is consistent with findings by (Siegel, Miller, & Jemal, 2019) who said early sexual exposure, early marriages being related to cultural differences exposed young women to sexually transmitted viruses such as HPV and finally the burden of cervical cancer malignancies in sub- Saharan Africa. Screening of HIV positive women for HPV DNA and precancerous lesions was independently associated with reduced odds of cervix cancer **[AOR:0.50(95% CI:0.29-0.89),p<0.019]**. This shows that screening of these women for HPV is the major prevention programme for cervical cancer. The national cancer prevention and control strategy for Zimbabwe (MOHCC, National Cancer Prevention and Control Strategy for Zimbabwe, 2014-2018) indicated that cervical cancer screening is the most cost-effective intervention especially in limited resource settings.

5.4 Implications

The prevalence of precancerous lesions among HPV DNA positive women is very significantly high. The cervical cancer screening programme is reaching a few urban women, it need to be expanded to the general population in rural areas. The findings also point to an increase in HIV testing facilities. The study was conducted at PSH new start centers only; hence it limits the generalization of the findings. The study included mostly women in urban settings, and who were HPV DNA positive from the registers, hence no randomization of respondents was conducted. The study participants were drawn mostly from urban sites which did not represent the attributes of the rural population. As a cross-sectional study, the researcher could not conduct causal inferences. Rather it focused on associations.

5.5 Recommendations

Based on the findings of the study, the following recommendations are being directed towards the PSH, ministry of health and childcare and other key stakeholders in the scaling up of cancer screening facilities including among rural populations.

SPECIFIC FINDINGS	KEY RECOMMENDATION
High prevalence of precancerous lesions among HPV DNA positive women	• There is need for PSH and the Ministry of Health and Child Care to increase cancer screening facilities in both urban and rural populations to prevent cervical cancer among the at risk populations. • Involve the key stakeholders to increase the cancer screening facilities and Ministry of health and childcare to provide manpower for the programme.
Benefits of Cervical Cancer screening High proportions of the behaviors of use of vaginal herbs and contraceptive use including condoms.	• There is need for PSH social marketing team and MOHCC health promotion team to work with various key stakeholders in the development of targeted messages on benefits of prevention of cervical cancer. • **Communication strategy:** PSH and ministry of health and child care to develop a human centered approach strategy on prevention of cervical cancer.
Reinforcement of Prevention behaviors	• PSH and health promotion team

like knowing HIV status, age at first sexual debut at 18 years and use of condoms.	to have a strong social media strategy in place to reinforce positive prevention behaviors which promote cervical cancer prevention in youths
Limited cervical cancer screening Centers	• PSH and the Ministry of health and childcare to consider decentralizing cervical cancer screening centres using public and private premises.

5.6 Suggestions for Further Research

1. Gaps in the cervical cancer referral system

2. Evaluation of the screen and treat strategies of cervical cancer

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APPENDICES

APPENDIX 1 Questionnaire

Questionnaire number----------Date of Interview----------

Demographic data

1. How old are you? ----------
   Une makore mangani?
2. What is your highest level of education?
   Makafunda kusvika papi?
   a) None
   b) Primary
   c) Secondary
   d) Tertiary
3. What is your occupation
   Munoita basa rei?
   a) Unemployed
   b) Formally employed
   c) Self-employed
   d) Student
4. Marital status
   Makaroorwa here?
   a) Single
   b) Married/ Cohabiting
   c) Divorced /Separated
   d) Widowed
5. Number of children? (Dead and or alive)
   Makaita vana vangani?
   a) 0
   b) 1 to 3
   c) 4 to 6

d) More than 6

Menstrual and Sexual History

6. Age at first menstrual period/ *Makatanga kutevera nemakore mangani?*

7. Do you use vaginal herbs and or vagina salts? *Munoshandisa mishonga yechibhoyi kupfeka kunhengo yesikarudzi here*?

8. Age at first sex/ *Makatanga bonde nemakore mangani?*

9. Number of lifetime sexual partners/ *Makasangana nevanhu vangani pabonde muupenyu hwenyu*

10. Any history of STIs? / *Makamborwara nezvirwere zvepabonde here?*

11. Use of condoms? *Munoshandisa macondom pabonde here?*

a) Yes
b) No

a) 0
b) 1 to 5
c) 6 to 9
d) 10 or more

YES or NO

a) Yes
b) B) No
c) Sometimes

Clinical History

(*Tick one that apply)*

12. HIV Status Negative/Positive on ART/ Positive not on ART

13. HPV DNA test date and result: Date

Positive/negative

14. VIAC test date and result: Date----------Positive/ Negative/ Suspicious of cancer.

15. Have you ever received treatment for suspected cervical cancer? *Makamborapwa mafungidzirwa kuti mungaita gomarara remuromo wechibereko here?*

a) Cryotherapy
b) LEEP
c) Hysterectomy

Thank you/ Ndatenda / Ngiyabonga!!

