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Uptake and determinants of cervical cancer screening among health care workers in Aga Khan university hospital, Nairobi Kenya.

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UPTAKE AND DETERMINANTS OF CERVICAL CANCER SCREENING AMONG HEALTH CARE WORKERS IN AGA KHAN UNIVERSITY HOSPITAL, NAIROBI KENYA.

By

DR. DOREEN MORAA OSORO

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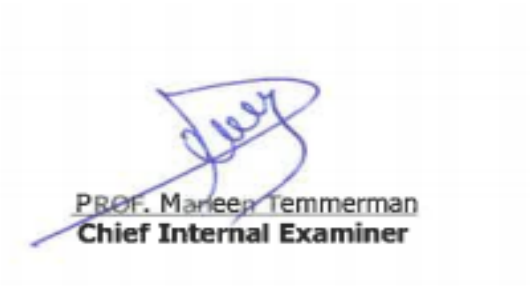

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DEDICATION

This thesis is dedicated:

To the memory of my beloved father, Mr. Simon Osoro, who passed away before finishing the medical internship and proceeding to my post-doctoral study, you are dearly missed.

To my mother, who supported me both financially, emotionally, and spiritually through undergraduate and postgraduate studies, you are truly a great pillar.

To my husband, Joel Mosoti for, his encouragement to always aim higher and support since undergraduate studies. Thank you for believing in me.

To colleagues, who have supported me and mentored me throughout the process, more so to Dr. Okemo for helping me during the early stages of concept development.

I dedicate this work and give special thanks to my children Ellie and Andrew: aim for the stars, believe in yourself and, everything you desire is within your reach.

ABSTRACT

BACKGROUND

The cancer burden has been rising globally. The reported incidence of cervical cancer is 13.1 / 100,000 globally and 40 / 100,000 in Kenya. Up to 88% of all cervical cancer deaths have been reported in lower to middle-income countries. In comparison, developed countries had up to two to four time's lower rates of cervical cancer incidence and mortality. The burden of cancers attributable to carcinogenic infections has potentially modifiable risk factors, for which prevention tools already exist. There is a gap in the implementation of evidence-based interventions including primary prevention with the HPV vaccine and secondary prevention with screening and treatment of early precancerous lesions. Both structural and personal impediments to screening programs commonly encountered in sub-Saharan Africa include lack of availability, accessibility, affordability of health services, limited resources, lack of awareness, high HIV burden, poor health-seeking behavior, psychological factors. The Kenyan government is rolling out cervical cancer screening programs, but the coverage is still low, mainly due to lack of awareness, knowledge, lack of services, and cost of screening, fear, ignorance, and stigma. Therefore, we decided to study the level of screening and determinants of screening, in a well-educated population with good medical coverage, health insurance, and availability of services, to understand the factors that play a role even in this population. In addition, we decided to explore the role of men in the prevention of cervical cancer. Traditionally men have not been involved in reproductive health, as it has always been considered as a woman's domain. Policy development in family planning has engaged men in taking a proactive role and this has seen acceptability and increased uptake of family planning services, which could be modeled in other preventive and promotion programs of screening for cervical cancer.

METHODS: We performed a descriptive cross-sectional study recruiting from a population of 2246 health care staff offering direct or indirect health services in the Aga Khan University Hospital, Nairobi, Kenya. The study population was stratified into clinical, administrative, and support staff. The non-probability sampling method was done proportionately to the size of the population to ensure equal representation. Using the prevalence calculation, 362 participants were invited and directly approached after adjusting from the finite population. Data were obtained using a validated semi-structured Cervical cancer Awareness Measure questionnaire (CAM tool). Which collected data including socio-demographic, screening practices and attitudes, advocacy, and knowledge on vaccination. The present study used the Chi-square test for data analysis and further explored the data for an independent variable using multivariate logistic regression. The perceived psychological barriers to health seeking behaviour

seen in the study were discussed using the Health Belief Model for identification of actions to achieve efficacy in uptake of cervical cancer screening.

RESULTS:

Out of the 362 invited staff, 352 agreed to participate in the study (97.2 % response rate), with 295 (83.8%) females and 57 (16.2%) males. Out of the 295 females, 183 (62%) (95% CI: 56.2% to 67.6%) had ever been screened for cervical cancer while 112 (38%) were never screened. Factors associated with cervical cancer screening included age above 30 years, parity, marital status, insurance cover, exposure or caring for a cervical cancer patient.

On prevention of cervical cancer, 271 (77%) both males and females participants knew the correct age of vaccination, and 24 (8.1%) of the female participants had been vaccinated for cervical cancer. Only 36 (10.2%) of both females and males participants believed in the protective effects of the vaccine, 149(50.5%) of the female participants and 25(43%) of male participants did not believe that vaccination is protective against cervical cancer.

On the uptake of routine screening among the 183 females who had ever been screened, 30 (16.4%) had three yearly screening results, with 153(83.6%) were either screened or awaiting due screening interval or not following the recommended interval for screening after the initial screening. Of the 112 females who had not screened for cervical cancer, 59 (52.7%) cited the test as invasive. Out of the 41 (13.9%) female participants who declined future screening opportunities, 68.3% cited psychological factors including fear of the procedure.

Of the male participants 42 (63.7%) knew the status of screening of either their partner or close family member with only 9 (15.8%) correctly identified the recommended age of screening. Forty-four (77.2%) males were aware of the availability of cervical cancer vaccine though only 6(10.1%) thought that vaccination against cervical cancer was protective.

The insurance cover was high in this population with 294 (83.5%), with a majority of 303 (86.1%) being aware of the cervical screening program availability. Health education was the primary source of current knowledge for 262 (74.4%), while only 103 (29.3%) relied on media as their source of cervical cancer knowledge. Women who had high knowledge of cervical cancer were twice as likely to screen for cervical cancer as those with low knowledge of cervical cancer (AOR: 2.085; 95% CI: 1.212-3.631).

CONCLUSIONS

The study illustrates a 62% screening rate in healthcare workers in a private tertiary hospital with minimal to no structural barriers to screening. Personal psychological barriers, including fear of the screening procedure, were the principal reasons for not screening or going for routine screening. In Aga Khan

University Hospital, there is still an opportunity to increase the acceptability of the test by addressing the psychological fear of the procedure. This can be done by filling of surveys in each vist and counselling of the patients before the procedure. Innovative screening services can be assessed and offered as an alternative to the regular pap smear, so as to increase acceptability of conducting the screening procedure. Likewise, structuring of education programs can be included in the policy to focus on cervical cancer, screening practices, and importance of vaccination. In addition, cues for action like media campaigns, training programs, and yearly message reminders for screening will aid in increasing cervical cancer screening rates.

The findings of this study will be important to share with the governmental and non-governmental stakeholders focusing on cervical cancer screening barriers. The identified personal barriers together with the existing structural barriers need to be addressed in vulnerable populations to improve future cervical cancer screening rates in Kenya. Likewise, implementation of the existing study findings and evidence-based interventions can help achieve the goal of elimination of this preventable cancer.

LIST OF TERMS, ABBREVIATIONS, AND SYMBOLS USED

ACOG	American College Of Obstetrician and Gynecologists
AKUH, N	Aga Khan University Hospital, Nairobi
CIN	Cervical Intraepithelial Neoplasia
CAM TOOL	Cervical cancer Awareness Measure Tool
HPV	Human papilloma virus
IARC	International Agency for Research on Cancer
KDHS	Kenya demographic and Health Survey
LEEP	Loop Electrical Excision Procedure
LLETZ	Large Loop Excision of the Transformation Zone
LSIL	Low- Grade Intraepithelial Lesion
PAP	Papanicolaou smear
RCOG	Royal College of Obstetrician and Gynecologists
SCC	Squamous Cell Carcinoma
VIA	Visual Inspection with Acetic acid
VILLI	Visual Inspection with Lugol's Iodine
WHO	World Health Organization

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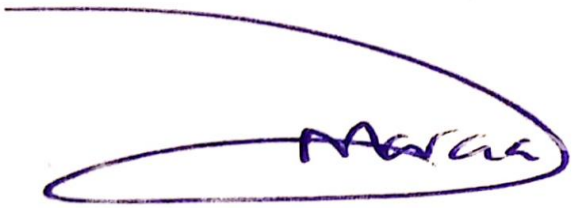
Thank you all.

DECLARATION

I declare this dissertation does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and that to the best of my knowledge, it does not contain any material previously published or written by another person except where due reference has been made in the text.



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(Signature of candidate)

2nd June, 2021

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CHAPTER ONE

INTRODUCTION

1.1: Burden of disease

Worldwide the burden of cervical cancer disease in 2018 was 570,000 new cases with incidence rate of 13.1/100000. Cervical cancer ranks fourth worldwide but ranks first as the leading cause of cancer-related mortality in Sub-Saharan Africa. (1, 2) More than 80% of cervical cancer in sub-Saharan Africa is very high compared to developed counties. In Africa, Southern Africa had the highest incidence rate of 43.1/100,000, with Eastern Africa at 40.1/100000 in 2018. This has recently changed with Eastern Africa being top of the list over the past 2 years at a constant of 40.1/100000, and a mortality rate of 28.6/100000. Southern Africa now has a lower cervical cancer incidence of 36.4/100000 and a mortality rate of 20.6/10000(1) *figure 1*.

In Kenya there were 5250 new cervical cancer cases and 3286 deaths in the year 2019. The incidence rate was at 33.8 /100000 with a mortality rate of 22.8 / 100000. The cumulative risk of acquisition of cervical cancer was 3.7% and cumulative mortality from cervical cancer risk was at 2.6%. A total of 9.1% of women estimated to have high risk HPV subtypes 16/18(3). This can be compared to Uganda, which had 6413 new cases and 4301 deaths in 2016. The incidence rates rose from 28.8 / 100000 in 2016 to 47.5 /100000 by 2019. The prevalence of high risk HPV 16/18 was at 3.5% in women who had normal cytology and 30% and 45% in women who had LSIL and HSIL respectively and at 57% in those diagnosed with cervical cancer(4) . In South Africa, there had been a steady rise in cervical cancer incidence rates from 24/100000 in 1998 to 39 /100000 in 2002. This has reduced currently to 36.4/100,000 a period of 17 years. The burden of disease was higher between age groups of 50 to 59 years and 60 to 69 years with stage III disease. (5, 6)

Worldwide the incidence of cervical cancer has gone down with developed countries like the UK having a total of 3200 cases reported between 2015 and 2017. There has been significant decrease in case numbers from 25% to 2% between 1990s and 2017. This percentage has stabilized at this rate over the past 20 years with approximately, 85% of the women having screened for cervical cancer in the last 5 years. This implemented programs have contributed to adherence on the recommended routine testing seen in this developed countries (1, 7)

Data on cervical cancer incidence by GLOBOCAN, IARC 2020 worldwide and per region as summarized in *figure 1*

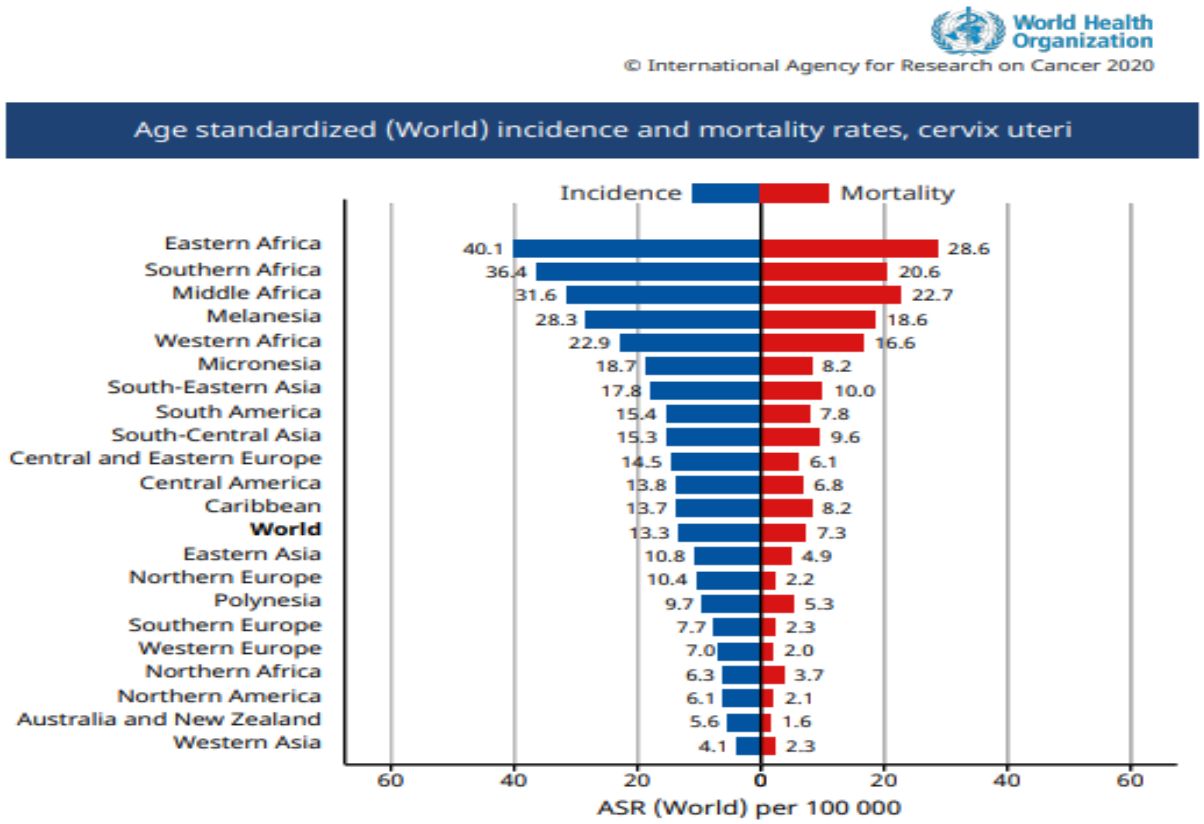


Figure 1: IARC WHO-GLOBOCAN Age Standardized Rate of Cervical Cancer Worldwide and regions 2021

Among the 10 top cancers in Kenya, the age standardized incidence for cervical cancer was 39.9 /100,000, ranking second but with a higher mortality rate than breast cancer (GLOBOCAN 2018) (7) (figure 2). The overall incidence rate of cervical cancer in 2018 was at 12.4% in Kenya. The cumulative risk of developing cervical cancer in the future among women between 15 to 44 years was at 3.6%. The cervical cancer mortality rate and cumulative mortality risk in 2018 was at 11.9% and 2.5% respectively(7). This mortality rate can be attributed to late diagnosis where palliative treatment is the only option. Age of diagnosis is a vital prognostic factor in overall the survival of cervical cancer, with advanced ages being associated with worse prognosis. Most women in Kenya are diagnosed with advanced cervical cancer at the peak of their productivity. This late diagnosis is due to low screening uptake, and the longer duration clinical symptoms take to transform from a precancerous lesion to cancer. Early disease is mostly asymptomatic and can be

cured with appropriate treatment interventions. It can be detected through screening, and curative interventions can be undertaken. (1, 8).

The top 10 cancers in incidence and mortality rate in Kenya in *figure two* below (GLOBOCAN 2018)

Incidence, Mortality and Prevalence by cancer site

	New cases				Deaths				5-year prevalence (all ages)	
Cancer	Number	Rank	(%)	Cum.risk	Number	Rank	(%)	Cum.risk	Number	Prop. (per 100 000)
Breast	6 799	1	16.1	4.69	3 107	2	11.5	2.28	15 496	57.28
Cervix uteri	5 236	2	12.4	3.60	3 211	1	11.9	2.50	10 881	40.22
Prostate	3 412	3	8.1	4.59	1 780	4	6.6	2.31	5 833	21.83
Oesophagus	2 974	4	7.1	1.57	2 743	3	10.1	1.49	3 247	6.04
Non-Hodgkin lymphoma	1 798	5	4.3	0.53	1 098	7	4.1	0.38	4 038	7.51
Stomach	1 781	6	4.2	0.90	1 501	5	5.5	0.78	2 429	4.52
Leukaemia	1 579	7	3.7	0.44	1 159	6	4.3	0.38	3 745	6.96
Colon	1 546	8	3.7	0.71	1 051	8	3.9	0.49	2 870	5.34
Ovary	1 126	9	2.7	0.98	798	11	2.9	0.80	2 314	8.55
Rectum	973	10	2.3	0.42	670	13	2.5	0.30	1 916	3.56

Figure 2: GLOBOCAN (IARC 2018) Incidence, Mortality and Prevalence Rate by Cancer site

1.2: Global preventive strategies for cervical cancer

The World Health Organization has launched a global strategy on cervical cancer, 'Elimination as a public health problem' as primary prevention and treatment strategy. Worldwide, WHO aims to enhance uptake of cervical cancer screening using simple algorithms and highly effective HPV testing. This is 90 -70 -90 targets for vaccination, cervical cancer screening, and treatment by 2030 with target of reducing cervical cancer incidence rates to below 4 /100000. The ongoing vaccination efforts whose benefits in cancer reduction are projected using comparative model analysis, will be seen in future generations at adulthood,. (1, 5, 8, 9).

Cervical cancer screening programs have seen an increasing number of women screening for cervical cancer in developed countries. In the UK, a trend analysis from 1971 to 2013 by Francesca et al. demonstrated that, approximately 85 % of the women are estimated to have been screened in in past 5 years from 2013. with aversion of 65,000 (48%) cases of cervical cancer since introduction of cervical cancer screening(10). Cervical cancer screening is provided by National Health Insurance at no cost to the women, in addition, effective screening programs exist with a computerized call and recall which invites the women every 3 to 5 years, since 1988. (11)

In developing countries, affordability of health services and lack of such programs has contributed to the low screening rates seen in low to middle income countries which have significantly lower rates and a relatively high burden of disease (11, 12). In Kenya, the cervical cancer screen rate as per the 2014 Kenya Demographic Health Survey was at 3.5%. (KDHS 2014). A collaborative effort among countries is essential, to enable the formulation of systems to detect early disease and offer early interventions, follow up and treatment of precancerous lesions. (7)This programs of cervical cancer screening can pick up potential health diseases in a population that are at risk but have no symptoms, which eventually leads to decreased incidence and mortality from cervical cancer. Early detection, treatment, and intervention will cause a rise in cervical cancer surveillance and reduce the burden of the disease.

1.3: Age and cervical cancer

The age of screening for cervical cancer has been controversial and each country has been using protocols it has developed. Kenya's cervical cancer screening policy is based on WHO recommendation to start screening at the age of 25. WHO, through the US Preventive Service Task Force (USPSTF) issued a recommendations statement on screening for cervical cancer. A decision analysis model looked at age of index screening, optimal interval of screening and most effective strategies of screening. The conclusion was screening at ages of 21 to 65 years was associated with significant reduction in cervical cancer cases and mortality (11, 13). Center for Disease Control (CDC) has also recently recommended screening to start at the ages of 21 years.

The incidence rate of cervical cancer starting rising as of 25 years of age, the average age at diagnosis is 53 years worldwide with a range of 44 years to 68 years (14). In developing countries, the incidence of cervical cancer has risen to the age of 55 to 69 years as compared to a peak of 40 years in developed countries, and a recent study in Denmark recommends extending the cervical cancer screening age to up to 69 years. Cervical cancer incidence and mortality remain high in older women, and screening beyond 65 years could have a benefit. (15) Using the Markov model there was a risk reduction, once screening continues up to 75 years of age. A correlation exists between negative exit HPV tests with or without cytology and a low remaining lifetime cervical cancer risk for unvaccinated women with a cervix after the

age of 55 years (16). Thus recommendations are towards changing the upper limit of cervical cancer screening worldwide (1), *figure 3* on incidence with age, below.

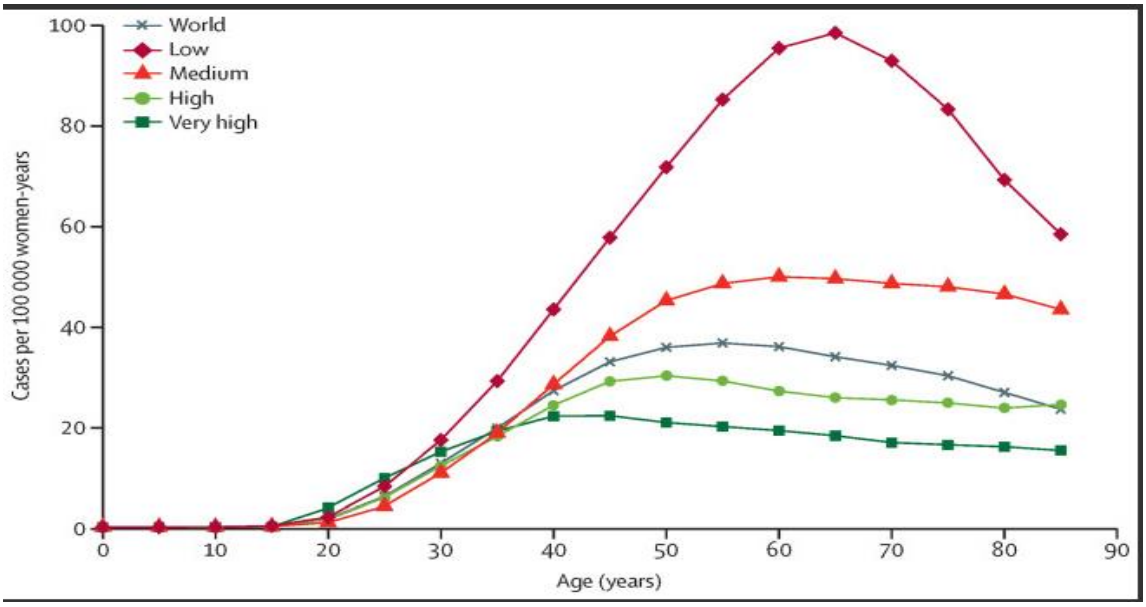


Figure 3: Age-specific incidence of Cervical Cancer Worldwide and in terms of Four Tier HDI (17)

The recommended interval after index cervical cancer screening is 3 years. Additional HPV DNA co-testing for women above 30 years of age can be done with 5 year interval before testing again. This is because below 30 years of age, an immunological clearance of the HPV infection is slightly higher as compared to those above 30 years where persistence of disease and can lead to progression. In a three year retrospective study by *ming et al.* co testing has shown efficacy in picking up CIN on subsequent follow up tests where the cumulative risk of those who had high risk HPV in co-test had CIN 3 on subsequent follow up(1, 18, 19)

1.4: Cervical cancer screening strategies and economic planning

Cervical cancer screening methods include cytology screening, HPV DNA testing, and VIA, VILLI. The VIA VILLI test is advocated for low resource settings as a basic screening tool (19). The Visual Inspection with Acetic acid (VIA) or Visual Inspection with Lugol's iodine is used. Abnormal findings are referred to and tested with cytology or colposcopy. In developing countries, cytology screening is done in good resource centers and they adopt the convention Pap smear or liquid-based cytology. (20) Early detection of precancerous or early-stage cancer increases chances of successful treatment and overall survival (21). With the increasing availability of vaccines, there is a high chance of decreasing the incidence of cervical cancer (22).

Developing countries have a high burden of disease and early implementation of screening programs increases the awareness of the first signs of cancer to the general public(23). To effectively achieve early detection, there has to be improved accessibility and affordability and better early referrals among the various levels of health care. Health services thus need funding to capacity to enable the primary preventive programs to succeed. The economic impact of treating cancer is high with the ever-increasing cost of care as treatment is throughout the disease with individual loss of productivity and human resource due to low quality of care and premature death. To decrease this health and economic burden, prevention should be the focus of the Ministry of Health in addition, determining the prevalence of disease would assist in the proper allocation of funds for programs and policies (8).

1.5: HPV and cervical cancer progression

Cervical cancer is caused by persistent infection by the human papillomavirus (HPV) that is not cleared by the host immunity. Other cofactors implicated in progression include the HLA type, immunosuppression, sex steroid hormones, and smoking. The progression to CIN 3 in 10% of CIN 1 and 20% of CIN 2 cases, whereas at least 12% of CIN 3 cases progress to invasive carcinoma. (1, 24). Using a statistical model, it can take 10-20 years for a precancerous lesion caused by HPV to develop into an invasive disease (25). It is possible to detect and treat cervical cancer at its precancerous stages thus lowering the morbidity and mortality due to cervical cancer.

There are various histological types of cervical cancers. The squamous histological type is the most common, 9 in 10 cases while the rest being adenocarcinoma or mixed type of the two. The human papilloma virus being the predominant cause of pre-invasive and invasive squamous cell cancers of the lower genital tract, of which cervical cancer is the most prevalent(26)z (27) .HPV is a double-stranded DNA virus with more than 100 subtypes. The subtypes are further sub-classified into high-risk subtypes that can cause cancer and low-risk type. High-risk subtypes cause cancerous changes and they include 16, 18, 31 33, 35, 39,45,51,52, 56, 58, 59, 66, 68, 73. Approximately, 70% of cervical cancer caused by types 16 and 18 (28).

There is a positive correlation of the viral load and severity of intraepithelial lesions. Where the higher the viral load the severe the lesion and it is more crucial to also determine the viral load with every positive DNA test (29). At the time of infection, the HPV virus invades squamous epithelium. The host immunity usually launches an immune response to clear the infection. Persistence of the low risk HPV type 6 and 11 infection results in vulvar vaginal warts, anogenital warts, and oropharyngeal warts. The High risk

HPV 16 and 18 among other subtypes, causes precancerous and cancerous lesions by integrating into the host genome and through the viral oncogenes E6 and E7 which bind to and inactivate the Rb protein by E6 proteins, E7 binds p53 resulting in rapid degradation (30) with the net effect of transformation of the cell, and continuous proliferation of the cell and prevention apoptosis (30).

1.6: Transmission of HPV and associated risk factors

In males the prevalence of HPV is high, the reason is that they act as carriers. Once the male partner is infected, the scrotum act as a reservoir for the virus. The mode of spread of the virus is mainly through sexual contact. Multiple transmissions occur during repeated penetrative sexual contact, with more transmission rate from female to male compared to the male to female. Non-penetrative sexual transmission occurs also through various contacts of the female anus and scrotum contact and also through to female hands and genitals contacts. Thus both sexes can act as important reservoir for HPV. (31).

Non-sexual transmission of HPV, though low, has been documented especially during the normal delivery time to the infant (27). In addition, HPV DNA is positive on transvaginal ultrasound probes and colposcopes despite routine disinfection (32, 33). The initial infection can lead to either clearance of the virus by the immune system of the host. In cases where the is the failure of the immune system to clear the infection, the persistence of the virus on the epithelium occurs(34). This persistence of the virus on the epithelium incorporates into the cell DNA cell changes that affect transcription and apoptosis of the cell. (35). A WHO survey conducted by the International Agency for Research on Cancer (IARC) confirmed the risk of cervical cancer to be up to four times higher, especially in women who have human papillomavirus infection(35).

Factors that increase the risk of acquiring HPV infection include low awareness and knowledge on cervical cancer, early onset of sexual activity, multiple sexual partners, and high-risk sexual partner (30, 36, 37). Increasing parity increases the risk for subsequent squamous cell carcinoma of the cervix among HPV-positive women(38) .The noted decline in parity in developed countries can be seen as a course of reduction in cervical cancer incidence (39). Contraceptive use and its association to cervical cancer depend largely duration of use. A duration of 5 years has a risk of 10% than in women and this sharply rises to 60% by 9 to 10 years of hormonal contraceptive use on the persistence of hormonal effects long after the use of oral contraceptives even 10 years later.(38, 40) The use of oral contraceptives from around age 20 to 30 years is estimated to increase the cumulative incidence of invasive cervical cancer by age 50 from 7.3 to 8.3 per 1000 in developing countries and 3.8 to 4.5 per 1000 in more developed countries. (40).

Cigarette smoking as a contributing risk factor to cervical cancer acquisition is well known. The molecular basis is poorly understood, postulated mechanisms include immunosuppression interaction of smoking carcinogens with damaged infected DNA cervical cells have also been implicated as factors that increase infection(19, 41).Among high-risk HPV positive women who had more than 8 yrs. of smoking or used more than 18 cigarettes /day have an enhanced risk of high-grade cervical lesions(19) (30)

1.6: Justification

We have limited data on screening practices in cervical cancer among healthcare providers. A healthcare worker is any worker who offers direct or indirect services to individuals seeking healthcare in a hospital setup. In Aga khan University hospital, Nairobi, insurance cover and cytological tests are available thus structural barriers are not seen in this population as compared to the general population where structural factors are the major barriers to cervical cancer screening. This screening practices and view of healthcare workers is essential in increasing screening for cervical cancer. Among predictors of cervical cancer screening, referral and advocacy of screening to patients by health care workers for cervical cancer screening had a positive correlation to cervical cancer screening. (42) (43-45).

Cancer screening and care are core pillars of Aga Khan University Hospital, Nairobi, The hospital has invested in programs that promote cervical cancer awareness and offer world-class treatment options to those affected with cancer. Regular media reminders of these services and the recognition of the month of October in raising awareness of cervical cancer screening at a subsidized cost. Implementation of theory-based cervical cancer education has been shown to increase women's participation in cervical cancer screening programs (46). We explored these unique barriers on healthcare workers and sensitized healthcare workers as an integral outreach tool in campaigns. In addition, we empowered and addressed the gaps that were found deficient at the completion of the study, and recommended sustainable programs for continued screening for healthcare workers.

The trends of routine screening uptake following initial screening is essential, to due to the ever present risk of getting HPV infection that can be progressive over the years to a precancerous lesion or cervical cancer. Regular screening has been shown to decrease the incidence and mortality of cervical cancer by up to 80% as it leads to additional diagnostic as colposcopy and subsequent treatment. (43). Data on routine screening collected over time can describe trends of unexplored barriers to screening once a fluctuations on cervical cancer rates per quota of a year. Introduction in the UK, of models that predict future routine screening rates using current screening rates, have preempted set up of measures that ensure targeted rates can be met(47)

Contrary to the belief of good health, healthcare workers are constantly exposed to occupational hazards at the workplace and can also fall ill (45). Healthcare worker's population attitudes and practices have a direct reflection on the community and if the attitude and practices on screening are low, the impact to offer and educate the public may be affected (30, 48). A case-control study by *Nganga et al* among

Kenyan women focused on predictors of cervical cancer screening noted low screening rates, despite the high level of awareness and recommended targeted screening to high-risk groups (49).

Predominantly, structural barriers are the most cited impediments to screening among general population in Kenya. Barriers to screening of health care workers would tend to be unique due to minimal to no structural barriers in this population present. Common personal barriers to health seeking behaviour can be explained using a psychological model, 'the Health Belief Model'. Low perception of susceptibility and severity of cervical cancer can explain the cervical cancer screening trends among heath staff in this tertiary hospital. Using this behavior model, the present study also looked at determinants of cervical cancer screening explain the uptake rates seen in this population of health care workers. It also unearthed unexplored barriers to screening that will help guide to formulate recommendations on programs to overcome the barriers and cause a positive effect on robust advocacy.

A health care worker plays a critical role as advisors and behavioral models to patients and the population. Health workers are held to high standards by the community as advocates of preventive and promoting health. Healthcare workers need to uphold this view held by the community by being living examples (45). Healthcare workers fare no better than the general population when it comes to non-communicable diseases and screening for preventable diseases. Medical professions , do not enjoy good health despite offering the same to their patients and are a higher risk of avoiding this preventive health-seeking behaviour(50). By increasing the knowledge on cervical cancer through education programs, a great effect can be realized through advocacy and referrals form educated health care staff, with as more than 50% of pap smears in clinics are due to provider referral (51). Advocacy of cervical cancer screening by healthcare workers who come into contact the general population seeking medical treatment (52). On the contrary, the quality of updated knowledge on screening procedures and routine to the actual burden of disease is low among healthcare workers, more especially if they have less interaction with reproductive health, and formal education programs should be developed(53). This will have an impact on advocacy to the patients they encounter at work and also the close relatives of the healthcare workers.

Risk of not screening for cervical cancer has been shown to deter early curative treatment, and healthcare workers who has never screened are highly unlikely to advocate the patients or even the close family members on the need for screening for cervical cancer (50). This test requires consent from the patient and the use of speculum examination which may cause some discomfort during the procedure. The results are not relayed immediately cytology can take up to 10 to 14 days. In comparison to regular screening for

non-communicable diseases like hypertension, blood pressure screening that are not invasive and results are relayed almost immediately. This may create a barrier to screening or subsequent follow-up tests (54).

The inclusion of male participants in reproductive health has seen improvement in uptake of various services like family planning. This was done through funded programs that incorporated males during family planning clinic sessions. There were significant positive response to discussing family planning and involvement in decisions making process (55). The present study novel idea to include such model into cervical cancer screening to look participation and involvement in males in preventive services in reproductive health.

CHAPTER TWO

LITERATURE REVIEW

2.1: Cervical cancer economic impact and recommended guidelines

The age at diagnosis for cervical cancer is early compared to other cancers thus a greater loss of life years. At the time of diagnosis, most of the women are at the peak of productivity in their late 30 and early 50. Cervical cancer screening as a secondary intervention aims to increase quality-adjusted life years (QALY) through early detection and treatment. Years of life lost due to a preventable disease, reveals a vital need of programs that lead to prevention of this cancer. Cervical cancer reduces the life span of an individual and it has a great impact on expected economic productivity per individual. This is in relation to the sick off during treatment period and loss of productivity. The burden of cervical cancer in low-income countries thus negatively influences the growth of the economy through loss of productivity and thus more emphasis on the need of adapting prevention programs. (52)

Progression of Premalignant lesions takes 3-7 years to develop in cervical cancer, though detected premalignant lesions are treated at diagnosis, estimating duration can be done and noted to be much shorter if high-risk HPV is present. Thus ample time for detection and treatment has been used to formulate optimum screening schedules and vaccination. (56, 57) .WHO cervical screening guidelines recommend screening of women of ages 21- 29 years with a Pap test alone every 3 years (28, 58). ACOG guidelines recommend screening can stop after 65 years if you do not have a history of moderate to severe abnormal cervical cells or cervical cancer and you have had three negative consecutive pap tests or 2 consecutive negative co-test results in the past 10 years(59). For women who had a subtotal hysterectomy, will continues with screening though adherence has been noted to be low(60), with those who had a total hysterectomy with abnormal cervical smears will need vault smear which is recommended to continue for 20 years after the time of surgery(59, 61). The risk of cervical cancer over the years has been shown to high up to the late 70 and current studies in Denmark looking at the effect of screening up to 69 years of age(62)**.** Though the recent notion of increasing the age up to 75 years would be prudent as the risk due to early exposure is present.

2.2: Novel screening strategies and impact of single visit approach

Newer screening techniques have been employed as technology advances. This includes HPV testing that gives us the molecular understanding subtype and the potential of malignant transformation. Identification of oncogenic subtypes through HPV testing has enabled prediction of the risk of future development to

cervical cancer. Utilization also of innovative service delivery by offering self HPV DNA testing has shown marked acceptability and feasibility in utilizing this test to not only increase cervical cancer screening rates but in early detection of precancerous lesions compared to pap smear(61, 63).

A single visit approach to cervical cancer prevention done in Thailand with visual inspection with VIAA affects revealing an increased cervical cancer incidence rate to an equivalent of doubling this rate, and this was due to higher coverage and positive findings (18). Another cross-sectional study done in India looked at the impact of a single round of screening using VIAA on cervical cancer incidence and mortality in women between 30-59 yrs. Found a high detection rate thus the conclusion that using VIAA as a screening tool in rural setups results in early detection of cervical neoplastic (46). HPV DNA testing in women above 30 years or older tends to improve the test specificity and using a combination of cytology and HPV testing, results in a high negative predictive value. Urine-based HPV testing as a method to screen for cervical cancer has been proposed as a future potential alternative to the current methods available as it's non-invasive and may eliminate the psychosocial barrier. (10, 64)

2.3: Kenya's approach to vaccination and cervical cancer eradication

In Kenya, Health is among the government's Big Four Priority agenda. The rolling out of Universal Health Coverage by 2022 has seen the opening up of 10 cancer centers. This is in addition to the preexisting ones in Kenyatta National Hospital and Moi Referral and Teaching Hospital and will aid in devolving care to the rural community. (65). The existing cancer policies aiming to improve treatment and accessibility of cancer care noted challenges like the high cost of treatment of cancer and most cancer centers are located in urban areas. Partnership with Non-Governmental Organizations through programs that can identify these needs create sustainable programs and policy have worked. (10). The creation of outreach programs and camps have been adopted by Moi teaching hospital to be able to reach the community and empower healthcare workers that work in that community. In 2019, Kenya has also introduced programs of vaccinating 800,000 school-going children annually to help mitigate the effect of cervical cancer. Cancer prevention and treatment in LMIC countries is greatly underfunded with an estimated allocation of 5% of global cancer resources in countries with 80 % of the global cancer burden.

The health and economic impact of scaling up cervical cancer prevention in selected lower-middle-income countries would be very cost-effective, and a comprehensive program could avert 5.2million cases, 3.7 million deaths over a lifetime of the vaccinated population thus averting substantial disability-adjusted life years by incidence reduction(46, 66). HPV vaccination as a primary preventive initiative

may avert more cervical cancer cases, though it has minimal impact on mortality reduction. Vaccination will cause the development of immune among vaccinated school-going children and eliminate cervical cancer in the future through immunity development (66). A combination of vaccination screening and early treatment reduces mortality substantially (11, 67). For comprehensive cervical cancer prevention, both HPV vaccination and screening enhance the effectiveness of this program(11).

Vaccination increases the herd immunity where a substantial fall in vaccine-targeted HPV genotypes in vaccinated women. There was also a lower prevalence of vaccine-targeted types in unvaccinated women, and a possible indication of cross-protection against other HPV subtypes (11, 68). The two major vaccines Gardasil 9 and Cervarix. These vaccines have been approved by FDA to protect against HPV infection. (68) Cervarix, a bivalent vaccine that protects against HPV types 16 and 18, Gardasil, a quadrivalent that protects against type 6, 11, 16, and 18 thus additional coverage. Vaccinations are given from 9 years to 26 years of age, (69) with WHO safety update on the vaccine have reported low rates of anaphylaxis in 1.7 cases per 1 million doses with no other adverse reactions identified. It is considered to be extremely safe.

Despite the benefits of HPV vaccination, uptake has been slow even in developed countries. In Kenya the cost of these vaccines is high and there has a lack of awareness and knowledge of the availability of the vaccines, which are beneficial to school-going girls and young ladies up to 26 years of age. Until recently in the 2019 -2020 GAVI vaccine alliance, launched by the Health Cabinet Secretary aims to introduce vaccines as part of a routine immunization program. They are targeting 800,000 school-going children annually which is part of Kenya's Big Four Action Plan of improving access to quality healthcare services.

2.4: The Health Belief Model influence on health-seeking behaviour

Health-seeking behaviors have a significant impact on screening habits. Preventive behaviors established during adolescence can reduce cancer though out the lifespan of an adolescent. This includes vaccination and education on avoiding substance abuse and high-risk behavior(70). There is a consistent positive correlation between cervical cancer risk and early age of initiation of sexual activity and increased number of sexual partners (71).

The Health Belief Model was developed in the 1950s by a social psychologist and has been used greatly to explain patterns of health-seeking behavior in a population and factors that can be used to increase efficacy in interventions. It explains the psychology of health-related behavior perception and attitudes towards the uptake of screening by healthcare workers. This model looks at 4 major pillars that determine

the health-seeking behavior of the population. It looks at the attitude and beliefs towards the health problems, the attitude on possible benefits of action, common barriers to action, and how the attainment of self-efficacy can be accomplished. The model explains engagement (or lack of engagement) in health-promoting behavior (72). Public health and health promotion interventions that are based on social and behavioral science theories are more effective than those lacking a theoretical base (WHO). This theory provides designs for conducting health-promotion interventions.

The formulated interventions are cues to action, which are monitored and evaluated once the implementation of the action points has been done. This model can be used in increasing health-seeking behavior in diseases where psychological barriers are the predominant causes of poor health-seeking behavior. It has the modifiable factors of the general population, individual beliefs, and actions needed to achieve efficacy as shown in *Figure four* below by *fayanju et* al. who studied health-seeking behavior in screening for breast cancer. (73)

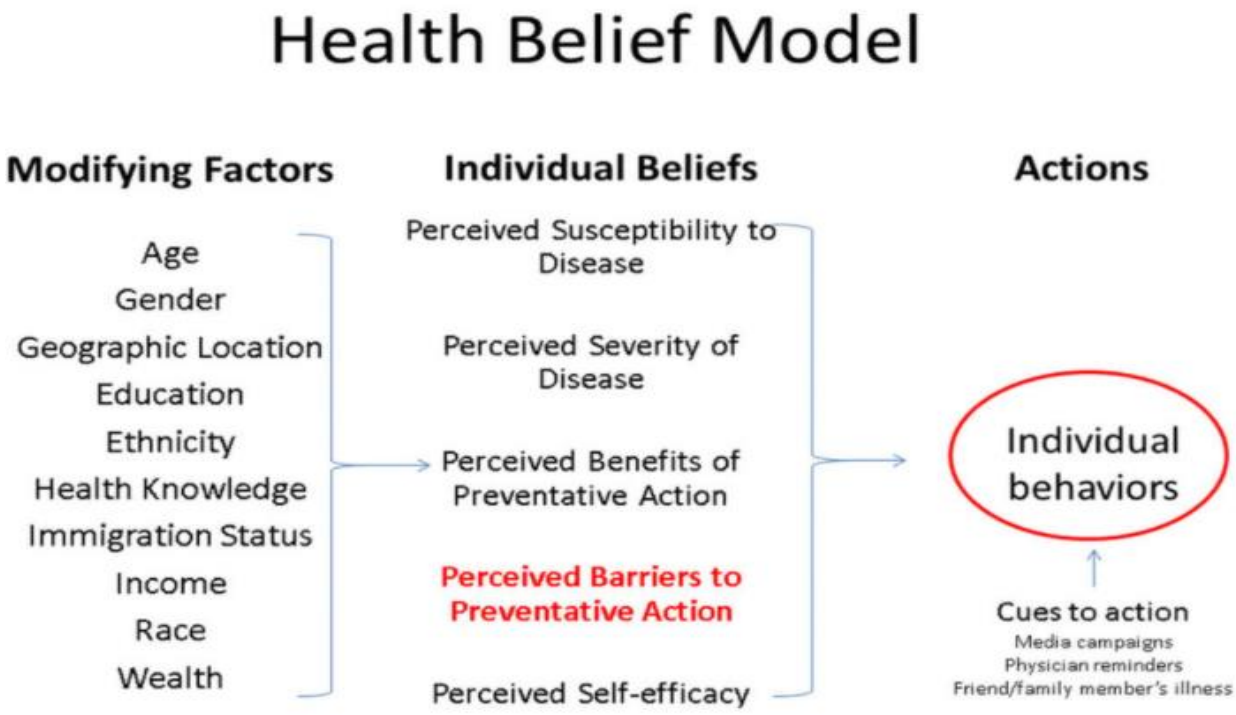


Figure 4: Health Belief Model by Fayanju et al.(74)

Perceived susceptibility

Perceived susceptibility is one's perception of the likelihood of getting a disease. Perception of risk will prompt an individual to engage in behaviors that will reduce their risk of being susceptible to the health

problem. This Perception of susceptibility is an integral role in current sensitization programs towards cervical cancer screening. Low perception of susceptibility to a disease leads to denial by the individual that they are at risk of acquiring the disease. They may acknowledge that the disease exists and that they may be at risk but believe it is unlikely. Such individuals are more likely to engage in unhealthy or risky behavior compared to those who have the perception of susceptibility. For those with a high perception of disease, or who have cared for patients or loved ones with cervical cancer, would be more likely to perceive themselves as at risk and adapt to following the routine screening.

This was evident as in the breast cancer mammography screening (75). The broader impact of disease on one functioning both work and social role and financial impact should be emphasized. This might increase the perception of severity and should be emphasized during campaigns of screening programs. For health care workers the fear of diagnosis might play a pivotal role, as they may have the knowledge of cancer prognosis. The Pap smear test results also take a minimum of one week, this long turnaround time may cause unending anxiety and lead to most people differing the test or all not testing at all. (76)

Perceived benefit

The perceived benefit of engaging in a health-promoting behavior is assessed by an individual and the value of screening or maintaining a healthy lifestyle and reduce the risk of disease. The belief in screening to reduce cervical cancer risk, and the advantage of early treatment will make an individual engage in routine behavior. Barriers include individual assessment of obstacles that might hinder behavior change like fear of pain, stigma, and social-cultural beliefs**.** Women's participation in cervical cancer screening can be influenced by their own beliefs regarding personal risks and a sense of control over those risks.

Healthcare workers know about the prevalence and incidence of diseases and should be the leading example and educators to the patients they interact with. In Ethiopia study showed healthcare workers despite knowing, the screening rates were low and recommended further study on the low numbers was recommended (76). Healthcare workers have easy access to information on timing and sites of screening, contrary to study in china in low resource set ups, there was limited knowledge and less equipped with the recommendation to start programs to increase knowledge of healthcare workers more especially those who do not directly deal with reproductive health services (76).

The health belief model noted for the efficacy of an intervention, action must be willingly be taken by the group at risk. The likelihood of behavior change is attributed to the provision of education on symptoms,

perceived risk, and knowledge of susceptibility. (77-79). Identifying factors influencing the psychological barrier will help to tailor education to health care workers and in turn, lead to them advocating for screening and also establish the role of male healthcare workers in advocating for screening. Both demographic variables and psychological characteristics contribution to health-seeking behavior is crucial in causing change towards seeking preventive services and participation in programs that promote health, as shown in the figure below by *fayanju et al.*

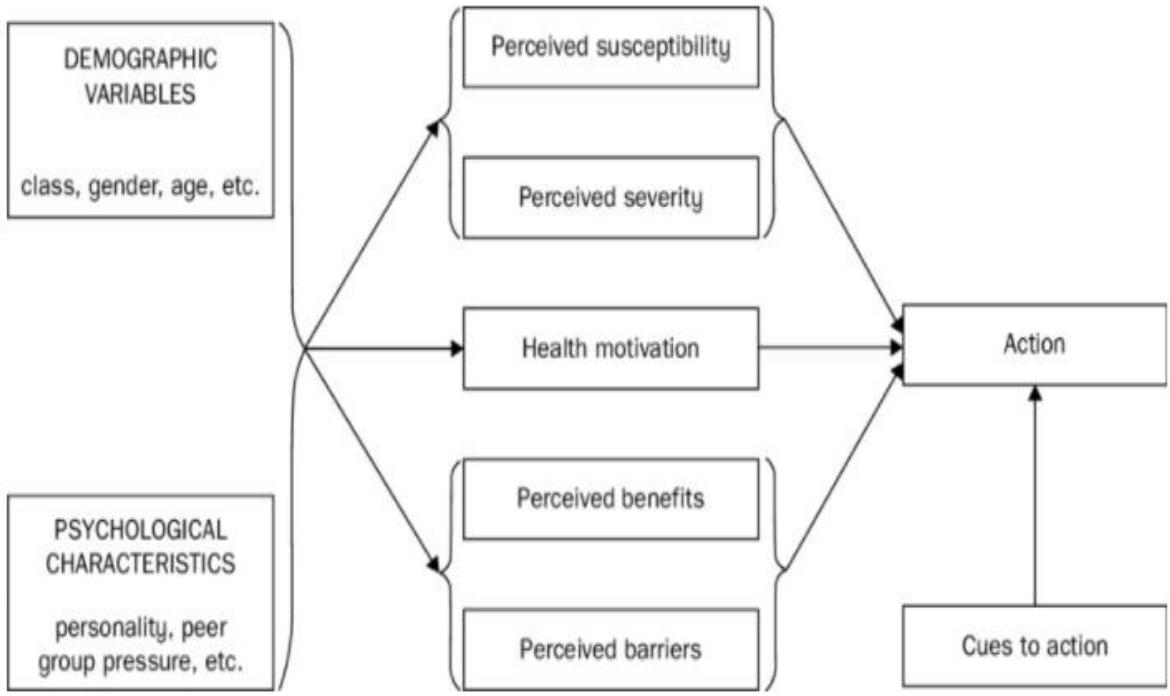


Figure 5: Health Belief Model (2) by Fayanju et al.(80)

This will be an integral part of identifying new barriers to screening that is healthcare-related, a component that has not been explored before. A systematic review was done on the effect of education and advocacy and referral of patients for cervical cancer screening showed a significant increase in the rates of cervical cancer screening on women who were educated and referred for screening.

This supports the implementation of theory-based cervical cancer educational interventions to increase women's participation in cervical cancer screening programs, especially targeting communities with low literacy levels (13, 81). Additionally, cervical cancer screening programs should consider the option of offering women the opportunity for self-sample collection particularly when such women have not responded to previous screening invitations or reminder letters for Pap smear collection as a method of screening (76).

2.5 Factors affecting screening

Main barriers to screening can be classified on a multilevel scale. System-level barriers would include lack of infrastructure, accessibility affordability of the test. Community-level barriers and individual level include the following, lack of awareness of cervical cancer and its health implication among the population (45), healthcare providers and policy makers, absence or poor quality screening methods, limited accessibility to healthcare services, and lack of referral systems. For the health care providers stigma and psychological barriers comes out as important barriers to screening for cervical cancer.

2.6 Cervical cancer Awareness Measure (CAM) Tool

This is a validated tool that was developed by the UCL health Behavior Research Center, in collaboration with the department of health cancer team and the eve appeal. The tool was modified in 2014 and was designed to measure awareness of symptoms, risks, and barriers of cervical cancer screening. It can also be used to compare and monitor the effectiveness of interventions done. Identification of knowledge gaps and perception of risk is also captured by this tool. The questions were modified appropriately to suit the population of the present study.

2.7: Studies using - Cervical CAM Tool

The tool has been used in various studies including the Cervical Cancer Awareness and Symptoms Initiative (CCASI). It is based on a generic CAM developed by Cancer Research UK, University College London, Kings College London, and Oxford University from 2007 to 2008.

Other studies that have utilized the tool include the Gynecology cancer research fund: U.k data archive study number 6645-National Awareness and Early Diagnosis Initiative, a report on awareness levels of cervical cancer amongst women in England. It has also been used among the African population, in Tanzania among postnatal mothers in mother and child health clinics (82).

CHAPTER THREE

METHODOLOGY

3.1 Research Question

What is the uptake of cervical cancer screening among healthcare staff in Aga khan University Hospital, Nairobi?

3.2: Objectives

3.2.1: Primary objectives

To determine the uptake of screening among eligible healthcare workers at AKUH, female workers within the age category of 21-65 years

To assess the determinants of screening practice

3.2.2: Secondary objectives

To assess the knowledge, attitude, and practice of both male and female health care staff

To determine knowledge and advocacy of male healthcare staff to their spouses

3.3: Study design and setting

The present study was a descriptive cross-sectional study using the Cervical CAM tool with binary outcome.

The study was conducted in Aga Khan University Hospital, Nairobi Kenya. The Aga Khan University Hospital is a 254-bed tertiary level hospital with a total of 25 Outreach clinics in Kenya with 15 of the outreach clinics located within Nairobi.

The outreach clinics have a clinician, a nurse, lab technician, pharmaceutical technician. Women and men healthcare workers working in the various departments in the Main hospital were included in the study. The eligible participants were recruited after signing the informed consent. The participants were categorized into three departmental categories as clinical, administrative, and supportive. Probability sampling was done that was proportional to the size of the population in each department. Self-administered questionnaires were handed out to eligible participants.

3.4 Study variables

Table 1: Study variables

Variable	Questions	Operationalization
Age	Age at time of study	Reported in years
Parity	Number of children	Reported in numbers
Marital status	Marital status	Married, single, widow, divorced
Contraceptive use	Ever used contraception and mode used	Yes or no and subtypes
Mode Payment of healthcare	Use of health insurance or cash	Insurance or cash
Vaccination	Ever been vaccinated for cervical cancer	Yes or no
Education level	Highest level of education	None, primary, secondary, tertiary
Cervical cancer screening	Ever screened for cancer	Yes or no
Frequency of screening and co testing	Annual or 3 yearly	Annual,3 yearly,5 yearly
Gender	Male or female	Male or female
Professional cadre	List	List
Awareness of screening	Awareness of screening program for cervical cancer	

3.4.1: Inclusion criteria

Women between ages of 21 to 65 years

Men healthcare workers working AKUH, Nairobi

3.4.2: Exclusion criteria

Women with cervical cancer or on follow up for cervical intraepithelial lesion

3.4.3: Study population

AKUH, Nairobi has a total of 2246 workers working in the main and outreach clinics in 15 subdivided cadres

3.5 Sample size

In order to estimate the sample size, Rationale used was up being the proportion of screened healthcare workers (which was unknown) thus taken up as 50%.

$$n_0 = \frac{Z_{\frac{\alpha}{2}}^2 P(1-P)}{d^2}$$

n: was the sample size

Z: the statistic corresponding to the level of confidence of 1.96

P: expected prevalence (which was unknown, estimated at 50%)

d: the precision was at 5%

Sample size (n) = 384

With adjustment for finite population

$$n = \frac{n0/}{1+ \frac{n0-1}{N}}$$ **= Sample size (n) 362**

The present study aimed to recruit 362 participants in the various departments.

3.6: Data Collection procedures.

The study recruited three research assistants who were trained on the questionnaire, participant recruitment, and data collection. The research assistants had a clinical background and were approved by the institution in conducting the study. A unique study number was assigned to each self-administered questionnaire and consent signed by eligible participants.

3.7: Data Management

The completed data tool was collected daily on completion of the task and reviewed for completion. All forms were coded for confidentiality, locked in a cupboard with access limited to the principal investigator to be kept for a period based on the university policy of storing research materials.

3.7.1: Data Analysis

Social demographic data were explored using descriptive statistics such as percentages, frequencies, standard deviation (SD). For continuous variables, Median Interquartile Range (IQR) was used. For categorical variables frequency and percentages were used. Predictors of cervical cancer were analyzed using bivariate logistic regression and P values < 0.05 were considered as a significant predictor. The Chi-square test was used to test independent associations between the outcome and the explanatory variables. Variables with the P values <0.2 were considered for the multivariate model

3.8: Ethical consideration

Ethical approval was obtained from the Research Ethics Committee at the Aga Khan University, Nairobi. Approval from Human Resource AKUHN department was obtained and population information to conduct the study on health care workers from the department records. National Commission of Science, Technology and Innovation license was also obtained ***REF 972894*** for the study duration.

Due to the highly sensitive and confidential nature of the present study, confidentiality and privacy of data collected were adhered to. And patient autonomy to participate or not participate was adhered to. Patient confidentiality and privacy were maintained by assigning each participant a unique study number with the exclusion of their names or staff numbers. Only data that were necessary to meet the study objective were collected and handled only by the lead investigator and research assistants. In addition, research assistants were trained and sensitized on the nature of information and for any need for referral of participants who wished to have screening done to gynecology clinics.

Participants filled the study tools which was placed in a labeled study folder that was kept under a locked cabinet with other collected filled tools that were accessible by only lead investigator and research assistants. The study folders were handed over to the AKU Faculty of Health Sciences Research Office upon completion of dissertation write up as per section 4.1.6 (f) of the Faculty manual of research policies and procedures and stored securely in the AKU research office for a minimum period of 5 years as per section 7.8.4 of the AKU research Ethics manual.

CHAPTER FOUR

RESULTS

4.1: Socio-demographic characteristics of the respondents

The characteristics of the 352 participants (97.2 % response rate) who were recruited for the study are summarized in Table 1, and the vast majority 295(83.8%) were females. The median (IQR) ages of the study population were 32(28-38) years. Sixty-four percent (63.9%, n=225) of them were married, 260(73.9%) were clinical staff, and 294 (83.5%) of the participants had medical insurance to cover the cost of healthcare. Among the females, 285(96.6%) of them had a parity of 1-4 children, (*table 2)*

Table 2: Social-demographic characteristic of the respondents (N =352)

Characteristics	Frequency	Percentage
Gender		
Female	295	**83.8**
Male	57	16.2
Median(IQR) Age, years	**32(28-38)**	
Age –groups, years		
20-29	120	34.1
30-39	150	42.6
40-49	68	19.3
50 and above	14	4.0
Department		
Clinical staff	307	87.2
Support staff	20	5.7
Administrative staffs	25	7.1
Marital status		
Married	225	63.9
Single	114	32.4
Other	13	3.7
Cost of healthcare		
Medical insurance	294	83.5
Cash	58	16.5
Parity(females only: n 295)		
Nulliparous	5	1.7
1-4 children	285	96.6
> 4 children	10	3.4

In terms of Recommended index screening age for cervical cancer screening, 229 (65.1%) mentioned that cervical cancer screening can be performed once a woman is sexually active, 68(19.3%) mentioned that it can be done for women aged 21-25 years, 19(5.4%) that screening could be done at age 30 years or older, and the rest did not know the age at which screening should be done. Of the participants interviewed 316(89.8%) were aware of Human Papilloma Virus (HPV) vaccine and only 36(10.2%) believed that the vaccine provides complete protection against cervical cancer, 174(49.4%) believed that the vaccine does not provide complete protection. When asked about the recommended age to start screening, Seventy-seven percent (77%, n=271) of the women mentioned that the vaccine is offered at age 9-26 years, 4(1.7%) said at the age of 30 years, 40(11.4%) and 35(9.9%) were not sure and did not know the age respectively. Participants with a history of cancer either from close family or close friends were each 37 (10.5%), 180 (51.1%) had cared for a patient with cervical cancer at a point in their profession, but had neither themselves nor close family member was affected (*Table 3*).

Table 3: Knowledge of cervical cancer screening and exposure to a cervical cancer patient both male and female participants (n=352)

	Frequency	Percentages
Source of information		
Medical Education	262	74.4
Media	103	29.3
Friends	38	10.8
Pamphlets	9	2.6
Recommended age of index screening		
Once sexually active	229	65.1
21-25 years	68	19.3
> 30 years	19	5.4
Don't know	36	10.2
Awareness of HPV vaccine		
Yes	316	89.8
No	36	10.2
HPV vaccinated(females only, n=295)		
Yes	24	8.1
No	271	91.9
HPV vaccine protective effects		
Yes	36	10.2
No	174	49.4
don't know	142	40.3
Age when vaccination is offered		
Don't know	35	9.9
not sure	40	11.4

9-26 years	271	77
30 years	4	1.7
Contact with a patient with cervical cancer		
Close family member	37	10.5
Close friend acquaintance/colleague	37	10.5
Cared for patients with cervical cancer	180	51.1
Don't know	98	27.8

Of the participants interviewed, 303(86.1%) were aware of cancer screening in AKUHN. sixty-five percent (64.8%, n=191) were neither on oral pills, IUCD nor implants, 28(9.5%), 52(17.6%), and 24(8.1%) were using oral pills, IUCD, and Implants respectively. There were 183(62%) of the women who had been screened for cervical cancer, however, only 30(16.4%) had been getting 3 yearly screenings as recommended thus a high loss to follow-up rate. The main source of information for cancer was mentioned as medical education (262, 74.4%), 103(29.3%) were through media, 38(10.8%) through friends/relatives and the rest were through the pamphlet, 254(86.1%) of the participants were to screening should there be an opportunity (*Table 4*).

Table 4: Uptake of Screening, Attitude, and Practice (n 352)

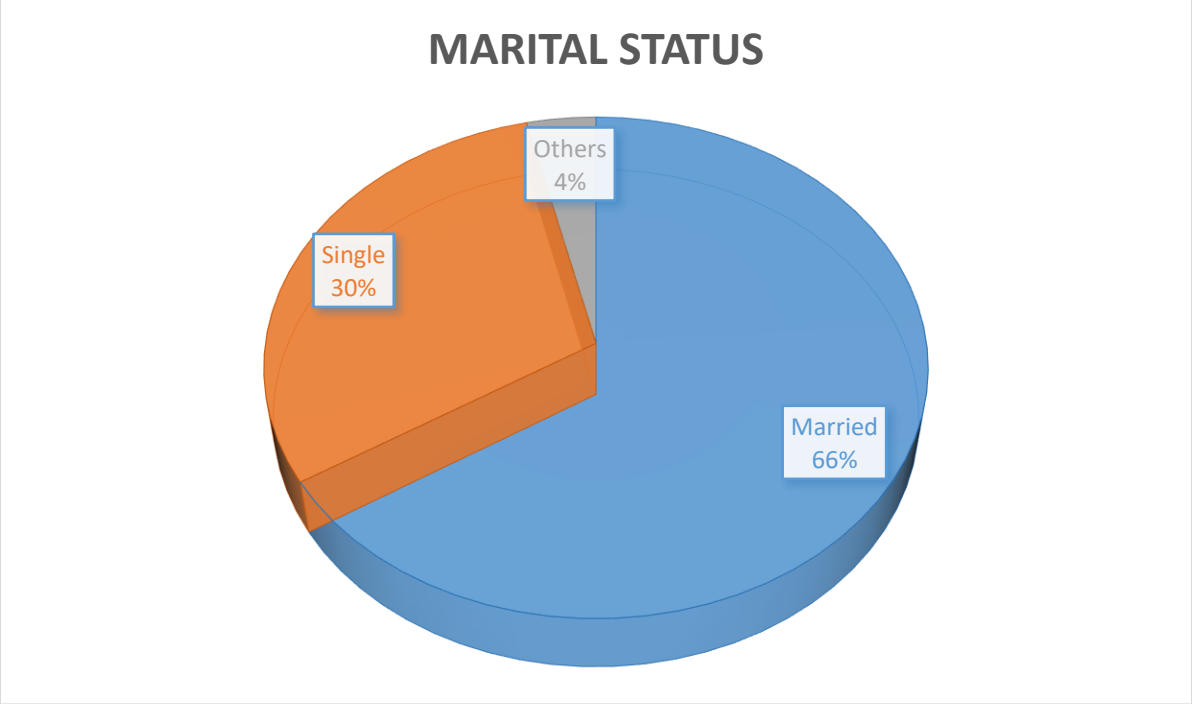
Characteristics	**All**		**Females**		**Males**	
	Frequency	Percentages	Frequency	Percentages	Frequency	Percentages
Aware of AKUHN cancer screening						
Yes	303	86.1	**259/295**	87.8	**44/57**	77.2
No	49	13.9	**36/295**	12.2	**13/57**	22.8
Contraceptive use						
Contraceptive method	104	35.2	104	35.2		
No contraceptive	191	64.8	191	64.8		
Ever screened for cervical cancer						
Yes	183	62.0	183	62.0		
No	112	38.0	112	38.0		
Routine screening practice(*n 183*)						
3 yearly	30	16.4	30	16.4		
Lost to follow up screening	153	83.6	153	83.6		
Source of information						

medical education	262	74.4	221	74.9	41	71.9
media	103	29.3	88	29.8	15	26.3
friends/relatives	38	10.8	33	11.2	5	8.8
Pamphlets	9	2.6	9	3.1	1	1.8
Opportunity screened						
Yes	254	86.1	254	86.1		
No	41	13.9	41	13.9		

4.2.: Female partcipants socio-demographic characteristics

The total number of married female participants was 195(66.1%) ,with 89(30.2%) of the participants being single and 11(3.7%) participants were widowed or divorced as shown in *chart 1* below.

Chart 1: Marital status of female participants, n 295



Of the female participant's perception on awareness of cervical cancer 36(12.2%) strongly agreed and 101(34.2%) agreed that there is enough awareness on cervical cancer with an almost equal number of 31(10.5%) and 95(32.2%) strongly disagree and disagree respectively. The majority of the female participants agreed they advocate for cervical cancer screening with 128(43.4%) strongly agree and 113(38.3%) agreeing. The participants knew the presenting symptoms of cervical cancer and location of

these screening services, with 123(43.4%) and 113(38.3) strongly agree and agree respectively. 121(41%) and 82(27.8%) strongly agreed and agreed respectively that cervical cancer is preventable with 81(27.5%) and 62(21%) agree that cervical cancer can be sexually transmitted. On knowledge of risk factors of cervical cancer majority were aware there risk factors of cervical as described in *table 5.*

Table 5: Female participants Perception and Knowledge on cervical cancer (n 295)

Knowledge of cervical cancer	Strongly disagree	Disagree	Neither agree/or disagree	Agree	Strongly agree	I don't know
	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
There is enough awareness on cervical cancer	31 (10.5)	95 (32.20)	25 (8.5)	101 (34.2)	36 (12.2)	7 (2.4)
I advocate for cervical cancer screening to everyone	24 (8.1)	18 (6.1)	9 (3.1)	128 (43.4)	113 (38.3)	1 (1.02)
I know symptoms of cervical cancer and where to get screening from	20 (6.8)	26 (8.8)	18 (6.1)	123 (41.7)	88 (29.8)	20 (6.8)
Cervical cancer is preventable	18 (6.1)	17 (5.8)	30 (10.2)	121 (41.0)	82 (27.8)	27 (9.2)
Cervical cancer can be sexually transmitted	37 (12.5)	53 (18.0)	28 (9.5)	81 (27.5)	62 (21.0)	34 (11.5)
Knowledge of risk factors						
Infection with Hpv(Human Papilloma Virus)	166 (56.3)	92 (31.2)	3 (1.0)	4 (1.4)	5 (1.7)	25 (8.5)
Being a smoker	47 (15.9)	93 (31.5)	44 (14.9)	54 (18.3)	16 (5.4)	41 (13.9)
Having weak immune system-e.g. Hiv/diabetes	74 (25.1)	139 (47.1)	22 (7.5)	24 (8.1)	8 (2.7)	28 (9.5)
Long use of oral contraceptive	36 (12.2)	74 (25.1)	43 (14.6)	49 (16.6)	21 (7.1)	72 (24.4)
Infection with Chlamydia (a sexually transmitted infection)	62 (21.0)	123 (41.7)	39 (13.2)	24 (8.1)	13 (4.4)	30 (10.2)
Starting to have sex at a young age (before age 17) OR Having many sexual partners	102 (34.6)	107 (36.3)	30 (10.2)	22 (7.5)	7 (2.4)	27 (9.2)
Not going for regular smear or Pap tests	73 (24.8)	117 (39.7)	30 (10.2)	36 (12.2)	23 (7.8)	16 (5.4)
Having a sexual partner with many previous	109 (36.9)	122 (41.4)	19 (6.4)	8 (2.7)	9 (3.1)	28 (9.5)

4.3:Barriers to cervical cancer screening

Among those who declined to be screened given an opportunity, 68.3% mentioned they would be too scared, 22% would have been worried about the finding of the test, and 19.5% would have been too embarrassed. Other reasons mentioned are presented in *Figure 6. Figure 7* shows the reasons for not screening, 52.7% mentioned having the pap smear taken was invasive, 21.4% were afraid screening may affect her dignity, 16.1% said they did not have enough time, 10.7% were afraid of the outcome of the screening test, 6.3% were unsure of the privacy as the rest of the participants did not know/have any reason why they have not tested.

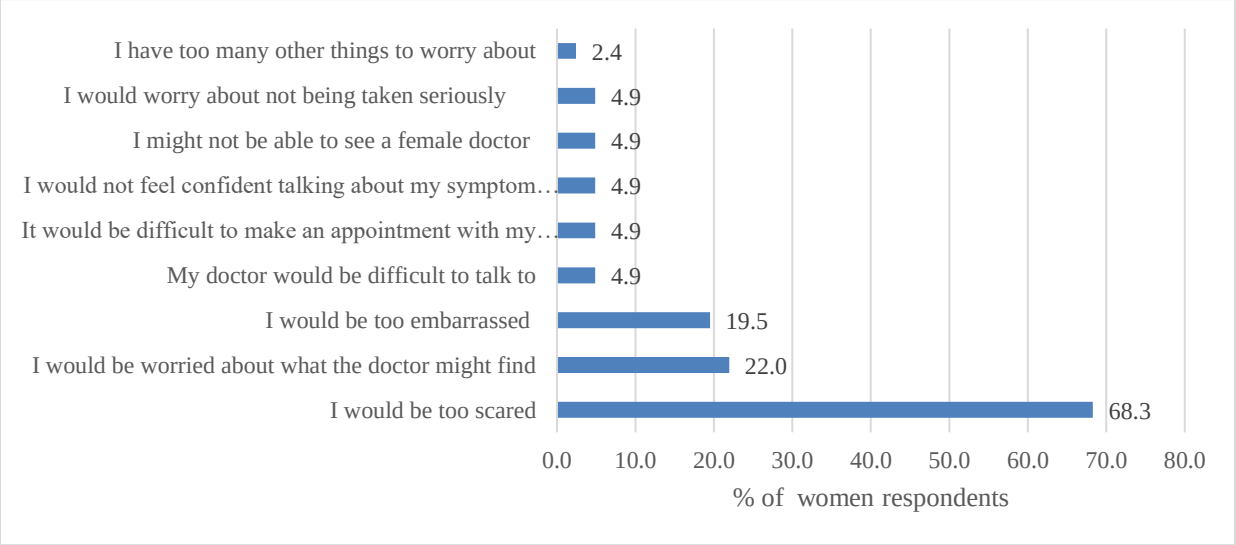


Figure 6: Reasons for declining future screening Opportunity (Multiple responses, n 41

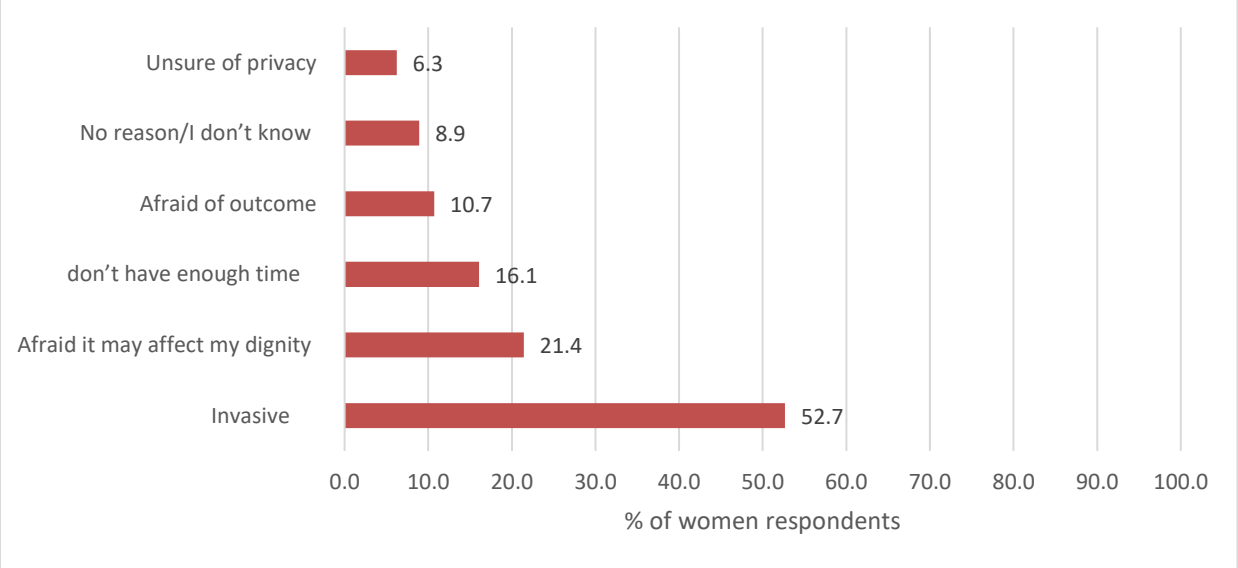


Figure 7: Reasons for nor screening (multiple responses, n 112)

4.4 Female participant's knowledge of risk, attitude, and prevention strategies on cervical cancer

Knowledge of risk and attitude was assessed among all the participants, participants who agreed or strongly agreed that there is enough awareness on cervical cancer were 113(32.1%) and 39(11.1%) respectively. Those who strongly agreed to advocate everyone to be screened were 127(36.1%), 99(28.1%) strongly agreed that they know the symptoms and where to get screening from, 98(26.4%) strongly agreed that cervical cancer is preventable, and 68(19.2%) strongly agreed that cervical cancer can be transmitted sexually. (Table 4). In the association of HPV to cervical cancer, Fifty-six percent (56%, n=197) of the women associate HPV with cervical cancer, 113(32.1%) believed that starting sex at a young age (before age 17), 124(35.3%) having many sexual partners as risk factors of cervical cancer, 87(24.7%) strongly agreed that having a weak immune system is a risk factor, 84(35.3%) strong agreed that not going for a regular pap smear test is a risk factor. Other risk factors strongly agreed upon by the participants are listed in (*Table 6.)*

Table 6: Female participants Knowledge on Risk factors of cervical cancer (n 295)

Risk factors	**Strongly agree** n(%)	**Agree** n(%)	**Neither agree or disagree** n(%)	**Disagree** n(%)	**Strongly disagree** n(%)	**Don't know** n(%)
Infection with Hpv(Human Papilloma Virus)	197(56.0)	107(30.4)	5(1.4)	5(1.4)	5(1.4)	33(9.4)
Being a smoker	55(15.6)	112(31.8)	56(15.9)	61(17.3)	19(5.4)	49(13.9)
Having weak immune system-e.g. HIV/diabetes	87(24.7)	163(46.3)	26(7.4)	29(8.2)	9(2.6)	38(10.8)
Long use of oral contraceptive	43(12.2)	84(23.9)	52(14.8)	55(15.6)	26(7.4)	92(29.1)
Infection with Chlamydia (sexually transmitted infection)	69(19.6)	149(42.3)	44(12.5)	28(8.0)	16(4.6)	46(13.1)
Starting to have sex at a young age (before age 17)	113(32.1)	132(37.5)	35(9.9)	25(7.1)	9(2.6)	38(10.8)
Not going for regular pap smear tests	84(23.9)	139(39.5)	34(9.7)	43(12.2)	26(7.4)	26(7.4)
Having many sexual partner	124(35.3)	148(42.1)	22(6.3)	11(3.1)	10(2.8)	37(10.5)

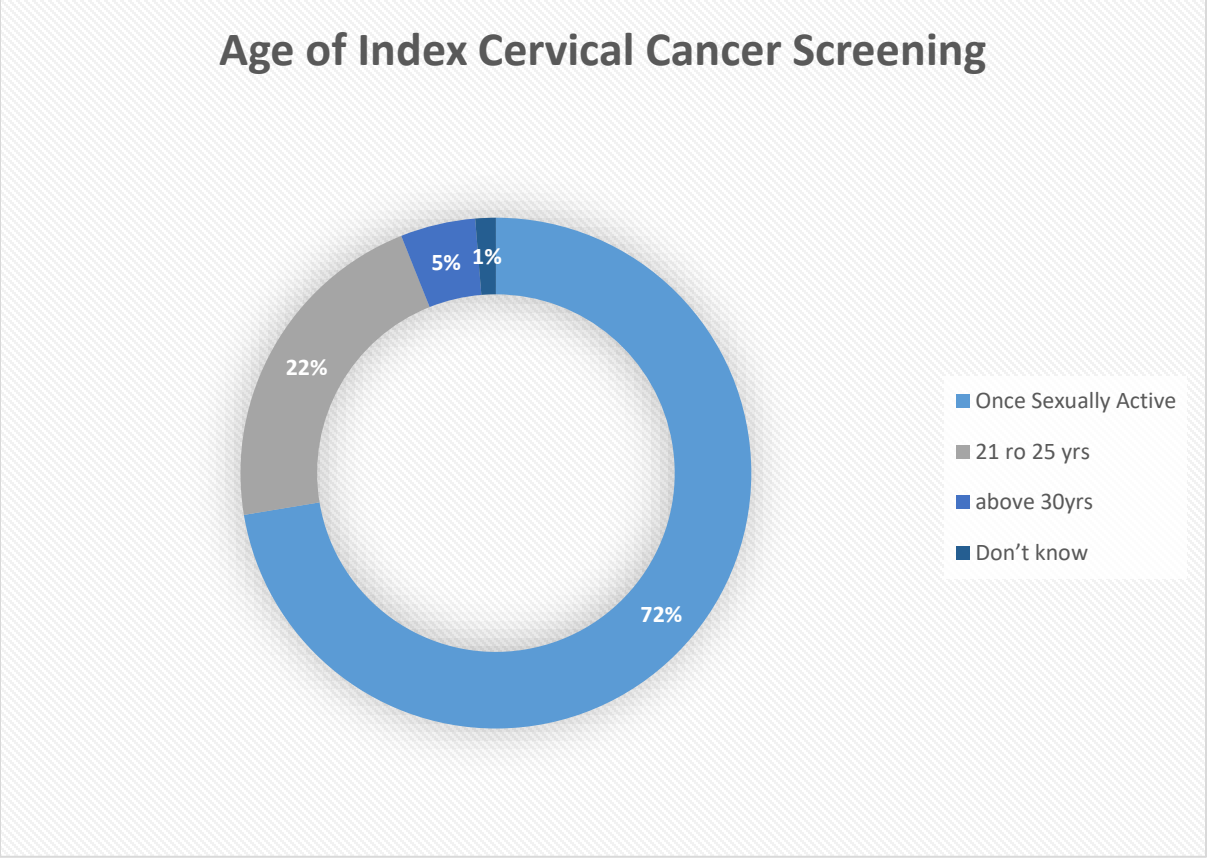
Perception of susceptibility was assessed among the 295 female participants 92(31.2%) and 96(32.5%) expressed they would rather know if they had cervical cancer with 108(36.6) and 151(51.2%) expressing interest in participating in future cervical cancer screening. On prevention strategies, 79(22.4%) strongly agreed and 149(42.3%) agreed use of barrier methods can reduce the risk of cervical cancer. The majority of the female participants agreed that screening is an effective preventive measure with 102(29.0%) and 157(44.6%) strongly agree and agree respectively. On the perception of future susceptibility 43 (14.6%) strongly agreed and 81(27.5%) agreed they were susceptible with 90(30.5%) unsure of susceptibility to cervical cancer. The perception of screening is as described in *table 7*

Table 7: Female Participants perception on susceptibility to cervical cancer (n 295)

Perception to cervical cancer screening	Strongly Agree	Agree	Neither agree nor disagree/not sure	disagree	Strongly disagree	Don't know
	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
I'd rather not know if I have cervical cancer(females only)	43(14.6)	32(10.8)	19(6.4)	92(31.2)	96(32.5)	13(4.4)
I intend to accept future invitations for screening(females only)	108(36.6)	151(51.2)	13(4.4)	6(2.0)	5(1.7)	12(4.1)
Using condoms can reduce the risk of getting cervical cancer	79(22.4)	149(42.3)	31(8.8)	25(7.1)	11(3.2)	57(16.2)
Cervical screening is effective in preventing cervical cancer	102(29.0)	157(44.6)	22(6.2)	18(5.1)	13(3.7)	40(11.4)
Stopping smoking can reduce the risk of cervical cancer	53(15.1)	148(42.1)	46(13.1)	22(6.3)	17(4.8)	66(18.7)
Talking to family or friends about gynecological symptoms) is embarrassing	46(13.1)	65(18.5)	29(8.2)	93(26.4)	80(22.7)	39(11.1)
The chances of curing are better when the disease is discovered at an early stage	191(54.3)	111(31.5)	10(2.8)	3(0.8)	6(1.7)	31(8.8)
Do you think this disease could affect you in the future? (females only)	43(14.6)	81(27.5)	39(13.2)	19(6.4)	23(7.8)	90(30.5)
There are effective methods that significantly reduces the risk disease	108(30.7)	155(44.0)	27(7.7)	8(2.3)	3(0.9)	51(14.5)

On knowledge of index cervical cancer screening age, 198 (67.1%) of the participants mentioned that cervical cancer screening should start once the female is sexually active, 59(20%) stated it should be between 21 to 25 years and 13(4.4%) mentioned index screening should be at ages above 30years, 25(8.5%) did not know **(***chart 2)*

Chart 2: Female participant's knowledge on age of index cervical cancer screening, n 295



Awareness of vaccine local availability and vaccination uptake

Up to 272(92.2%) of the female participants were aware of local availability of cervical cancer vaccine, with 23 (7.8%) unaware of the vaccine availability. Only 24 (8.1%) of the female participants had ever been vaccinated for cervical cancer with 271 (91.9%) having not received the vaccine. 30(10.2%) of the female participants believed protective effects of the vaccine against cervical cancer while 149(50.5%) said they did not, with 116(39.3%) not sure if the vaccine is protective as shown in *chart 3 and chart 4* below.

Chart 3: Female participant's awareness and uptake of vaccination N 295

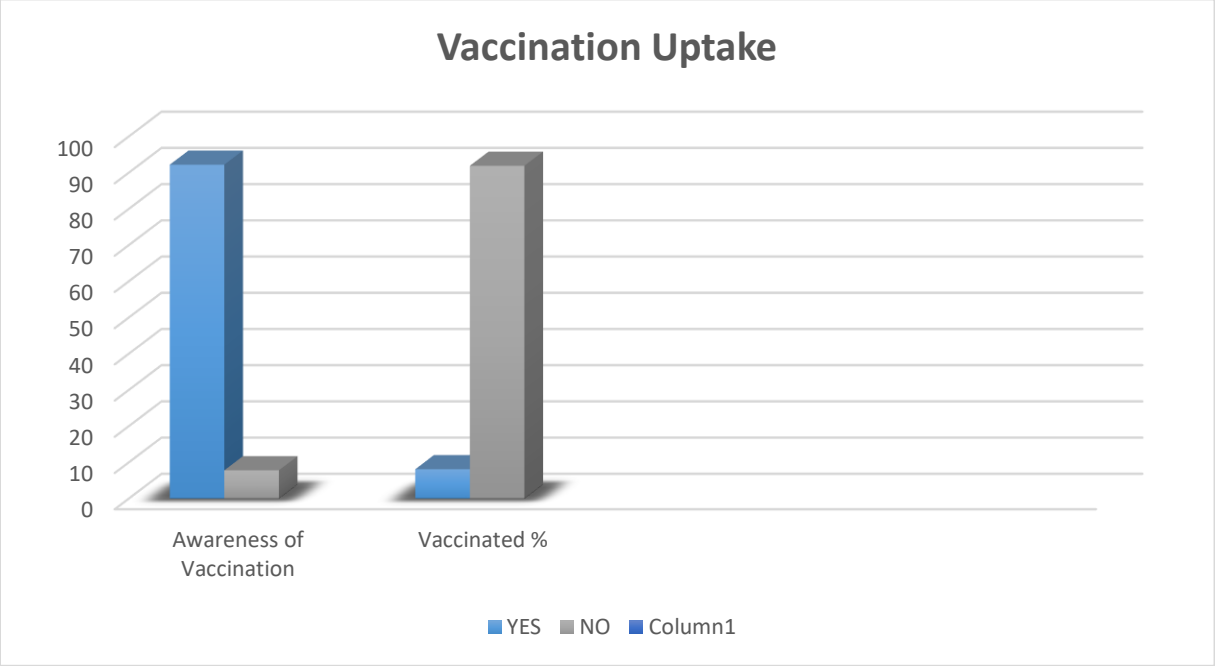
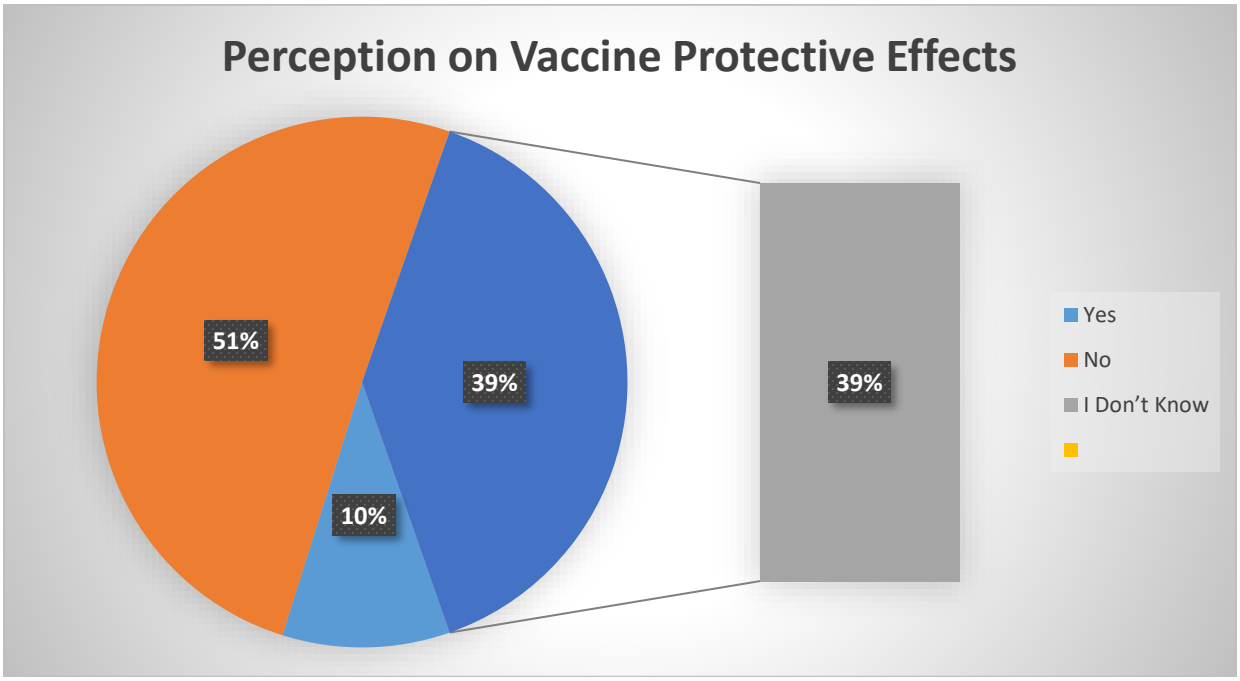


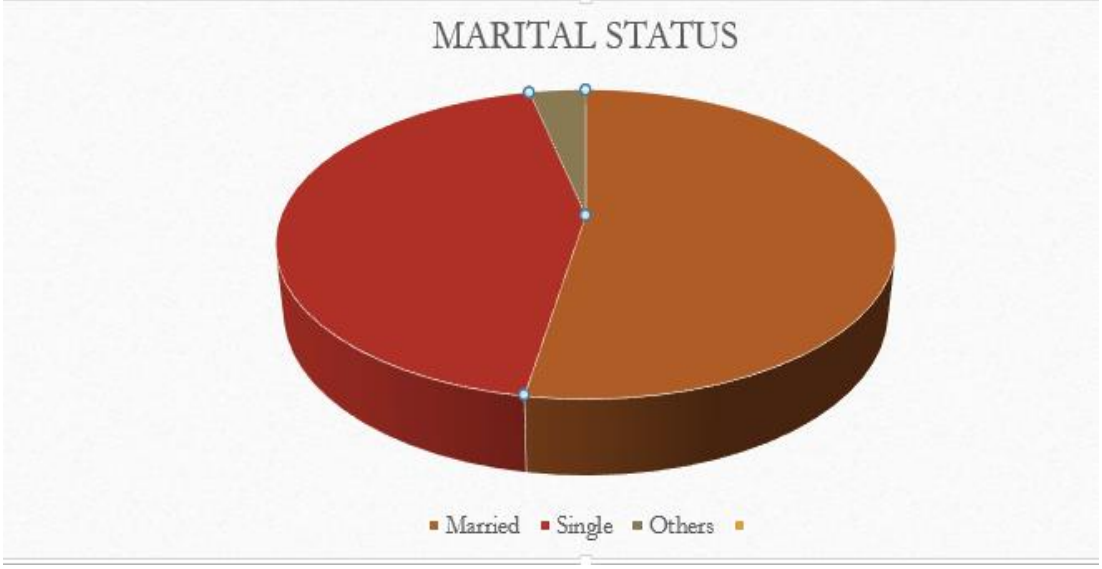
Chart 4:Perception of protective effects of vaccination



4.5: Male participants Socio-demographic characteristics

For socio-demographic characteristics of the male participants, 30(52.6 %) were married with 25 (43.8%) being single as per *chart 4* below.

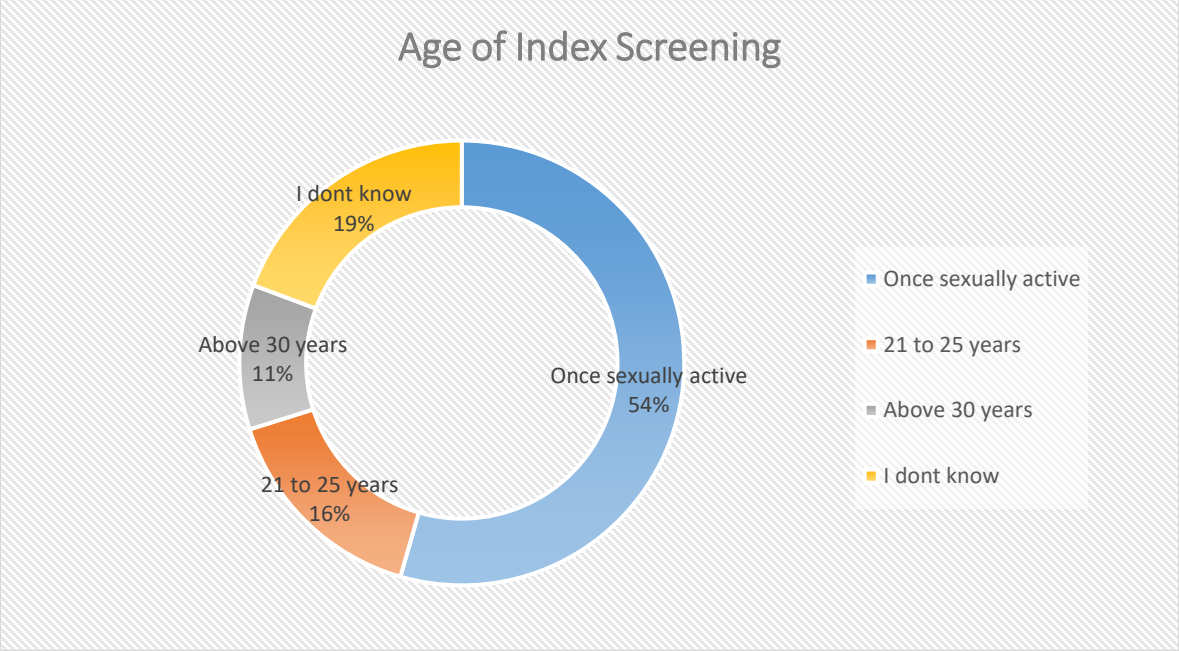
Chart 5: Marital status of the male participants



Knowledge on recommended age of index screening

For the male participant's majority,31(54.4%) stated that screening should start once women were sexually active with 9(15.8%) said screening should start from ages of 21 to 30 years of age. 6 (10.53%) stating it should begin above 30 years(*chart 5*)

Chart 6: Male knowledge on age of index screening



On the analysis of the male participant's majority agreed that there is low awareness among the population with 10(17.5%) strongly agreed with 17(29.) agreeing on low awareness. Most of the male participants knew if the partner or close family member had been screening for cervical cancer with 28(49.1%) agreeing and 14(24.6%) strongly agreed and had advocated for cervical cancer screening. On the risk factors of cervical cancer 31(54.4%) strongly agreed that HPV has a strong association with cervical cancer with 15(26.3%) agreeing on this association. Other risk factors responses are as listed in (*table eight)*

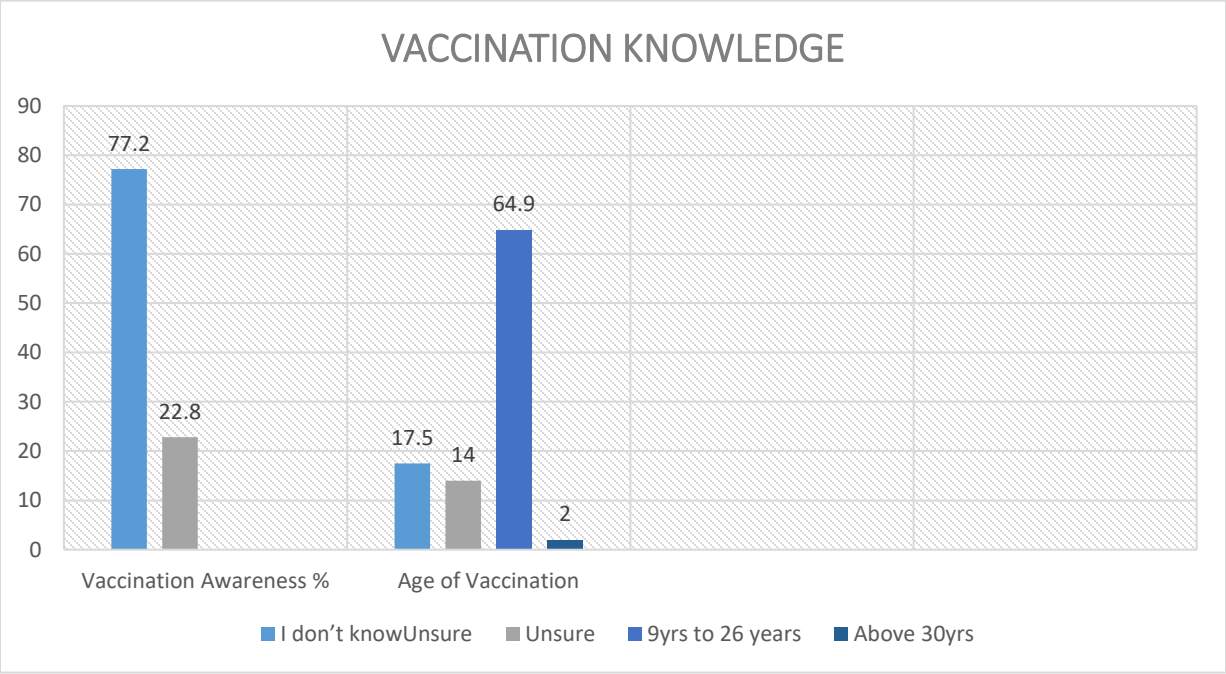
Table 8: Knowledge among male participants

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree	I don't know
There is Enough Awareness on cervical cancer	**10**(17.5)	**17**(29.8)	12(21)	12(21)	3(5.2)	3(5.2)
Knowledge of partner or close family member have been screened	6(10.5)	4(7.0)	1(1.7)	**28**(49.1)	**14**(24.6)	4(7.0)
Hpv infection as a risk factor	NA	8(14.0)	2(3.5)	**15**(26.3)	**31**(54.4)	8(14.0)
Low immunity and risk for cervical cancer	1(1.8)	5(8.7)	4(7.0)	**24**(42.1)	**13**(22.8)	10(17.5)
Not going regular pap smear	3 (5.3)	7(12.3)	4(7.0)	**22**(38.6)	**11**(19.3)	10(17.5)
Early age of coitarche	2(3.5)	3(5.2)	5(8.7)	**25**(43.9)	**11**(19.3)	11(19.3)
Partner with many previous sexual partners	1(1.75)	3(5.3)	3(5.3)	**26**(45.6)	**15**(26.3	9(15.9)

Male perception on Vaccination as a preventive measure

On awareness on vaccines developed against prevention of cervical cancer, of the male participants, 44(77.2%) were aware of the availability of vaccination in Kenya and were aware of the ongoing campaign to vaccinate schoolgoing children, with only13(22.8%) unaware of the availability of vaccine for cervical cancer. Of the 37 (64.9%) male participants correctly identified the recommended ages the vaccination with 10(17.54) not knowing the recommended vaccination age. Those unsure of the age for vaccination were 8(14%) (*Chart 6*)

Chart 7: Male participant's vaccination awareness and age of vaccination



Determinants of cervical cancer uptake

The prevalence of screening was estimated to be 62 %(95%CI: 56.2%-67.6%). The prevalence was high among women in other types of marital status, medical insurance, parity 2-6 children, women aged 30 and above, those who were aware of the HPV vaccine, those using IUCD, high knowledge of cervical cancer, and similar proportions on the perceptions. In the bivariate analysis marital status, method of payment for healthcare, age of the women, history of a friend or close family member ever had cancer, and parity was significantly associated with the uptake of cervical cancer.

In the multivariate analysis, having a medical insurance cover, women aged 30 and above years, having a close friend/colleague with a history of cancer, and high knowledge of cervical cancer were significantly associated with the uptake of cervical cancer screening.

Women who used medical insurance as a method of payment for healthcare were approximately four-fold likely to screen for cervical cancer than those who pay in cash (AOR: 3.973; 95%: 1.889-8.673).

Women aged 30 and above years were three times high likely to screen for cervical cancer compared those their counterparts aged 20-29 years. Those with friends/colleagues with a history of cervical cancer were more than five times high likely to screen for cervical cancer than those with a close family member with a history of cancer (AOR: 4.0; 95%CI: 1.582-18.438) and those who do not know whether friend/relative ever had cancer were more than four times high likely to screen for cervical cancer compared to those with a close family member with a history of cervical cancer (AOR: 4.394; 95%CI: 1.705-.11.646).

Women who had high knowledge of cervical cancer were twice highly likely to screening for cervical cancer compared to those with Low knowledge of cervical cancer (AOR: 2.085; 95% CI: 1.212-3.631). The mean knowledge, perception, and barrier scores were estimated to be 18.8(SD: 4.6), 21.1(SD: 8.2), 24(SD: 7.0) respectively. These were later categorized into high and low, respondents with average scores above the mean were classified as high, and those below the mean were categorized as low. (*Table 9)*

Table 9: Multivariate Analysis

Factors	**Screening**				
	Yes n (%)	**No** n (%)	**p-values**	COR(95%CI)	AOR(95%CI)
Marital status					
Single	43(48.3)	46(51.7)		1	1
Married	132(67.7)	63(32.3)	**0.006**	2.241(1.344-3.756)	1.159(0.543-2.429)
Other	8(72.7)	3(27.3)		2.853(0.769-13.669)	2.066(0.471-11.399)
Payment of healthcare					
Cash	15(34.1)	29(65.9)		1	1
Medical insurance	168(66.9)	83(33.1)	**< 0.001**	3.913(2.018-7.873)	**3.973(1.889-8.673)***
Parity					
0-1	44(46.3)	51(53.7)	**0.002**	1	
2-6	139(69.5)	61(30.5)		2.641(1.601-4.387)	1.903(0.927-3.930)
Awareness of HPV vaccine					
No	21(58.3)	15(41.7)		1	
Yes	162(62.5)	97(37.5)	0.715	1.193(0.578-2.410)	
Contraceptive used					
None of the above	116(60.7)	75(39.3)		1	
Pills	17(60.7)	11(39.3)		0.999(0.448-2.309)	
IUCD	38(73.1)	14(26.9)	0.222	1.755(0.908-3.554)	
Implant	12(50.0)	12(50.0)		0.647(0.273-1.528)	

Age-group, years					
20-29	41(41.4)	58(58.6)		1	
30+	142(72.4)	54(27.6)	**< 0.001**	3.720(2.249-6.223)	**3.015(1.688-5.442)***
Contact with a person with cervical cancer					
Close family member	16(50.0)	16(50.0)		1	
Close friend acquaintance/colleague	24(80.0)	6(20.0)		4.000(1.341-13.225)	5.136(1.582-18.438)*
Cared for patient with cervical cancer	92(57.9)	67(42.1)	**0.0315**	1.373(0.638-2.956)	2.044(0.882-4.770)
Don't know	51(68.9)	23(31.1)		2.217(0.948-5.237)	4.394(1.705-11.646)*
Knowledge					
Low	70(55.6)	56(44.4)	**0.053**	1	1
High	**113**(66.9)	56(33.1)		1.614(1.004-2.602)	**2.085**(1.212-3.631)*
Perceived benefit and prevention					
Low	**112**(65.5)	59(34.5)	0.181	1	1
High	71(57.3)	53(42.7)		0.706(0.438-1.135)	0.879(0.510-1.522)
Perceived barriers					
Low	96(61.5)	60(38.5)	0.905	1	
High	87(62.6)	52(37.4)		1.046(0.653-1.678)	

CHAPTER FIVE

DISCUSSION

The present study results from a disproportionately high burden of cervical cancer and mortality rates in developing countries affecting the women at their most productive ages and the recommendation by WHO of elimination of cervical cancer through identification of barriers specific to each population through screening and treatment initiative. We also identified factors associated with screening and barriers of screening unique to healthcare workers.

5.1: Screening rate

The study recruited 352 participants with a response rate of 97.2%. The present study found a prevalence uptake of 62% (95% CI: 56.2% to 67.6%) out of the total of 292 women participants who had ever been screening for cervical cancer. This was attributed to the high knowledge (45), Marital status is an important predictor of health-seeking behavior and notably, 63% of our participants were married (45). Other factors included the availability of screening tests and comprehensive insurance cover for the health providers. A comparison cross-sectional study among Health care workers in King Fahad Tertiary Hospital in Saudi Arabia only 26.2% of the participants had been screened for cervical cancer. Similarly noted marital status was noted to be a predictor of cervical cancer screening. (83). However this present study cannot conclusively say the screening rate as high or low due to limited studies among healthcare workers, thus further studies are needed for comparison.

In the comparison of the rate to national screening rates, the overall cervical cancer screening rate among the Kenyan population was 3.5% (KDHS 2014), this rate may have gone up from the time this survey was conducted. In Africa 2018 a pooled prevalence of cervical cancer screening was at 12.12 % with a range of 7.65% in southern sub-Saharan and 14.13% in eastern Africa (84) and 14.3% in Tanzania among a cohort of women seeking postnatal and family planning services in Tanzania (79). In developed countries, the screening rates are high, with noted average screening rate for women ages 21 to 65 years was 82.6% in 2014, and 77.7% in Texas as per the Behavioral Risk Factor Surveillance System (BRFSS) that was published in the American Cancer Society.

The World Health Organization projection on elimination strategies of cervical cancer using preventive strategies through vaccination and cervical cancer screening as secondary measures. WHO targets to have at least 70% worldwide screening rate, in addition, to reduce the incidence rate from 13.1 in 100000 to 4 in

100000 and to achieve 90% vaccination of girls by the age of 15 years (55). Cervical cancer vaccination program in Kenya through a partnership with GAVI, WHO, and UNICEF aim to vaccinate annually 800,000 school-going children. A Rising number of women screening for cervical cancer has been seen and this rise is facilitated by programs like the Western Kenya Cervical Cancer Prevention Project (WKCCPP) a collaboration with the ministry of health, Maendeleo Ya Wanawake, and Kenya cancer society which aims to mobilize women to undergo screening for cervical cancer and have made great strides in screen and treat initiative.

The impact of covid 19 on cervical cancer screening rates has noted a 78% reduction in screening rates in 2020 among women aged 21 to 31 years. This drop is attributed to the several lockdowns and controlled hospital visits seen in most parts of the world with noted slight improved screening rates when lockdown is lifted. (47). With the ongoing pandemic and repeated lockdown due to rising positivity rates, the impact of health-seeking behavior will be great. This in the long run negatively affects also the already achieved milestones on cervical cancer prevention and promotion. Innovative service delivery like mailed self-collection kits may be crucial in this setup.

5.2: Uptake of Routine screening

Routine 3 yearly screening is recommended for patients following a normal index screening test. The present study found a high loss to follow up rate of 83.6% and a considerably low reuptake rate of 16.4%. This was an unexpected finding in our study considering the initial relatively high percentage of index screening. Among the negative predictors of screening, negative or unpleasant experiences had an impact on routine screening. This low reuptake rate was also seen by *almaro et. Al* in a cross-section study where half of the participants (51.28%) had only one pap smear test in their lifetime (83). Psychological barriers in invasive screening tests require more analysis on behavior and intention and consider other factors like community and environmental factors that influence screening behavior. This would be through thematic studies from the subthemes of not screening this present study found

The majority of our female participants were willing to participate in future screening opportunities. The present study found out 86.1% agreed to future cervical cancer screening with only 13.9 % of the female respondents declining screening in the future. For the female participants who declined, 68.3 % of those who declined cited fear of the procedure and scared of abnormal findings and embarrassment. Laura et al qualitative study on barriers to screening among older women in England noted the same barriers and in addition negative perception by health professionals and extreme negative experience (1). To address this

psychological fear and achieve efficacy, behavior modeling using the health belief model and innovative service delivery interventions will be necessary.

5.3: Barriers to Cervical cancer screening

A total of 38% of female healthcare workers had never screened for cervical cancer. The main barriers our study found were sub-classified as personal or structural impediments. Personal impediments were cited by a total of 52 % of the female healthcare workers. There were no structural barriers cited as a cause of not screening and thus these personal impediments were unique to our population. This finding was also seen in One study in a minority ethnic group attributed to personal barriers (85). These personal impediments included the acceptability of the screening procedure and future impaired working relations. A majority of the female participants felt that the procedure was invasive and uncomfortable, as it involved a detailed pelvic and speculum examination as the major barrier to screening. In contrast majority of studies looking at barriers to screening have found structural impediments like cost, literacy, accessibility, and lack of awareness as the major barriers to screening (43, 86) (2, 13, 87, 88). Other cited personal barriers included procedure will have an effect on dignity and impair future working relationships with colleagues.

In addition, creating time to screen, having to queue with patients, and lack of assurance on privacy and confidentiality. Some of the participants made suggestions on the creation of a separate staff clinic dedicated staff would make them go for screening. Interventions focusing on personal barriers using behavioral risk factor surveillance systems are effective (39). Interventions that were found to be effective were community-based self-sampling, improved accessibility, and availability of kits for testing, and acceptability (51) This can be accomplished by the creation of a specialized preventive clinic dedicated to offering this cervical cancer screening services and have comprehensive programs on evaluation and monitoring follow up.

5.4: Predictors of cervical cancer screening

Advocacy of screening for cervical cancer is an important predictor of cervical cancer uptake for a population that offers health service to the population, the expectation and accountability to the profession. Having knowledge on cervical cancer and its prevention, and the Opportunity of advocating and advice to patients on the importance of cancer and prevention. Advocacy by healthcare workers has an impact where the screening rate was high among most women who were referred by healthcare workers. (81, 89) Working in a tertiary hospital with access to screening services that are catered for by the insurance, the

ideal expectation is that screening uptake and subsequent follow-up screening be high or comparable to rates seen in developed worlds of up to 80%.

Predictors of cervical cancer screening in our study were history of caring for patient cancer or knowledge of an affected friend or relative, age more than 30 years, marital status, high parity availability of insurance cover, and high knowledge. This was also seen in the study among healthcare workers in Jordan and also among the general population of women seeking maternal and child care in Tanzania (45, 89). Age more than 30 years is associated with increased screening is likely due to most women at this age are financially independent and can afford these services, or are married(14) and have birthed in hospitals where this service is offered. A contrast to our finding, cumulative predictors in Africa to a systematic review and met analysis done in sub-Saharan, the educational status, age, HIV status, contraceptive use, perceived susceptibility, and awareness about screening locations(83). This further compounds the discussion that cervical cancer screening predictors are unique to each subgroup of the population. Focus on the identification of these predictors is important. The predictor's identification of subpopulation will allow effective implementation of cervical cancer screening programs that are tailored to the need of the population.

Cervical cancer mean age of diagnosis compared to other cancer is early at an age where they are reproductive and main economic contributors thus a greater loss of life years (55, 79). Cervical cancer screening increases the quality-adjusted life-year (QALY) by early detection of precancerous lesions and early-stage cancer and point of care same-day intervention (47). There has been an increasing number of women going for cervical cancer screening in sub-Saharan Africa. This is attributed to the increasing number of screening and inclusion of cervical cancer vaccines as part of extended vaccination programs (1). This great milestone has however been affected since the onset of the pandemic in 2020 and has cause regression in previously noted progress. (90)

No association was found between screening for cervical cancer and the method of contraceptive, Hpv knowledge and vaccination, and uptake of cervical cancer screening. In our study we 64 % of the female participants were not on any contraceptive methods. And most used contraceptive method among the 36 % was an intrauterine device at 17 % and only 9% were on oral contraceptives. The study by WHO has linked long-term use of oral contraceptives has been linked to cervical cancer(67). The majority of our study participants knew about HPV vaccination following vibrant media advertisements on the program of vaccination of school-going girls in October 2020. However, the majority of our participant's ages range 30 to 39 years and only 9% were below the age of 26 had ever been vaccinated. Vaccination will see the

reduction of cervical cancer cases in a future projection among school-going children. In addition, it will have a big role in the development of herd immunity in years to come from the projected population-level models where it targets 80% coverage. (70)

5.5: Social determinants of health

Among the cues to efficacy, education is an important pillar in increasing our knowledge of the severity and impact of cervical cancer. Knowledge on causes, risk, and prevention of cervical cancer was high. However, only 19.3% had correct information on when to start screening and how frequently to screen. The majority of healthcare workers (74.4%) acquired their knowledge of cervical cancer from outdated medical education taught in medical college. The Lack of recent updates on cervical cancer screening practice highlighted the gap of knowledge and quality of knowledge among healthcare workers and future intervention should focus on bridging this gap and creating future education programs and regular mails or reminders on text messages that contain due screening dates, updated information, and research and innovative ideas that are ongoing.

Education as an intervention of cervical cancer prevention is useful if held among peers or using appointed health advocates (85). For healthcare workers appointed ambassadors of cervical cancer screening who work in the various departments in the institution can be used to augment knowledge and encourage uptake and advocacy to cervical cancer screening. The majority of healthcare staff had insurance cover and 66.9% of them had ever screened for cervical cancer. Cervical cancer screening has been done at a subsidized cost every year in October, which is the world cervical cancer prevention month. Regular reminders through Continuous medical education forums, departmental ambassadors, and email or texts to remind the clients on screening would be effective. Likewise, the creation of a private clinic dedicated to staff for screening will charge the perception of cervical cancer screening by ensuring privacy and efficiency. Utilization of self-collected H tests mailed to an individual are some of the innovative screening ideas that aim to improve the acceptability of the test (91)

5.7: Male participation in reproductive health

The present study has illustrated that men are actively involved in the advocacy of cervical cancer screening tools and had knowledge if their partners or close family member had been screened for cervical cancer. This was an unexpected finding in this study as traditionally men have kept away issues concerning reproductive health. Male engagement in other reproductive health sectors like family planning has seen this change in perspective and funded programs and workshops have supported this welcomed attitude change. (70) In this present study 28(49.1%) had knowledge on health-seeking behavior of their spouse or close family member and the majority had knowledge of the risk factors and were aware of the preventative strategies currently under implementation. The presence of vaccines

against cervical cancer has been publicized through the media where school vaccination of school-going children is underway. This vaccination has projected future benefits of reduction of cervical cancer using a comparative model of low-income countries (45)

CHAPTER SIX

CONCLUSION

Barriers to cervical cancer screening are specific to each subgroup population and have a great impact on uptake and routine cervical cancer screening. The majority of the staff had insurance covers and thus affordability and accessibility of cervical cancer screening did not play a role as a structural barrier. Personal impediments were the cause of not screening for cervical cancer, with psychological fear being cited by a majority as the reason they declined future screening opportunities. Addressing these specific personal impediments would see an increase in the uptake rate of cervical cancer screening. Programs that would aim to understand what personal intentions are and practice would be able to form innovative solutions that address these perceived barriers. Cues to action can be formulated, with constant evaluation and monitoring of these laid out actions to achieve efficacy in cervical cancer screening. Novel screening methods that may be more acceptable to the population can be explored to overcome these psychological barriers.

Constant updates on knowledge on cervical cancer and current recommended practice have a vital role to play in health-seeking behavior. Knowledge on the high burden of disease through current sources like media can improve the perceived severity of the disease. This would positively influence on adaptation of health-seeking behavior that aims to prevent cervical cancer. The low perception of susceptibility among the health care workers can also be improved through a constant update on disease severity and preventive measures. Sustaining these programs through constant training and monitoring their effectiveness over time will achieve the goal of elimination of cervical cancer.

Participation of men in the reproductive health domain more especially in the creation of awareness and involvement in preventive programs are innovative ways to increase screening. Men's knowledge on screening of their partners or close family members was high and can be used as a novel avenue relay advocacy of cervical cancer screening among the general population. Awareness of preventive measures like vaccination was attributed to the recent media campaigns. Focus on regular media coverage on cervical cancer and vaccination will reinforce this awareness on both gender and put a sense of responsibility to both. Vaccination uptake among healthcare workers was low as most were beyond the recommended age vaccination and had previous sensitization on protective effects of cervical cancer vaccine. Current campaigns on vaccination are ongoing among school-going children. The protective

effects in cervical cancer reduction will be in seen future when the will be herd immunity built after wide vaccination coverage.

CHAPTER SEVEN

STRENGTHS AND LIMITATIONS

7.1 Strengths

The strength of the present study is there were significant barriers specific to the female subpopulation that was found. These barriers have a significant effect on the referral and advocacy of cervical cancer screening by health care workers. Currently, a few studies are looking at barriers that the healthcare provider encounters to prevent screening and this could be a major drawback to advocacy and referrals of patients. This referral by a health care worker has been demonstrated to have an influence on screening rates among the general population.

This present study also analyzed the engagement of male participants to reproductive health issues, with noted commendable involvement of the male participants toward their partner or close family member's heath. Personal impediments were a major cause and subthemes of these causes can be further analyzed in qualitative studies and interventions can be analyzed in randomized control trials.

7.2: Limitations

1) Access to outreach staff from the main hospital was not feasible due to the covid pandemic, restricted accessibility to the 15 planned outreach, thus sampling was only done in the main hospital.
2) Confidentiality clause Human resource-restricted use of systematic sampling using sampling frame with a list of staff ID. Number estimates per department were given and sampling was done as per population in each department. This was also subject to changes in total employment numbers resigning and hiring of new staff.
3) Recall bias and social desirability bias were limitations most healthcare staff may have forgotten the years of screening or respond in ways that favor character protection and exposes what seems to be poor health-seeking habit.

CHAPTER EIGHT

RECOMMENDATIONS

8.1: Health Education Based Interventions

The present study looked at knowledge of cervical cancer and its impact on cervical cancer screening. This was more especially in knowledge on recommended ages for index screening, the attitude of susceptibility to cervical cancer, and source on updates of cervical cancer was noted to be from background medical education. New recommendations and updates are missed and would lead to poor uptake and follow-up screening rates.

In the current Aga Khan University Hospital, these health education interventions would include, a dedicated staff screening program with policies on recommended practice, departmental appointed trainers to conduct cervical cancer programs regularly. In addition to giving reading materials online or physically in clinics that offer screening services. All these programs will be evaluated and monitored regularly to ensure that the challenges can be picked and addressed appropriately.

This will bridge the gap in knowledge among health care workers in this tertiary hospital. Creation of training forums that meet annually, where each department conducts teaching on cervical cancer and have a pretest to gauge the initial knowledge on cervical cancer and post-test scores to test on retention of high-quality knowledge. As our study found out. The quality of knowledge of the healthcare workers was low and regular updates on screening were needed.

In the community, the use of targeted health education using peer educators and community health personnel who the population can relate to is effective as compared to national wide educators unknown to the group(92). The presence of identified peer ambassador who will be trained on cervical cancer and prevention. Having a peer that in the community who they are familiar with may have an impact on screening rates and follow-up rates.

The use of a peer counselor may pick up salient factors that are impeding cervical cancer follow-up tests. The ambassador will be alerting the departmental staff on programs of prevention and promotion of cervical cancer. Supplementing the knowledge with written brochures increases the retention of knowledge learned during such forums. This can be offered as a manual on screening that can be read before administration of the pre and post-test. These materials can also be used by the individual for future reference. This has contributed to increased perception of risk and self-efficacy (57)

8.2: Innovative service delivery to make the screening more accessible and acceptable.

A dedicated Screening program should be tailored to each subpopulation due to the unique barriers that exist. Nationwide the cervical cancer screening policy revision to include WHO recommendations on cervical cancer screening are essential. This will increase coverage of women screened and those eligible for vaccination should be directed to healthcare facilities that offer vaccination.

Community-based self-sampling HPV DNA has been part of the WHO task-shifting project. To overcome the use of psychological barriers of innovative services of cervical cancer screening sampling methods can be adopted. Self-sampling DNA is feasible and an acceptable sampling method that can both used by the general population, where the current pandemic has caused decreased health-seeking behavior because of fear. The kits can be delivered by community health care workers with instructions on usage. Use innovative service delivery like a dedicated staff screening clinic, self-collection DNA in Aga Khan University Hospital, and assessment of its acceptability among those who declined screening opportunities can be a novel idea in overcoming screening barriers. This will overall improve the acceptability of the test and increase follow-up routine screening tests **(11, 66).**

This new tool aims at increasing accessibility, uptake, and explore perception and acceptability and has been studied by Theresa et al in Ethiopia and was noted to be a socially acceptable and feasible intervention(46). The feasibility and acceptability of self-sampling in Kenya through the *chaguo letu* study by Irene et al among the rural community was noted to be significantly high though limited availability of the resources was noted(46). The study also described how the implementation process should be carried out. Using cost-effective analysis, repeated self-collected has a cost-benefit and there is increased participation and detection of a precancerous lesion as compared to regular Pap smear.(46)

8.3: Integrated Behavioral Therapy

This therapy aims to look at behavior and intention to go for a screening test. It focusses on How an individual makes a decision and external factors that might influence this decision-making process. From these barriers, interventions to create behavior change and certain action plans are formulated and implemented. Behavioral modeling has been used by psychologists to explain health-seeking behavior and it focuses on personal barriers and perceived low susceptibility and implementation of action cues to achieve efficacy.

The use of a structured model will be essential in looking at the barriers and integration of identified barriers to achieving a change in health-seeking behavior. Among the general population, the use of psychological assessment using surveys before visits should be used to collect data on perceived barriers.

A counseling session can be offered after the identification of those to be at risk and reduce loss to follow up after the test. The establishment of these impeding factors to screening has also been shown to positively alter screening behavior in a study on colorectal screening that utilizes colonoscopy as a screening tool. They used various innovative service delivery to relay anxiety and make the procedure as comfortable as possible(93)

8.4: Recommendations on Areas for further research

Qualitative research studies

1) Conceptual framework e.g. social-ecological model for the interventions at individual, community, societal that seek to investigate the acceptability of a novel innovative service like self-based sampling
2) Phenomenology study in-depth reflective description of an experience. This can be recommended for those that had refused the future opportunity for screening or filled after a clinic visit.
3) Thematic direct content analysis: in subthemes seen in the study. Focused group discussions can be held for further analysis of the various barriers cited for not screening for cervical cancer.

Quantitative research studies

A random control trial on study intervention of education and uptake, multicenter and use social ecologic models on the targeted individual, community or society. A random control trial on cost-effectiveness analysis of self-sampling HPV DNA test versus regular Pap smear.

8.5 Dissemination

Expected application of results and dissemination

The results of this current study on uptake of cervical cancer screening found there the perception to susceptibility was low and personal impediments was the major barrier to screening. Determinants of screening will guide interventions to increase this rate of screening and subsequent advocacy of screening.

As the holders of knowledge of the burden of the disease, this study will aim to also sensitize the need of healthcare workers who don't work in reproductive health to be more vigilant and advocate for screening for the patients they interact with or extend it to own spouses and relatives.

The results will be disseminated to the faculty academic rounds, department's faculty, and residents. It will be also be shared in a peer review journals through publications.

BIBLIOGRAPHY

1. Arbyn M, Weiderpass E, Bruni L, de Sanjosé S, Saraiya M, Ferlay J, et al. Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis. The Lancet Global Health. 2020;8(2):e191-e203.
2. Kangmennaang J, Onyango EO, Luginaah I, Elliott SJ. The next Sub Saharan African epidemic? A case study of the determinants of cervical cancer knowledge and screening in Kenya. Soc Sci Med. 2018;197:203-12.
3. 2019 IIICoHaCHIC. Kenya: Human Papillomavirus and Related Cancers, Fact Sheet 2019. Kenya: Human Papillomavirus and Related Cancers, Fact Sheet 20192019.
4. Nakisige C, Schwartz M, Ndira AO. Cervical cancer screening and treatment in Uganda. Gynecol Oncol Rep. 2017;20:37-40.
5. Somdyala NIM, Bradshaw D, Dhansay MA, Stefan DC. Increasing Cervical Cancer Incidence in Rural Eastern Cape Province of South Africa From 1998 to 2012: A Population-Based Cancer Registry Study. JCO Glob Oncol. 2020;6:1-8.
6. Somdyala NIM, Bradshaw D, Dhansay MA, Stefan DC. Increasing Cervical Cancer Incidence in Rural Eastern Cape Province of South Africa From 1998 to 2012: A Population-Based Cancer Registry Study. JCO Glob Oncol. 2020;6:1-8.
7. Patnick J. Cervical cancer screening in England. Eur J Cancer. 2000;36(17):2205-8.
8. Anfinan N, Sait K. Indicators of survival and prognostic factors in women treated for cervical cancer at a tertiary care center in Saudi Arabia. Ann Saudi Med. 2020;40(1):25-35.
9. Simelela PN. WHO global strategy to eliminate cervical cancer as a public health problem: An opportunity to make it a disease of the past. International Journal of Gynecology & Obstetrics. 2021;152(1):1-3.
10. Bhatla N, Singhal S. Primary HPV screening for cervical cancer. Best Pract Res Clin Obstet Gynaecol. 2020;65:98-108.
11. Brisson M, Kim JJ, Canfell K, Drolet M, Gingras G, Burger EA, et al. Impact of HPV vaccination and cervical screening on cervical cancer elimination: a comparative modelling analysis in 78 low-income and lower-middle-income countries. Lancet. 2020;395(10224):575-90.
12. Pesola F, Sasieni P. Impact of screening on cervical cancer incidence in England: a time trend analysis. BMJ open. 2019;9(1):e026292-e.

13. Shrestha AD, Neupane D, Vedsted P, Kallestrup P. Cervical Cancer Prevalence, Incidence and Mortality in Low and Middle Income Countries: A Systematic Review. Asian Pac J Cancer Prev. 2018;19(2):319-24.
14. Wittet S, Aylward J, Cowal S, Drope J, Franca E, Goltz S, et al. Advocacy, communication, and partnerships: Mobilizing for effective, widespread cervical cancer prevention. Int J Gynaecol Obstet. 2017;138 Suppl 1:57-62.
15. Sawaya GF. Cervical Cancer Screening—Moving From the Value of Evidence to the Evidence of Value. JAMA Internal Medicine. 2018;178(10):1293-5.
16. Melnikow J, Henderson JT, Burda BU, Senger CA, Durbin S, Weyrich MS. Screening for Cervical Cancer With High-Risk Human Papillomavirus Testing: Updated Evidence Report and Systematic Review for the US Preventive Services Task Force. JAMA. 2018;320(7):687-705.
17. Malagon T, Kulasingam S, Mayrand MH, Ogilvie G, Smith L, Bouchard C, et al. Age at last screening and remaining lifetime risk of cervical cancer in older, unvaccinated, HPV-negative women: a modelling study. Lancet Oncol. 2018;19(12):1569-78.
18. Tranberg M, Petersen LK, Elfström KM, Hammer A, Blaakær J, Bennetsen MH, et al. Expanding the upper age limit for cervical cancer screening: a protocol for a nationwide non-randomised intervention study. BMJ Open. 2020;10(11):e039636.
19. Appleby P, Beral V, Berrington de González A, Colin D, Franceschi S, Goodhill A, et al. Cervical cancer and hormonal contraceptives: collaborative reanalysis of individual data for 16,573 women with cervical cancer and 35,509 women without cervical cancer from 24 epidemiological studies. Lancet. 2007;370(9599):1609-21.
20. Syrjänen S, Shabalova I, Petrovichev N, Podistov J, Ivanchenko O, Zakharenko S, et al. Age-specific incidence and clearance of high-risk human papillomavirus infections in women in the former Soviet Union. Int J STD AIDS. 2005;16(3):217-23.
21. Guo M, Khanna A, Wang J, Dawlett MA, Kologinczak TL, Lyons GR, et al. Three-year risk of high-grade CIN for women aged 30 years or older who undergo baseline Pap cytology and HPV co-screening. Cancer Cytopathol. 2017;125(8):644-51.
22. Makuza JD, Nsanzimana S, Muhimpundu MA, Pace LE, Ntaganira J, Riedel DJ. Prevalence and risk factors for cervical cancer and pre-cancerous lesions in Rwanda. Pan Afr Med J. 2015;22:26-.

23. Practice Bulletin No. 157: Cervical Cancer Screening and Prevention. Obstet Gynecol. 2016;127(1):e1-e20.
24. Tabrizi SN, Brotherton JM, Kaldor JM, Skinner SR, Cummins E, Liu B, et al. Fall in human papillomavirus prevalence following a national vaccination program. J Infect Dis. 2012;206(11):1645-51.
25. Yabroff KR, Lund J, Kepka D, Mariotto A. Economic burden of cancer in the United States: estimates, projections, and future research. Cancer Epidemiol Biomarkers Prev. 2011;20(10):2006-14.
26. Handisurya A, Schellenbacher C, Kirnbauer R. Diseases caused by human papillomaviruses (HPV). J Dtsch Dermatol Ges. 2009;7(5):453-66; quiz 66, 67.
27. Arends MJ, Buckley CH, Wells M. Aetiology, pathogenesis, and pathology of cervical neoplasia. J Clin Pathol. 1998;51(2):96-103.
28. Vink MA, Bogaards JA, van Kemenade FJ, de Melker HE, Meijer CJ, Berkhof J. Clinical progression of high-grade cervical intraepithelial neoplasia: estimating the time to preclinical cervical cancer from doubly censored national registry data. Am J Epidemiol. 2013;178(7):1161-9.
29. Goodman A. HPV testing as a screen for cervical cancer. BMJ. 2015;350:h2372.
30. Steben M, Duarte-Franco E. Human papillomavirus infection: epidemiology and pathophysiology. Gynecol Oncol. 2007;107(2 Suppl 1):S2-5.
31. Long W, Yang Z, Li X, Chen M, Liu J, Zhang Y, et al. HPV-16, HPV-58, and HPV-33 are the most carcinogenic HPV genotypes in Southwestern China and their viral loads are associated with severity of premalignant lesions in the cervix. Virol J. 2018;15(1):94.
32. Pal A, Kundu R. Human Papillomavirus E6 and E7: The Cervical Cancer Hallmarks and Targets for Therapy. Front Microbiol. 2020;10:3116-.
33. Hernandez BY, Wilkens LR, Zhu X, Thompson P, McDuffie K, Shvetsov YB, et al. Transmission of human papillomavirus in heterosexual couples. Emerg Infect Dis. 2008;14(6):888-94.
34. Syrjänen S, Puranen M. Human papillomavirus infections in children: the potential role of maternal transmission. Crit Rev Oral Biol Med. 2000;11(2):259-74.
35. Sabeena S, Bhat P, Kamath V, Arunkumar G. Possible non-sexual modes of transmission of human papilloma virus. J Obstet Gynaecol Res. 2017;43(3):429-35.

36. Amador-Molina A, Hernández-Valencia JF, Lamoyi E, Contreras-Paredes A, Lizano M. Role of innate immunity against human papillomavirus (HPV) infections and effect of adjuvants in promoting specific immune response. Viruses. 2013;5(11):2624-42.
37. Dyer O. WHO links long term pill use to cervical cancer. BMJ. 2002;324(7341):808-.
38. Kashyap N, Krishnan N, Kaur S, Ghai S. Risk Factors of Cervical Cancer: A Case-Control Study. Asia Pac J Oncol Nurs. 2019;6(3):308-14.
39. Behbakht K, Lynch A, Teal S, Degeest K, Massad S. Social and cultural barriers to Papanicolaou test screening in an urban population. Obstet Gynecol. 2004;104(6):1355-61.
40. Muñoz N, Franceschi S, Bosetti C, Moreno V, Herrero R, Smith JS, et al. Role of parity and human papillomavirus in cervical cancer: the IARC multicentric case-control study. The Lancet. 2002;359(9312):1093-101.
41. Roura E, Travier N, Waterboer T, de Sanjosé S, Bosch FX, Pawlita M, et al. The Influence of Hormonal Factors on the Risk of Developing Cervical Cancer and Pre-Cancer: Results from the EPIC Cohort. PLoS One. 2016;11(1):e0147029.
42. Castle PE. How does tobacco smoke contribute to cervical carcinogenesis? J Virol. 2008;82(12):6084-6.
43. Al-amro SQ, Gharaibeh MK, Oweis AI. Factors Associated with Cervical Cancer Screening Uptake: Implications for the Health of Women in Jordan. Infectious Diseases in Obstetrics and Gynecology. 2020;2020:9690473.
44. Xi LF, Koutsky LA, Castle PE, Edelstein ZR, Meyers C, Ho J, et al. Relationship between cigarette smoking and human papilloma virus types 16 and 18 DNA load. Cancer Epidemiol Biomarkers Prev. 2009;18(12):3490-6.
45. Musa J, Achenbach CJ, O'Dwyer LC, Evans CT, McHugh M, Hou L, et al. Effect of cervical cancer education and provider recommendation for screening on screening rates: A systematic review and meta-analysis. PLoS One. 2017;12(9):e0183924.
46. Behnke A-L, Krings A, Wormenor CM, Dunyo P, Kaufmann AM, Amuah JE. Female health-care providers' advocacy of self-sampling after participating in a workplace program for cervical cancer screening in Ghana: a mixed-methods study. Global Health Action. 2020;13(1):1838240.

47. Yimer NB, Mohammed MA, Solomon K, Tadese M, Grutzmacher S, Meikena HK, et al. Cervical cancer screening uptake in Sub-Saharan Africa: a systematic review and meta-analysis. medRxiv. 2021:2020.12.26.20248864.
48. Castanon A, Landy R, Pesola F, Windridge P, Sasieni P. Prediction of cervical cancer incidence in England, UK, up to 2040, under four scenarios: a modelling study. Lancet Public Health. 2018;3(1):e34-e43.
49. Joseph B, Joseph M. The health of the healthcare workers. Indian J Occup Environ Med. 2016;20(2):71-2.
50. Ndejjo R, Mukama T, Musabyimana A, Musoke D. Uptake of Cervical Cancer Screening and Associated Factors among Women in Rural Uganda: A Cross Sectional Study. PLOS ONE. 2016;11(2):e0149696.
51. Ng'ang'a A, Nyangasi M, Nkonge NG, Gathitu E, Kibachio J, Gichangi P, et al. Predictors of cervical cancer screening among Kenyan women: results of a nested case-control study in a nationally representative survey. BMC Public Health. 2018;18(3):1221.
52. Chauhan BF, Jeyaraman M, Mann AS, Lys J, Skidmore B, Sibley KM, et al. Behavior change interventions and policies influencing primary healthcare professionals' practice—an overview of reviews. Implementation Science. 2017;12(1):3.
53. Bana S, Yakoob J, Jivany N, Faisal A, Jawed H, Awan S. Understanding Health Seeking Behavior Of Health Care Professionals In Tertiary Care Hospitals In Pakistan. J Ayub Med Coll Abbottabad. 2016;28(3):545-9.
54. Abotchie PN, Shokar NK. Cervical cancer screening among college students in Ghana: knowledge and health beliefs. International Journal of Gynecologic Cancer. 2009;19(3):412-6.
55. Heena H, Durrani S, AlFayyad I, Riaz M, Tabasim R, Parvez G, et al. Knowledge, Attitudes, and Practices towards Cervical Cancer and Screening amongst Female Healthcare Professionals: A Cross-Sectional Study. Journal of Oncology. 2019;2019:5423130.
56. McCaffery K, Waller J, Nazroo J, Wardle J. Social and psychological impact of HPV testing in cervical screening: a qualitative study. Sex Transm Infect. 2006;82(2):169-74.

57. Koffi TB, Weidert K, Ouro Bitasse E, Mensah MAE, Emina J, Mensah S, et al. Engaging Men in Family Planning: Perspectives From Married Men in Lomé, Togo. Glob Health Sci Pract. 2018;6(2):317-29.
58. Yang BH, Bray FI, Parkin DM, Sellors JW, Zhang Z-F. Cervical cancer as a priority for prevention in different world regions: an evaluation using years of life lost. Int J Cancer. 2004;109(3):418-24.
59. Jaisamrarn U, Castellsagué X, Garland SM, Naud P, Palmroth J, Del Rosario-Raymundo MR, et al. Natural history of progression of HPV infection to cervical lesion or clearance: analysis of the control arm of the large, randomised PATRICIA study. PloS one. 2013;8(11):e79260-e.
60. Vink MA, Bogaards JA, van Kemenade FJ, de Melker HE, Meijer CJLM, Berkhof J. Clinical Progression of High-Grade Cervical Intraepithelial Neoplasia: Estimating the Time to Preclinical Cervical Cancer From Doubly Censored National Registry Data. American Journal of Epidemiology. 2013;178(7):1161-9.
61. ACOG Practice Bulletin Number 131: Screening for cervical cancer. Obstet Gynecol. 2012;120(5):1222-38.
62. Andersen LL, Moller LM, Gimbel HM. Low adherence to cervical cancer screening after subtotal hysterectomy. Dan Med J. 2015;62(12):A5165.
63. Stokes-Lampard HJ, Macleod J, Wilson S. Variation in NHS utilisation of vault smear tests in women post-hysterectomy: A study, using routinely collected datasets. BMC women's health. 2008;8:6-.
64. Chumworathayi B, Blumenthal PD, Limpaphayom KK, Kamsa-Ard S, Wongsena M, Supaatakorn P. Effect of single-visit VIA and cryotherapy cervical cancer prevention program in Roi Et, Thailand: a preliminary report. J Obstet Gynaecol Res. 2010;36(1):79-85.
65. Sankaranarayanan R, Rajkumar R, Theresa R, Esmy PO, Mahe C, Bagyalakshmi KR, et al. Initial results from a randomized trial of cervical visual screening in rural south India. Int J Cancer. 2004;109(3):461-7.
66. Makau-Barasa LK, Greene S, Othieno-Abinya NA, Wheeler SB, Skinner A, Bennett AV. A review of Kenya’s cancer policies to improve access to cancer testing and treatment in the country. Health Research Policy and Systems. 2020;18(1):2.

67. Campos NG, Sharma M, Clark A, Lee K, Geng F, Regan C, et al. The health and economic impact of scaling cervical cancer prevention in 50 low- and lower-middle-income countries. Int J Gynaecol Obstet. 2017;138 Suppl 1:47-56.
68. Canfell K, Kim JJ, Brisson M, Keane A, Simms KT, Caruana M, et al. Mortality impact of achieving WHO cervical cancer elimination targets: a comparative modelling analysis in 78 low-income and lower-middle-income countries. The Lancet. 2020;395(10224):591-603.
69. Tabrizi SN, Brotherton JM, Kaldor JM, Skinner SR, Liu B, Bateson D, et al. Assessment of herd immunity and cross-protection after a human papillomavirus vaccination programme in Australia: a repeat cross-sectional study. Lancet Infect Dis. 2014;14(10):958-66.
70. Brisson M, Benard E, Drolet M, Bogaards JA, Baussano I, Vanska S, et al. Population-level impact, herd immunity, and elimination after human papillomavirus vaccination: a systematic review and meta-analysis of predictions from transmission-dynamic models. Lancet Public Health. 2016;1(1):e8-e17.
71. Markowitz LE, Hariri S, Lin C, Dunne EF, Steinau M, McQuillan G, et al. Reduction in human papillomavirus (HPV) prevalence among young women following HPV vaccine introduction in the United States, National Health and Nutrition Examination Surveys, 2003-2010. J Infect Dis. 2013;208(3):385-93.
72. Dunne EF, Sternberg M, Markowitz LE, McQuillan G, Swan D, Patel S, et al. Human papillomavirus (HPV) 6, 11, 16, and 18 prevalence among females in the United States--National Health And Nutrition Examination Survey, 2003-2006: opportunity to measure HPV vaccine impact? J Infect Dis. 2011;204(4):562-5.
73. Moss JL, Liu B, Zhu L. Adolescent Behavioral Cancer Prevention in the United States: Creating a Composite Variable and Ranking States' Performance. Health Educ Behav. 2019:1090198119839111.
74. Santelli JS, Sivaramakrishnan K, Edelstein ZR, Fried LP. Adolescent risk-taking, cancer risk, and life course approaches to prevention. J Adolesc Health. 2013;52(5 Suppl):S41-4.
75. Carpenter CJ. A Meta-Analysis of the Effectiveness of Health Belief Model Variables in Predicting Behavior. Health Communication. 2010;25(8):661-9.

76. Fayanju O, Kraenzle S, Drake B, Oka M, Goodman M. Perceived Barriers to Mammography among Underserved Women in a Breast Health Center Outreach Program. The American Journal of Surgery. 2014;208.
77. Jentschke M, Lehmann R, Drews N, Hansel A, Schmitz M, Hillemanns P. Psychological distress in cervical cancer screening: results from a German online survey. Archives of Gynecology and Obstetrics. 2020;302(3):699-705.
78. Dulla D, Daka D, Wakgari N. Knowledge about cervical cancer screening and its practice among female health care workers in southern Ethiopia: a cross-sectional study. Int J Womens Health. 2017;9:365-72.
79. Hanske J, Meyer CP, Sammon JD, Choueiri TK, Menon M, Lipsitz SR, et al. The influence of marital status on the use of breast, cervical, and colorectal cancer screening. Preventive Medicine. 2016;89:140-5.
80. Abraham C, Sheeran P. The Health Belief Model. 22015.
81. Lindau ST, Tomori C, Lyons T, Langseth L, Bennett CL, Garcia P. The association of health literacy with cervical cancer prevention knowledge and health behaviors in a multiethnic cohort of women. Am J Obstet Gynecol. 2002;186(5):938-43.
82. Koc Z, Ozdes EK, Topatan S, Cinarli T, Sener A, Danaci E, et al. The Impact of Education About Cervical Cancer and Human Papillomavirus on Women's Healthy Lifestyle Behaviors and Beliefs: Using the PRECEDE Educational Model. Cancer Nurs. 2019;42(2):106-18.
83. Mabelele MM, Materu J, Ng'ida FD, Mahande MJ. Knowledge towards cervical cancer prevention and screening practices among women who attended reproductive and child health clinic at Magu district hospital, Lake Zone Tanzania: a cross-sectional study. BMC Cancer. 2018;18(1):565.
84. Nwabichie CC, Manaf RA, Ismail SB. Factors Affecting Uptake of Cervical Cancer Screening Among African Women in Klang Valley, Malaysia. Asian Pac J Cancer Prev. 2018;19(3):825-31.
85. Miller MJ, Xu L, Qin J, Hahn EE, Ngo-Metzger Q, Mittman B, et al. Impact of COVID-19 on Cervical Cancer Screening Rates Among Women Aged 21–65 Years in a Large Integrated Health Care System — Southern California, January 1–September 30, 2019, and

January 1–September 30, 2020. MMWR Morbidity and Mortality Weekly Report. 2021;70(4):109-13.

86. Marlow L, McBride E, Varnes L, Waller J. Barriers to cervical screening among older women from hard-to-reach groups: a qualitative study in England. BMC Women's Health. 2019;19(1):38.
87. Marlow LAV, Waller J, Wardle J. Barriers to cervical cancer screening among ethnic minority women: a qualitative study. Journal of Family Planning and Reproductive Health Care. 2015;41(4):248.
88. Akinlotan M, Bolin JN, Helduser J, Ojinnaka C, Lichorad A, McClellan D. Cervical Cancer Screening Barriers and Risk Factor Knowledge Among Uninsured Women. J Community Health. 2017;42(4):770-8.
89. Crawford A, Benard V, King J, Thomas CC. Understanding Barriers to Cervical Cancer Screening in Women With Access to Care, Behavioral Risk Factor Surveillance System, 2014. Preventing Chronic Disease. 2016;13:e154.
90. Arrossi S, Matos E, Zengarini N, Roth B, Sankaranayananan R, Parkin M. The socio-economic impact of cervical cancer on patients and their families in Argentina, and its influence on radiotherapy compliance. Results from a cross-sectional study. Gynecologic Oncology. 2007;105(2):335-40.
91. Moodley J. Combined oral contraceptives and cervical cancer. Curr Opin Obstet Gynecol. 2004;16(1):27-9.
92. Winer RL, Lin J, Tiro JA, Miglioretti DL, Beatty T, Gao H, et al. Effect of Mailed Human Papillomavirus Test Kits vs Usual Care Reminders on Cervical Cancer Screening Uptake, Precancer Detection, and Treatment: A Randomized Clinical Trial. JAMA Netw Open. 2019;2(11):e1914729.
93. Brandt T, Wubneh SB, Handebo S, Debalkie G, Ayanaw Y, Alemu K, et al. Genital self-sampling for HPV-based cervical cancer screening: a qualitative study of preferences and barriers in rural Ethiopia. BMC Public Health. 2019;19(1):1026.

APPENDICES

APPENDIX I

CONSENT FORM

My name is Dr. Doreen Osoro, a postgraduate student in Aga Khan University Hospital, in the department of Obstetrics and Gynecology.

As part of the postgraduate medical program, I am required to conduct a research project.

This research tends to find out the number of female healthcare workers who have had cervical cancer screening and practice and the contribution of male healthcare workers to screening rates. This will involve filling a questionnaire that assesses this prevalence with also questions dressing factors that influence screening.

The benefit of this study will be knowledge of our screening rates and find recommendations for improving screening programs. The results will be kept anonymous and confidential. For participants willing to undergo screening or are eligible for vaccination, referral to the appropriate clinic will be done at your own cost.

All information given is confidential. Participation in the study is purely voluntary, and you have the right to withdraw at any stage.

Your co-operation is highly appreciated.
In case of any questions regarding the study, feel free to contact me using the following details.

Dr. Doreen Osoro
Tel. No +254724719888
Email: doreen.osoro@aku.edu
P.o. Box 30270-00100
Aga Khan University Hospital

Consent form

I …….. Hereby consent to participate in the study, having been informed and understood the nature of the study.

Date …….

Signature……..

I Dr. Doreen Osoro/ Research Assistant confirm that I have fully informed the participant of what the research entails and hereby undersign.

Date……

Signature……....

APPENDIX II

Study Pt ID……..

CERVICAL CANCER CAM TOOL

Prevalence of Cervical cancer screening among health care workers and factors affecting screening

The questions are of a sensitive nature, about cervical cancer awareness, we are interested in your thoughts and beliefs, so please answer the questions as honestly as you can. Please be re-assured that this questionnaire, like the others, is strictly confidential and you will not be identified by your answers.

Cervical cancer is cancer of the cervix, sometimes called the neck of the womb, where the womb joins the top of the vagina.

We appreciate your opinion on this research, but if at any time you feel that you do not wish to answer any one of the following questions then please type in REF and you will move on to the next question.

Demographics

1. Gender: Male☐ Female☐
2. Age ……
3. Department at AKUH…….
3 Marital status: ☐ Married ☐Single ☐other
4. Professional Cadre: ☐ Consultant ☐Resident ☐Medical Officer ☐Nurse ☐OTHER……
5. Cost of healthcare: ☐medical insurance ☐cash
6. How many children have you given birth to ……..

CERVICAL CANCER

7. As far as you are aware, is there an AKUH-N cervical cancer screening program
☐ Yes ☐ No

Question 7 ,8, 9 and 10 apply to female participants. If you are a male participant skip and go to Q 11

8. What form of contraception do you use: ☐Pills ☐ IUCD ☐Implant ☐none of the above

9. Have you had screening for cervical cancer before?☐ Yes ☐ No
10. How frequent have you screened for cervical cancer:
11. If you have never had cervical screening (smear or Pap test), why is that?
Following is a scale 0-5 please choose best answer that describes you tick on box

12. How did you hear about cervical cancer?
☐ Medical education☐ Media ☐ Friend/colleague ☐ Others……
13. If you had an opportunity for screening today will you be willing ☐ Yes ☐ No
if not ,Could you say if this reason might put you off going to the doctor if you had a symptom

	Strongly disagree	disagree	Neither agree/or disagree	agree	Strongly agree	I don't know
There is enough awareness on cervical cancer						
I advocate for cervical cancer screening to everyone						
I know symptoms of cervical cancer and where to get screening from						
Cervical cancer is preventable						
Cervical cancer can be sexually transmitted						

that you thought might be a sign of cervical cancer?
☐ I would be too embarrassed –
☐ I would be too scared
☐ I would be worried about wasting the doctor's time
☐ My doctor would be difficult to talk to
☐ It would be difficult to make an appointment with my doctor
☐ I would be too busy to make time to go to the doctor
☐ I have too many other things to worry about
☐ It would be difficult for me to arrange transport to the doctor's
☐ I would be worried about what the doctor might find
☐ I would not feel confident talking about my symptom with the doctor
☐ I might not be able to see a female doctor
☐ I would worry about not being taken seriously
14. How much do you agree or disagree that this can increase the chance of getting cervical cancer?

	Strongly agree	Agree	Neither agree or disagree	disagree	Strongly disagree	Don't know

Infection with Hpv(Human Papilloma Virus)						
Being a smoker						
Having weak immune system-e.g. Hiv/diabetes						
Long use of oral contraceptive						
Infection with Chlamydia (a sexually transmitted infection)						
Starting to have sex at a young age (before age 17) OR Having many sexual partners						
Not going for regular smear or Pap tests						
Having a sexual partner with many previous						

15. At what age are women first invited for cervical cancer screening in Kenya?
☐ Once sexually active ☐ between 21 yrs -25 yrs ☐ above 30 yrs☐ don't know
16. As far as you are aware, is there a vaccination to protect against cervical cancer?
☐ YES ☐ NO
17. Does it guarantee a 100% protection from cervical cancer?☐Yes ☐ no ☐ I don't know
18. At what age is the vaccination offered?
☐ I don't know ☐ not sure ☐ 9yrs-26 years ☐ 30 years
19. Have you ever been vaccinated?☐Yes ☐no
20. Have you, your family or close friends ever had cervical cancer? Please choose all that apply.
☐Myself ☐ Close family member ☐Close friend acquaintance/colleague ☐neither myself nor close family ☐ I don't Know

	Strongly Agree	Agree	Neither agree or disagree/not sure	disagree	Strongly disagree	Don't know
I'd rather not know if I have cervical cancer						

I intend to accept future invitations for screening						
Using condoms can reduce the risk of getting cervical cancer						
Cervical screening is effective in preventing cervical cancer						
Stopping smoking can reduce the risk of cervical cancer						
Talking to family or friends about gynecological symptoms) is embarrassing						
The chances of curing are better when the disease is discovered at early stage						
Do you think this disease could affect you in the future?						
There are effective methods that significantly reduces the risk disease?						