Appendix 2: Informed consent (English)

My name is Vongai Museza, a final year MPH student at Africa University. I am conducting research on determining the prevalence of precancer and cancer among HPV-DNA positive women in Zimbabwe. Purpose of the study is to assess the number of women who turn out to be having precancerous lesions following a positive HPV DNA test. This will help in developing strategies aimed at improving the quality of care for those who test positive for HPV. You were selected for the study as you are among the women who tested positive for HPV at one of the new start centers. Should you decide to participate, it will take about ten minutes to answer questions asked by the interviewer. The researcher will address the sensitive questions in a respectable manner and maintain the information obtained confidential. The participant is also free to divulge the information voluntarily. It is essential to note that there are no material benefits attached to the study. All the information obtained will be kept confidential, no names or any other identification will appear on questionnaires. However, coding of questionnaires will be done using serial numbers. Privacy will also be maintained. Participation in this study is on voluntary basis. Should the participant feel unable to participate, the action will not affect their relationship with the participant organization or any authority. If they chose to participate, they are free to withdraw their consent and discontinue participation without penalty. Please feel free to ask any questions pertaining to the study. You may take as much time as necessary to decide. If you have decided to participate in this study kindly sign the form in the spaces provided below as an indication that you have read the information and have agreed to participate.

Name of Research Participant

Please print ---------- Date ----------

Signature of Research Participant----------Date----------

If you have any queries, questions, or concerns beyond those addressed by the researcher or anything to do with the research, like your rights as a research participant. If you feel you have been treated unfairly and would like to talk to someone other than the researcher, feel free to contact my supervisor Dr Mugomeri on mugomerie@africau.edu or the Africa University Research Ethics Committee on telephone. (020) 60075 or 60026 extension 1156 or email aurec@africa.edu.

Name of researcher: Vongai Museza ----------

APPENDIX 3 Informed consent -Shona

Zita rangu ndinonzi Vongai Museza, ndiri mudzidzi ari mugore rekupedzisira muchidzidzo cheMaster's in Public Health paAfrica University. Ndirikuita tsvakurudzo yekuona kuti madzimai akaitwa ongororo yegomarara remuromo wechibereko kuchishandiswa ongororo ye HPV DNA, vangani vavo vakazowanikwa vachifungidzirwa kuti vane gomarara remuromo wechibereko. Chinangwa chetsvakurudzo ndechekuona kuti madzimai mangani anenge awanikwa aine hutachiwana hweHPV anowanikwa achifungidzirwa kuti vangangozoita gomarara remuromo wechibereko. Zvichabuda mutsvakurudzo zvichabatsira kugadzira nzira dzakananganana nekuvandudza rubatsiro runopiwa vanenge vawanikwa vaine hutachiwana hweHPV kuti varege kuzorwara kana kufa negomarara remuromo wechibereko. Masarudzwa kuti mupinde mutsvakurudzo iyi nekuti muri mumwe wemadzimai akawanikwa aine hutachiwana hweHPV pane imwe yemaNew Start Centre muno muZimbabwe. Makasununguka kusarudza kupinda kana kusapinda mutsvakurudzo iyi. Kana masarudza kupinda mutsvakurudzo, zvinokutorerai nguva inoita maminitsi gumi kupindura mibvunzo yamuchabvunziwa nemuzvina tsvakurudzo. Muzvinatsvakurudzo achachengetedza tsindidzo pane zvose zvaachakubvunzai nemhinduro dzamuchapa. Hamumanikidzwi kupindura mibvunzo iyi, isarudzo yenyu kupindura pasina kumanikidzwa. Hakuna mubairo wamuchapiwa kana muchinge mapinda mutsvakurudzo iyi. Mapepa achanyorerwa mhinduro dzamuchapa haazonyorwi mazita enyu kuitira kuchengetedza tsindidzo. Sarudzo yenyu yekupinda muchidzidzo ichi nekuzvidira, kana mukasarudza kusapinda muchidzidzo ichi, hazvikanganisi hukama hwenyu neMOHCC kana neveNew Start Centre. Kana mukasarudza kutora chikamu, makasununguka kubvisa mvumo yenyu uye kurega kutora chikamu pasina mutongo chero nguva.

Mibvunzo

Musati masaina fomu iri, munokwanisa kubvunza mibvunzo ine chekuita nechidzidzo chino yamusina kujekerwa nayo.

Mvumo

Kana mafunga kutora chikamu mutsvakurudzo iyi, ndokumbira musaine fomu iri munzvimbo yakapihwa pazasi sechiratidzo chekuti maverenga nekunzwisisa ruzivo rwapihwa pamusoro uye mabvuma kutora chikamu.

---------- ----------

Zita remunhu arikutora mvumo Date

Signature yemunhu akutora mvumo

Kana muine chero mibvunzo maererano nechidzidzo ichi kana fomu remvumo kupfuura iyo yakapindurwa nemuongorori kusanganisira mibvunzo pamusoro petsvakurudzo, kodzero dzenyu semutsvakiridzo, kana imi muchinzwa kuti hamuna kubatwa zvakanaka uye muchida kutaura nemumwe munhu asiri muongorori, inzwai makasununguka kutaura neve Africa University Research Ethics Committee parunhare (020) 60075 or 60026 extension 1156 chero email aurec@africau.edu

Zita remunhu arikuita tsvakurudzo: Vongai Museza

APPENDIX 4 Letter of Approval from PSH

Population Solutions for Health

2 December 2021

To whom it may concern

Dear Sir/Madam

Ref: Approval Letter to conduct study at Population Solutions for Health Newstart Centers

Dissertation Topic: To determine the prevalence and correlates of HPV DNA positive cervical cancer cases.

Evaluation Topic: Evaluation of the VMMC programme at Population Solutions for Health Gweru New Start Center

This letter serves to inform you that Population Solutions for Health (PSH) has granted permission to Vongai Museza to carry out the above-mentioned studies at Population Solutions for Health New start centers and Gweru Newstart Centre respectively for academic purposes only.

The investigator is mandated to observe ethical standards of the highest degree and will be required to seek ethical approval from the local Institutional Review Board (IRB) ahead of any work starting and to also acknowledge PSI and our major donors in the final project report. Further, the applicant should sign a PSH oath of confidentiality form should the study require that the applicant collects identifiable data. All study costs should be borne by the researcher.

The information gathered in the study should only be used for academic purposes and the applicant will be obliged to share study findings with key program members at PSH, the donors and community of practice.

Yours faithfully

02/12/2021

Jabulani Mavudze
Director Evidence Department

Population Solutions For Health
Suite 5, House East, Westgate Shopping Centre Offices, Westgate, Harare
+263.242.339597/80 | www.psh.org.zw

APPENDIX 5 Approval letter from AUREC

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare Tel (+263 20) 60075/60026/61611 Fax (+263 20) 61785 website: www.africau.edu

Ref: AU2364/22 4 February, 2022

Vongai Musara
C/O CHANS
Africa University
Box 1320
MUTARE

RE: **PREVALENCE OF PRECANCEROUS LESIONS IN HPV-DNA POSITIVE WOMEN IN THE PSH CERVICAL CANCER SCREENING PROGAM IN ZIMBABWE 2019 TO 2021**

Thank you for the above titled proposal that you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following

a) Research proposal
b) Data collection instruments
c) Informed consent guide

- **APPROVAL NUMBER** AUREC 2364/22
  This number should be used on all correspondences, consent forms, and appropriate documents.
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** February 4, 2022
- **EXPIRATION DATE** February 4, 2023
- **TYPE OF MEETING** Expedited
  After the expiration date this research may only continue upon renewal. For purposes of renewal, a progress report on a standard AUREC form should be submitted a month before expiration date.
- **SERIOUS ADVERSE EVENTS** All serious problems having to do with subject safety must be reported to AUREC within 3 working days on standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent document)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

Yours Faithfully

MAKY CHINZOU –
ASSISTANT RESEARCH OFFICER: FOR CHAIRPERSON
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE