EFFECTIVENESS OF PEER EDUCATION ON INCREASING AWARENESS AND UPTAKE OF COLORECTAL CANCER SCREENING AMONG RESIDENTS OF MT. ELGON SUB COUNTY, BUNGOMA COUNTY, KENYA

BY

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DECLARATION

This thesis is my original work and has not been presented for any award in any other institution of higher learning.

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ABSTRACT

Globally, Colorectal Cancer (CRC) is a leading cause of mortality with a slight preponderance to populations in low and middle-income countries (LMICs). CRC accounted for 10.2% of all cancers and 8.2% of all cancer deaths worldwide in 2018. In Kenya, CRC was estimated at 6.5% of new cancer cases and 4.5% of all cancer cases in 2020. Awareness and uptake of CRC screening remain suboptimal in LMICs due to less effective sensitization approaches. This study aimed at determining the effectiveness of Peer Education in increasing awareness and uptake of CRC screening among residents of Mt. Elgon Sub-County. Specifically, the study sought to assess the awareness of CRC screening; determine the uptake of CRC screening, establish trends in awareness and uptake of CRC screening during the intervention and to evaluate the effectiveness of the intervention. This was longitudinal interventional (pre-post) study using quantitative and qualitative approaches to data management over eight months. Trained peer educators were used to impart knowledge on CRC screening. The study was anchored on the Health Belief Model (HBM) augmented by the Diffusion of Innovation theory (DOI). From the population of 22,372 adults aged 45-75 years, some 440 participants were obtained using Taro Yamane's Equation. Quantitative data for the baseline and endline surveys was collected using semi-structured questionnaires while qualitative data was collected through Key Informants Interviews and Focus Group Discussions. A total of 402 participated in the study. Quantitative data was analyzed using SPSS version 25, while qualitative data was thematically summarized and analyzed using the NVivo application. Chi Square test determined existence of associations between the independent and dependent variables. Cochran's Q tests determined statistical significance of the differences in awareness and uptake of CRC screening at the different observation points. McNemar's test confirmed statistical significance of the differences in awareness and uptake of CRC screening between the baseline and end-line. Before Peer Education intervention only 19 (4.7%) were aware of CRC screening, while 9 (2.2%) had undergone screening. After Peer Education intervention 291(72.4%) were aware of CRC screening while 34 (8.5%) had screened. Respondents in the qualitative survey reported that awareness and uptake were low because of the ineffective conventional sensitization programs and outreaches in the Sub- County. Chi square analysis before Peer Education intervention reported that all socioeconomic and sociodemographic factors had no significant association with CRC screening uptake: age ($\chi2 = 2.781$, $p = 0.249$, gender ($\chi2 = 1.355$, $p = 0.244$, ethnic background ($\chi2 = 3.889$, $p = 0.421$), marital status ($\chi2 = 1.007$, $p = 0.604$) and religious affiliation ($\chi2 = 1.192$, $p = 0.755$. Cochrane Q test confirmed statistically significant increase in the awareness of CRC screening from 4.7% before Peer Education intervention to endline at ($\chi^2(3) = 444.671$, $p < 0.0001$.Similarly, there were statistically significant increments in uptake of screening at ($\chi^2(3) = 61.404$, $p < 0.0001$). The increase in uptake of CRC screening was 6.3% while for screening awareness was 67.7%. Using McNemar's test, the study confirmed the increases in both awareness and uptake of CRC were statistically significant screening at p=0.001 Conclusively, Peer Education anchored on HBM augmented by DOI theory attained statistically significant increases in awareness and uptake of CRC screening, with greater change observed in awareness. These findings will therefore inform national and county level efforts on enhanced awareness and uptake of CRC screening with emphasis on identifying further strategies to accelerate CRC screening uptake.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACS	American Cancer Society
BCRH	Bungoma County Referral Hospital
CI	Confidence Interval
CIDP	County Integrated Development Plan
CL	Confidence Level
CAW	County Assembly Ward
CRC	Colorectal Cancer
DOI	Diffusion of Innovation
FOBT	Fecal occult blood test
GLOBOCCAN	Global Cancer Report
HBM	Health Belief Model
HCW	Health care worker
HICs	High Income Countries
KEMRI	Kenya Medical Research Institute
KIIs	Key Informant Interviews
KNCCS	Kenya National Cancer Control Strategy
KNBS	Kenya National Bureau of Standards
LMICs	Low- and Medium-Income Countries
MOH-NCCP	Ministry of Health -National Cancer Control Programs
MOPHS	Ministry of Public Health and Sanitation
NCI	National Cancer Institute
NCCS	National Cancer Control Strategy
NCMETWG	National Cancer Monitoring and Evaluation Technical Working Group
NGCMK	National Guidelines of Cancer Management, Kenya
OR	Odds Ratio
PPS	Probability Proportionate to Sample

PSTs	Primary School Teachers
SSA	Sub Sahara Africa
SDG	Sustainable Development Goals
SNHSs	Spanish National Health Surveys
SPSS	Statistical Package for Social Sciences
TOTs	Training of Trainers
UNDP	United Nations Development Program
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Age-Standardized Rate

An age-standardized rate (ASR) is a summary measure of the rate that would have been observed if the population had a standard age structure.

Awareness is a mindful consciousness of your strengths, weaknesses, actions and presence. Awareness involves recognizing how to react to different situations and the triggers for the responses for you.

Baseline Survey: A baseline survey is an analysis describing the initial state of an indicator before the start of a project/programme

Bowel prep: elimination of all solid matter from the intestines by elimination of solid food intake for the duration of the prep and use of laxative medications

Colorectal Cancer- cancer of the colon and rectum and are adenocarcinomas.

Compatibility of innovation is the degree of fit between the proposed change and the individuals or community that is undergoing the change (Horner, et al., 2004).

Complexity of an innovation is the degree to which an innovation is perceived as difficult to understand or use.

Cognitive congruence-Having a similar knowledge base and learning experiences and therefore able to speak the same language in context. This a great foundation on which the Peer Education intervention is anchored.

Content validity-evaluates how well an instrument covers all the relevant parts of the construct it aims to measure. Also known aa the degree to which an assessment instrument is relevant to and representative of the target construct

Conventional health education model-the usual ways of communicating health ideas and information to the audiences by trained/professional health personnel.

CRC Incidence is the number of new CRC cases arising in a specified population over a given period of time (typically 1 year).

CRC mortality is the number of deaths due to CRC occurring in a specified population over a given period (typically 1 year). It can be expressed as an absolute number of deaths within the entire population per year or as a rate per 100 000 persons per year.

Curriculum content – the knowledge or skills or combination to be covered. This refers to the scope of Peer Education

Effects- refers to the outcomes or consequences of an intervention.

Effectiveness of an intervention- is measured by the extent to which the intervention has been successful in generating the desired outcomes in the target audience.

Endline Survey-a study conducted at the end of an intervention to help in understanding the impact of the intervention. This will be important in quantifying the actual effects of the Peer Education Intervention

Hemorrhoids-A condition of a swollen and inflamed veins in the rectum and anus that causes discomfort and bleeding

Household: A person or group of persons living in the same homestead or compound which may not necessarily in the same dwelling unit but share cooking arrangements and are answerable to the same household head.

Intervention: The act of interceding with the intent of modifying an outcome. In the context of this study, it is the Peer Education Curriculum and the Peer Educators who are tasked with training the respondents.

Observability refers to the extent that the results are visible to others. Interventions with a high degree of observability tend to be adopted faster than those where the results are not highly visible (Rogers, 1983)

Occult blood -Blood hidden in the stool.

Peer is a person who belongs to the same social group as another person or group. The social group may be based on age, sex, sexual orientation, occupation, socio-economic or health status, place of residence and other factors. In the context of this study peers will be adults age residents of Mt. Elgon Sub County. The peers have a strong social identity a reference term to "the knowledge that we belong to particular groups, together with emotional and value significance of group membership" (Tajfel, 1981).

Peer Education – for this study, Peer Education refers to health education activities that aim to positively improve people's health-related knowledge and awareness and thus change the relevant behavior. It is also known as peer-led health intervention. **Peer Education** is a model that uses certain individuals (Peers) in a population as agents of change to disseminate information and influence group norms in among their peers.

Perceived susceptibility refers to a person's subjective perception of the risk of acquiring an illness or disease and has wide variation in a person's feelings of personal vulnerability to an illness.

Precancerous/premalignant lesions are abnormal changes that occur in tissues in an early stage of cancer development which have the potential to progress to invasive cancer if left untreated. Screening for cervical cancer aims to detect cancer at this stage.

Relative advantage is the degree to which an intervention is perceived as better than the current practice.

Residents of Mt. Elgon: These are people living in Mt. Elgon sub-County in Bungoma County and are of age 45-75 years and above in age. They are deemed to be socialized in a unique way to the circumstances. This in tandem with Kenya National CRC screening guidelines which suggest people should undergo screening when they reach 45-75 years of age and also advise that older people should not consider screening for CRC to be necessary because they are in their sunset years.

Risk perception is one's belief about the likelihood of personal harm. This drives the probability of accepting or not accepting an intervention

Screening- refers to the use of simple tests across a healthy population in order to identify individuals who have ill health but do not yet have symptoms. Screening is an approach that

promotes vigilance for signs and symptoms that may be indicative of early disease to facilitate early detection and treatment

Social congruence-arising from similar roles in the society. Sharing "social congruence" refers to their similar social roles as peers in the society and explains why respondents are likely to feel more at ease with a peer-teachers than with "an outsider" like medical personnel taking the same roles. Memberships to Peer groups is guided by specific group norms (Campbell, 1995). These are the fundamental underpinnings for the Peer Based Interventions.

Survivorship-Survivorship focuses on the health and life of a person with cancer post economic issues of cancer, beyond the diagnosis and treatment phases. This will be important for managing those diagnosed with CRC at advanced stages.

Trialability refers to the availability of opportunities to test the innovation before wide-scale adoption.

Uptake of CRC screening- a cross-sectional assessment of the utilization of CRC screening service and is a critical determining of success for any population-based screening program.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Globally, cancer remains to be among the leading cause of death globally and has been reported to cause 10 million deaths annually. According to Sung et al. (2021), cancer is the second leading cause of non-communicable deaths in Kenya following cardiovascular and infectious diseases. Based on GLOBOCAN 2020 report on cancer in Kenya, new cases were reported to be 42,116, and 27,097 deaths. The five most common cancer cases in Kenya include breast as the leading followed by cervix uteri, prostate, esophageal, and colorectal. In male, prostate, esophageal, colorectal, stomach, and non-Hodgkin lymphoma are the leading causes of death respectively.

Colorectal Cancer (CRC) accounted for 6.5 % of all new cancer cases in both sexes having 8.3% incidences in males and 5.4% in females and also resulted in 8.2% of all cancer deaths (Ferlay *et al*,2020). In age-standardized incidence rates, CRC accounted for 11.9% and 9.7% in males and females respectively and 10.5% incidence and 7.5% mortality rates (GLOBOCAN, 2018). CRC is one of the commonest cancers worldwide and also one of the most curable, particularly, if detected early. The global burden of CRC is expected to increase by 60% to more than 2.2 million new cases and 1.1 million deaths by 2030 (Ferlay et al., 2010).

Mathematical modeling found that screening through colonoscopy is a highly cost-effective strategy to combat CRC in the SSA (Ginsberg *et al*,2012).

CRC is a major global health issue and ranks as the third most common cancer worldwide (Sung H, Ferlay J, Siegel RL, et al, 2020. CRC screening, like many health services, is influenced by individual beliefs, perceptions, and cultural values. For example, certain minority groups may have different attitudes towards cancer, fear invasive procedures or hold cultural taboos about discussing bodily functions. Generic messages are unlikely to resonate with these populations or address their specific concerns.

In this region of Africa, the misconception that Africans rarely developed CRC due to short life expectancy, high fiber diet with low levels of fat has led to very few studies being conducted on indigenous population on most cancers (KEMRI, 2006). Additionally, in the SSA countries, CRC reports on screening uptake and management are gathered from hospital-based studies relying mainly on hospital reviews by clinicians and with histo-

pathological confirmation by pathologists and therefore there is need to embrace population-based studies conducted on indigenous populations (KEMRI, 2006).

Regular colorectal cancer screening can significantly reduce mortality rates by detecting cancer at an early stage or even preventing it altogether through the removal of precancerous polyps. According to the American Cancer Society, screening can decrease colorectal cancer mortality by up to 60-70%. Early detection is associated with higher survival rates. The five-year relative survival rate for localized colorectal cancer is 90%, compared to 14% for distant-stage cancer.

Studies have pointed to several factors that hinder uptake of CRC screening: lack of knowledge about colorectal cancer, its risk factors, and screening methods is a significant barrier to screening uptake (Wong *et al.,* 2018).

Fear of discomfort or pain during screening procedures such as colonoscopy is also a common barrier. This fear can deter individuals from undergoing screening (Jones *et al.,* 2010). Cost is also a significant barrier to colorectal cancer screening uptake, especially for uninsured or underinsured individuals. Studies have shown that lack of insurance coverage is associated with lower rates of CRC screening (Wools et al., 2016).

Limited access to healthcare facilities and screening services, particularly in rural or underserved areas, can hinder CRC screening uptake (James *et al.,* 2012). Cultural beliefs and language barriers can also impact understanding of colorectal cancer and screening recommendations, particularly among immigrant and minority populations. (Christie *et al.,* 2018). Defeatist attitudes toward cancer, as well as denial of personal susceptibility to the disease, can lead to avoidance of screening (Rawl *et al.,* 2005).

By addressing these barriers through targeted interventions and policy initiatives, healthcare providers and public health organizations can improve colorectal cancer awareness and screening rates, ultimately reducing the burden of this disease. Several interventions have been implemented to increase awareness and uptake of CRC screening. These interventions target the various barriers outlined above. They must be anchored on effective application of a curriculum that stresses the importance of CRC screening can therefore improve utilization of CRC screening services.

Some of these interventions include: Education and Outreach Campaigns using Community-based education programs, mass media campaigns, and targeted outreach efforts. (Coronado *et al.,* 2019). Removing financial barriers to screening, has also been used as a strategy to increase awareness and uptake of CRC screening by offering low-cost or free screening tests,

waiving co-pays, and expanding insurance coverage, can increase screening uptake, particularly among uninsured and underinsured populations (Sabatino *et al.*, 2016).

Health Provider education also known as conventional health education has also been used over the years. Health service providers talk to groups or individual clients during clinical encounters regarding the need for uptake of CRC screening services and they provide recommendations. A study by Dougherty et al., 2016) revealed that provider recommendations tend to increase screening uptake but only for the clients who have a certain level of education

Conventional education model lacks the interactive components needed to engage with people on an emotional level. Psychological factors such as fear of the screening process, anxiety about a possible cancer diagnosis, and misconceptions about the invasiveness of procedures like colonoscopy can create significant barriers to participation in CRC screening (Jones RM, Woolf SH, Cunningham TD, et al. 2010)

Health education delivered through brochures, posters, or brief public service messages relies on passive forms of learning, which are less engaging. People are less likely to internalize or act upon information if they are not actively involved in the learning process. In contrast, more interactive and community-based methods, like peer education or workshops, foster greater engagement and allow individuals to ask questions, seek clarification, and discuss concerns in real time (Ruffin MT IV, Gorenflo DW, Woodman B.,2000).

Conventional health education often assumes that once people are aware of the need for screening, they will follow through. However, the complexity of the healthcare system can pose significant challenges to completing the screening process. People may not know how to schedule appointments, find transportation, or access affordable screening services. Conventional education campaigns do not typically provide this hands-on guidance or assist in navigating the system, which results in a gap between awareness and action. Programs that include patient navigation services or peer educators, who help individuals navigate these logistical and system-level barriers, have shown significantly higher screening uptake rates than traditional health education campaigns (Percac-Lima S, Grant RW, Green AR, et al. 2009)Interactive educational models, such as face-to-face conversations, community health outreach, or peer-led group discussions, encourage active participation, which has been shown to result in better retention of information and higher rates of health behavior change. (Jones RM, Woolf SH, Cunningham TD, et al. 2010). These conventional health education

campaigns are often short-term or episodic, with bursts of information disseminated during specific awareness months or campaigns (Kim et.al, 2018)

Conventional health education typically involves generic campaigns, pamphlets, public service announcements, and lectures, which may not take into account the diverse cultural, social, and linguistic backgrounds of target populations (Gupta S, Tong L, Allison J, et al. 2009).

Despite the aforementioned conventional health education awareness and uptake of CRC screening remains low especially in LMICs (GLOBOCAN, 2018). The conventional health education typically involving generic campaigns, pamphlets, public announcements and lectures does not take into account the diverse cultural, social and linguistic backgrounds of target populations and therefore less effective for behavioral change motivation (Gupta et.al, 2009). Health education delivered through brochures, posters, or brief public service messages relies on passive forms of learning, which are less engaging (Ruffin et.al, 2020)

Despite the interventions outlined in the foregoing, awareness about and uptake of colorectal screening services remains low especially in LMICs hence the need for a paradigm shift in the way health education and awareness is created especially among rural populations. It is for this reason that this study aims to explore the effect of Peer Education intervention on increasing awareness and uptake of CRC screening in a rural community of Mt. Elgon in Kenya.

Peer Education has grown in popularity and practice in recent years in the field of health promotion. For instance, in the United States, interest in peer-teaching has also been recognized with a survey in 2010 demonstrating that 76% of the 130 respondent medical schools utilized their medical students in some form of peer-teaching during the medical program (Soriano *et al,* 2010). The success this intervention was attributed to the fact that peer-teachers and their colleagues share a similar knowledge base and experiences, otherwise known as "cognitive congruence", which allows the peer-teachers to use language that their peers understand and to explain concepts at an appropriate level that is context-specific (Yu Tzu-Chieh *et al,* 2011). It is an interactive educational intervention and encourages active participation resulting in higher rates of health behavior change (Kim et.al, 2018).

Peer educators can effectively increase knowledge and awareness about CRC screening because individuals receiving information from peers tend to be more receptive to learning

about screening procedures, the importance of early detection, and the availability of screening options (Mackert et.al, 2020).

Inadequate levels of staffing of healthcare workers in the SSA remains a major drawback to the attainment the of Universal Health Coverage (UHC). This complicates the efforts to increase CRC screening awareness and uptake. This therefore necessitates the utilization of alternative strategies to plug the shortage of healthcare workers. The foregoing therefore led to the investigation of the effectiveness of Peer Education as an effective model of health education for increasing awareness and uptake of CRC screening given that Kenya is among the LMICs.

Peer-based approaches therefore, may be useful in promoting CRC screening amongst peers who hold beliefs of fear or fatalism as alluded to by previous studies which recommended that behavioral changes suggested to groups by peers improved their ways (Campbell, 1995).For this study, Primary school teachers (PSTs) have been chosen due to ability of teachers to comprehend basic health information and their capability to have innovative ways of training their participants in the challenging contexts in the Mt. Elgon sub county.

While the literature on CRC screening in Low- and Medium-Income Countries (LMICs) is growing, there is limited evidence about population –based CRC screening that influence CRC screening uptake in the SSA countries (WHO, 2008).Unlike the traditional health education that seeks to change the views and attitudes of single individuals, peer educational settings promote the accommodation of a range of individual opinions within an evolving group process where individual inputs weave and clash through the dialogue processes between peers as they ask one another questions, exchange anecdotes and comment on one another's experiences and perspectives (Campbell, 2000).

Peer education targets the marginalized as well as the underserved populations unlike the conventional health education efforts that often fail to reach the most at-risk populations, such as the uninsured, the elderly and low-income groups. These groups tend to have lower health literacy, fewer opportunities to receive health information, and greater barriers to accessing healthcare services. The information presented in conventional formats might not be accessible to them due to language barriers, literacy levels, or limited exposure to media where such campaigns are conducted. In contrast, community-based interventions, which employ local peer educators or community health workers, are better positioned to reach these groups, as they often engage directly in settings where high-risk populations live and work (Brouse CH, Basch CE, Wolf RL, Neugut AI, 2003).

Conventional health education efforts are often disseminated through healthcare institutions, which may not always be trusted by marginalized or minority groups (Greiner KA, Born W, Nollen N, et al.2005). Historical discrimination, health system inequities, or negative experiences with medical professionals have fostered distrust in healthcare institutions, particularly among racial and ethnic minorities (Mackert et.al, 2020).. As a result, conventional messages from these sources may not be well received or acted upon, even if the information is accurate and helpful (Kim et.al, 2018).

Effectiveness of Peer Education was associated with increase in the uptake of Sexual Health services and this led to the growing popularity of participatory peer health education as an effective tool for sustainable health behavior change (Campbell, 2000) but has not been tested in accelerating CRC screening services uptake and formed the rationale behind the utilization of the Peer Education intervention in attempting to increase the uptake screening.

Bungoma County is listed among the counties in Kenya that were unable to meet their annual health targets in the year 2015/2016 (World Bank/GOK Health Service Delivery Index Report of 2016). Among the sub counties of Bungoma County, Mt. Elgon Sub-County has the poorest health infrastructure and health indicators coupled with low literacy levels, poor health seeking behaviour and strong cultural inclinations (Bungoma CIDP 2013-2017)

A study by Parker et.al, (2019) done at Tenwek hospital, Kenya on CRC screening uptake among asymptomatic patients visiting the hospital recommended the need for similar studies to focus at community level to test viable interventions for improving screening awareness and uptake. Therefore, this community-based study explored the effectiveness of a Peer Education intervention on improving awareness and uptake of CRC screening in a rural community of Mt. Elgon Sub County, in Kenya.

1.2 Statement of the Problem

Colorectal cancer (CRC) is a growing public health concern in low- and middle-income countries (LMICs) such as Kenya, where the incidence and mortality rates are on the rise. Despite the availability of screening methods proven to reduce CRC-related mortality through early detection, awareness and uptake of colorectal cancer screening services remain critically low. This is particularly concerning given the potential for early intervention to significantly reduce the burden of the disease. Various factors, including limited knowledge about CRC, lack of access to screening facilities, cultural beliefs, and healthcare infrastructure challenges, contribute to the low screening rates.

When diagnosed late, the outcomes of prognosis are high morbidity and mortality rates. Besides deaths and disabilities, CRC poses enormous social and economic burdens to the national economies since they affect the working populations.

Despite intense conventional health education and community sensitization efforts on health seeking behavior, Bungoma County and all its Sub-counties, Mt. Elgon Sub- County included, is listed among the counties in Kenya that were unable to meet their annual health targets in the year 2015/2016 according to a World Bank Report of 2016. Key health outcome indicators have remained poor in comparison to the national averages. These include Maternal Mortality Ratio at 382 per 100,000 live births, Infant Mortality rate at 39 per 1000 live births against the national average of 32 children per 1000 live births, Child Mortality rate at 55 per 1000 live births against national average of 41 per 1000 live births among others.

In addition, treating advanced CRC is very challenging and that is why the study proposes to increase the uptake of screening services in symptomatic populations and also in asymptomatic high- risk populations to help in early detection (NCSG, 2018).

Low screening and late treatment contributed to more than 85% of CRC deaths in low and middle-income countries with death rates varying from country to country and this may be linked due to inadequate access and utilization of screening services for prevention and early detection of the disease. Holle and Pharm (2017) in the research findings also suggested that patients should be screened for CRC to detect precancerous lesions and their subsequent early removal.

Data at Bungoma County Referral hospital shows that there is a 18% increase in CRC incidences in the County. Additionally, of the 12 new CRC cases that were registered at the Bungoma County referral hospital in the past one year, 6 (50%) died. This depicts a likelihood that 50% were diagnosed in late stages when the CRC cells had already metastasized. Although the awareness and uptake of CRC, which was also a targeted indicator during conventional health education was not known at the time of the study, it can be implied that the CRC screening awareness and uptake were also low despite the conventional health education intervention which includes health visits, organized outreaches and medical camps. No research had been done to determine the awareness and uptake of CRC screening in Bungoma County and specifically Mt. Elgon Sub County.

Persistent poor health seeking and practice indicators despite conventional health education and lack of research evidence on awareness and uptake that this study set out to explore the effectiveness of a Peer-led health education intervention on awareness and uptake of CRC screening services among residents of Mt. Elgon Sub County. This study therefore provides a paradigm shift in the way health education is implemented especially in rural communities.

1.3 Objectives of the Study

1.3.1 Broad Objective

To evaluate the effectiveness of Peer Education on increasing awareness and uptake of CRC screening among residents of Mt. Elgon Sub County in Bungoma County, Kenya

1.3.2 Specific Objectives

i. To establish the awareness of CRC screening and the associated factors before and after Peer Education intervention amongst residents of Mt. Elgon Sub County

ii. To determine the uptake of CRC screening and the associated factors before and after Peer Education intervention among residents of Mt. Elgon Sub-County

iii. To establish trends in uptake of screening and awareness amongst residents of Mt. Elgon Sub County during the Peer Education intervention

iv. To examine the effectiveness of the Peer Education intervention in increasing awareness and uptake of CRC screening amongst residents of Mt. Elgon Sub County

1.3.3 Research Questions

i. What is the awareness of CRC screening and the associated factors before and after Peer Education intervention amongst residents of Mt. Elgon Sub County?

ii. What is the uptake of CRC screening and the associated factors before and after Peer Education intervention among residents of Mt. Elgon Sub-County?

iii. What are the trends in uptake of screening and awareness amongst residents of Mt. Elgon Sub County during the Peer Education intervention?

1.3.4 Null Hypothesis

H_{02}: Peer Education Intervention has no effect on awareness and uptake of CRC screening amongst Mt. Elgon Sub County residents

1.4 Justification

Despite the increasing incidences and mortality arising from CRC, empirical population-based studies have not been conducted in Kenya to determine the awareness and uptake levels of CRC screening services among rural populations. Most of the studies done on CRC screening were carried out in national referral hospitals in the cities hence minimal research data in sub-county and community hospitals. Additionally, conventional health education interventions have failed to positively improve health seeking practices especially of rural populations, yet no novel or innovative health education interventions have been tried out (NGCMK, 2013).

In Kenya, promotion of CRC screening is done among symptomatic patients visiting health facilities. This study shall provide a paradigm shift the by proposing the use of Peer Education model in acceleration of CRC screening among men aged 45-75 years who are at higher risk for CRC in the context of a rural Kenyan setting. The use of this model to inform behaviour change among this group is novel for a demographic that is difficult to reach with health information in these settings.

This study shifts attention for CRC awareness and screening uptake from health care facilities for information to the populations using Peer Educators.

Identifying behaviors, understanding barriers and opportunities and developing interventions all require understanding context specific values, needs, and norms to change knowledge, attitudes, beliefs and practices**.** Therefore, this study was timely because it was done at a time when Kenya was grappling with measures to curb the increasing numbers of adults with CRC. Community-specific data on effectiveness of the Peer Education are crucial in the institution of sustainable and scalable interventions

However, this type of study can gather data directly from individuals in a non-clinical setting, offering insights into the practical obstacles they face, and guiding the development of strategies to overcome them (Jones RM, Devers KJ, Kuzel AJ and Woolf SH,2010)

The study is unique because it tested a Peer–led health education intervention targeting peers belonging to a demographic that is hard-to-reach with health information at community level by capitalizing on the sense of trust and belonging to ensure effective delivery of health messages (Lansdorp-Vogelaar I, Knudsen AB, Brenner H,2010). This is opposed to

conventional health education where health service providers are viewed as the sole custodians of knowledge. A well-conducted community study provides robust data for local or national health authorities to create evidence-based policies (Israel BA, Schulz AJ, Parker EA, Becker AB,1998).

By identifying gaps in awareness and access to screening, this research can lead to the development of more effective public health campaigns, mobile screening units or subsidies to support underprivileged groups (Levin TR, Corley DA, Jensen CD, et al,2017).

Globally, findings of this study will inform the body of knowledge on Colorectal Cancer with emphasis on prevention as well as screening for early diagnosis and treatment. Kenya has classified CRC screening into three categories: those that target populations, those that target providers, and those targeting health systems (Myers *et al*, 2007). However, no studies have been done to test effectiveness of different health education interventions especially targeting populations in the rural areas.

1.5 Significance of the study

These findings highlight the gaps in the prevention and control of CRC while taking into account the cultural factors. These great insights in the subject of awareness and uptake of CRC from asymptomatic participants from the residents of Mt. Elgon Sub County will be used for making decisions on frameworks that reflect the Counties and Sub Counties burden of CRC in light of our healthcare systems. The findings of this study will therefore inform CRC Screening awareness and uptake policy and programming especially for rural populations.

This study was part of the pioneer researches into this subject area locally. This study has led to a clearer understanding of the CRC screening uptake and awareness of CRC from a Sub County perspective. The study will be imperative in directing interventions aimed at reducing the CRC burden through the acceleration of uptake of CRC screening using strategies tailored specifically to meet the unique socio-cultural factors of Mt. Elgon sub county

Findings of this study can inform the body of knowledge on models for accelerated CRC screening uptake for early detection. At County and Sub- County levels the findings can be used to inform novel programming approaches aimed at increasing awareness and uptake of CRC screening for early diagnosis and better prognosis. The study therefore provides empirical evidence for CRC screening policy reviews by players globally, regionally and nationally.

These findings may also inform CRC screening policy reviews regionally and nationally in provision of evidence for mainstreaming Peer Education as a viable health education model in the planning and setting up programs in CRC management especially in the strategic areas of screening in alignment to Sustainable Development Goals (SDG) Three which inspires to ensure health and well-being for all. These findings can also help in building up the county CRC registry as a step towards the development of national CRC registry and can be used by local cancer bodies, academicians and medics for policy revision and development.

The study contributes to the empirical literature on CRC screening in Bungoma county by highlighting the current awareness and uptake levels of CRC and also by emphasizing the role of Peer Educators in increasing the uptake of the service by overcoming the barriers through peer education. The study's contribution to epidemiology will be critical to management of Non-Communicable Diseases (NCDs) and specifically CRC which is increasingly becoming a NCD of global concern yet uptake of screening services for early diagnosis and treatment remains low and to obtain data.

1.6 Study limitations

These are the characteristics of design or methodology which may impact or influence the interpretation of the findings from this research. The limitations and the mitigations are described below:

i.The health infrastructure was poorly developed with FOBT as the only available screening method at the nearest level four facility (Bungoma County Referral Hospital). The participants were advised appropriately to seek this service at the facility

ii.Some respondents had limited level of education. This deficient educational background might have negatively impacted on the learning ability and health literacy of these participants. The data collection tools were translated to Kiswahili for ease of understanding (Appendix XI)

iii. The geographical topology of the area of the study to an extent limited the accessibility to some parts of the study area.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews both theoretical and empirical literature relevant to the research study in order to identify gaps emanating from the previous related studies to be filled by the current study. It critically examines the existing body of knowledge related to the study area. The chapter is divided into sections as follows: The Epidemiology of CRC, Awareness of CRC Screening and the influencing factors; Uptake of CRC screening and the influencing factors; Trends in awareness and uptake of CRC screening; Peer-led Health Education; Theoretical Model of Peer Education; The Peer Education Spiral; The tenets of Peer Education; Theoretical Framework of the Study including the underpinning theories of the Health Belief Model and Theory of Diffusion of innovations, the theoretical and the conceptual framework of the study which is also illustrated and discussed.

2.2 The Epidemiology of CRC

CRC is a cancer of the large intestines (colon) and the lower part of the digestive system (rectum) as shown in Figure 2.1. Together the condition is referred to as colorectal cancers (CRC) (KNCCS, 2017-2022). CRC results from a multi-factorial etiology comprising interplays between genetic and environmental factors that cascade of genotypic and phenotypic changes that result in the formation of malignant tumors (Oluwasola *et al*, 2005). CRC develops through a gradual accumulation of genetic and epigenetic changes leading to the transformation of normal colonic mucosa into invasive cancer.

In most cases, the progression of CRC is slow growing which accommodates a window of opportunity for detection of both early cancer and precursor lesions (Schreuders EH, *et al*, 2015). Although the mean age of CRC diagnosis is around 50 years, recent patterns of incidence and mortality from CRC have shown that in some cases CRC present before age 50 (Ward *et al*, 2008). Many people with CRC experience no symptoms in the early stages of the disease and when symptoms appear, they vary depending on the size of the cancer and location in the large intestine. CRC is highly preventable with the use CRC screening tools and when found in early stages, it can easily be treated.

The approach involves detecting CRC at a treatable and an earlier stage hence derailing CRC fatality. Majority of CRCs arise from polyps and the two classes of precancerous lesions that predispose to CRC are conventional adenomas and serrated polyps and the known risk factors

include personal history of colon or other cancer, tobacco, Inflammatory bowel diseases, family history of ovarian, endometrial, breast cancer, Familial Adenomatous polyposis (FAP) and hereditary non-polyposis CRC (Scanlon and Sanders,2014).

Approximately 75% of CRC cases occur sporadically in the average risk population while 25% are associated with high risk factors. Social-environmental factors including dietary intake of fat, obesity and low fiber intake have been associated with elevated possibilities of CRC development (Winawer *et al* 1997, World Cancer Research Fund, 2011 p.6). Symptomatic disease can be diagnosed using history, physical examination, double contrast barium enema, and colonoscopy.

It is advisable that biopsy for histopathology should be taken during endoscopy. The symptoms are relatively non-specific and may mimic other conditions such as gastro-intestinal infections and other inflammatory conditions. Therefore, a high index of suspicion is required for effective early detection (NGCMK, 2013). Modifiable factors associated with increased risk of CRC are obesity, physical inactivity, a diet high in red or processed meat, heavy alcohol consumption, and smoking (ACS, 2011).

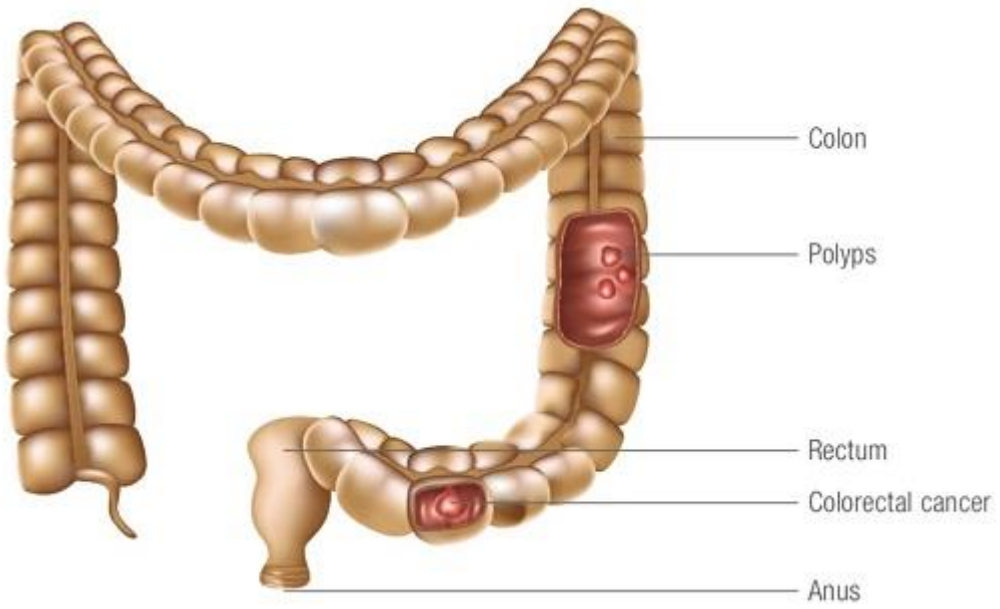

Figure 2.1 Anatomy of the Colon and rectum depicting polyps (Source: ACS, 2011).

2.3 Awareness of CRC Screening and associated factors

Findings from a prospective study carried out in Spain posited that awareness of risk factors (OR 2.32, 95% CI (1.49–3.61) and CRC signs or symptoms (OR 1.65, 95% CI (1.03–2.64) were independent predictors for intention to participate in CRC screening (Gimeno-Garcia *et*

al,2009). Further findings from another study in the USA revealed that programs that provided instruction on CRC prevention and screening through flyer distribution, newspaper advertisements, radio advertisements and publicly display of posters improved compliance (M Crookes *et al*,2014).

A US study on factors influencing uptake of CRC screening services, it was revealed that awareness of CRC screening services was associated with having ever used either CRC procedures (OR 6.46, CI 95% (4.28–9.74)) or up-to-date screening (OR 7.23, CI 95% (4.36–11.98) (Baxter NN, *et al,* 2012). Another Irish study reported that lack of awareness about CRC services and negative attitudes is closely associated with unwillingness to participate in CRC screening (Mc Cattery *et al*,2003).

In other studies, increasing the patient's awareness using advanced visual media through local campaigns was found to be associated with higher acceptance rates for screening colonoscopies (Albrecht *et al*., 2016).Another study on African American women reported that women identifying themselves as moderately susceptible were more likely to adhere to screening than women in the high susceptibility group or those who did not know their susceptibility (Lisa *et al*,2015).

Other related research works have suggested that high rates of screening uptake can be achieved by modifying the phases of the behavior process by increasing the knowledge about the important features of CRC and by reducing the barriers while amplifying the perceived benefits of undergoing screening with the outcome of such interventions being to increase possibilities of scheduling appointments for CRC screening (Champion, 2008).

The lack of awareness on CRC and screening has been suggested as barrier to screening adherence especially in areas with opportunistic screening than in those with well-organized programs (ACS, 2011). Several factors influencing CRC screening have been reported including the lack of awareness, inadequate access to healthcare facility due to poor infrastructure, unawareness among the health care providers in rural areas regarding importance of early diagnosis and treatment screening (Mc Cattery *et al*,2003. Some of the reasons for not participating in CRC screening have pointed to low self-perceived risk, dislike of the test, low confidence, and lack of social support (NGMCK, 2013).

Awareness of CRC symptoms, risk factors and screening contribute to a higher chance of participation in CRC screening. In this regard, participants with a middle level of knowledge of CRC symptoms were more likely to have CRC screening (OR = 3.33) while those with a

high level of knowledge of CRC risk factors (OR = 2.61) were more likely to undertake CRC screening as was found in a Hong Kong study (Choi *et al*,2014).

The concept of risk perception is one's belief about the likelihood of personal harm and is based on individual beliefs about disease risk and severity as outlined in the HBM (Rosenstock *et al*.1988). High-risk perception of developing CRC has been frequently associated with higher screening participation rates (Wardle *et al*,2000). In a study carried out in a large representative sample of UK, participants who answered that their risk was higher than average-risk population were more willing to participate in CRC screening (98%) than those who answered same risk at 84% or lower risk at 74% (Robb *et al*,2004).

On the same breadth but for a Nigerian study on the uptake of prostate cancer screening services, the findings alluded to the fact that cancer screening services uptake is relatively lower among African men and is associated with low awareness and knowledge levels on the disease (Oladimeji *et al.,* 2010). Studies have also shown that cultural norms of secrecy that bar individuals from discussing issues of CRC leads to low gain in awareness about the importance of CRC screening (Robb *et al*,2004).

In a European study carried out in 953 average-risk participants, the ever use of CRC screening being up-to-date screening was more than four times higher among participants with high education level (Champion,2008). As a result, increasing knowledge among them regarding CRC screening and prevention is likely to promote informed decision on screening (Yu Tzu-Chieh *et al,* 2011). Knowledge among communities regarding CRC and its screening services is important and therefore populations should have current and accurate knowledge about CRC to promote informed decisions about CRC screening.

On awareness, the World Health Organization, report in 2018 states that between 30 and 50% of CRC cases are preventable in which case, behavior plays a major part. Prevention of CRC, especially when integrated with the prevention of other related chronic diseases and programs within healthcare such as sexual and reproductive health, offered the greatest public health potential and the most cost-effective long-term method of cancer control (World Health Organization, 2017). The reduction of the predisposing risk factors through responsible behaviors has a net effect of significantly reducing the possible CRC cases among the populations (Omolo B, Oluchina B, Kaggia S B,2021).

At the present time, other than Tenwek Hospital (a surgery and endoscopy referral facility in southwestern Kenya) studies, there is scarcity of documented information on the level of

awareness of CRC in Kenya (NCCS 2023-2028). There is scarcity of information on CRC screening services uptake in Kenya and therefore this study aims to produce population-based CRC screening uptake data from a Rural-Kenya perspective to guide the sensitization mechanisms that will accelerate CRC screening services uptake as the study gap.

In Kenyan health facilities, only symptomatic patients are screened for CRC in Kenya and therefore this study has provided a shift the paradigm to the screening of asymptomatic persons amongst the populations. This calls for the need to intervene beyond provision of guidelines and advocate for uptake of screening services for early detection must be underscored. The study therefore aimed at providing new knowledge to Epidemiology on the effectiveness of a context-appropriate Peer Health Education Intervention on awareness and practice of screening for CRC by instituting behavioral change amongst communities of Mt. Elgon Sub County in Bungoma County.

Establishing CRC screening awareness is a critical factor for ensuring that the participants have a clear understanding which is necessary for adopting behavior change to accelerate screening uptake. Given that positive relationships have been documented between screening uptake and awareness CRC screening in other jurisdictions, this study assessed the effectiveness of the Peer Education as an intervention for increasing the awareness and uptake of CRC screening. There is need to first determine awareness levels of CRC in the rural populations of Kenya. However, no studies that have empirically examined the levels of CRC screening awareness in Mt. Elgon Sub County and this therefore necessitated this study.

2.4 Uptake of CRC screening and associated factors

Adherence to CRC screening remains low in most developed countries, ranging from 19% in Croatia and the Czech Republic to 69% in the Basque region of Spain (Portillo I, *et al*. 2017) Screening helps in detection and removal of pre-cancerous lesions which prevent or delay the occurrence of CRC since detection of early-stage disease allows early therapeutic intervention/treatment with good clinical outcomes and require compliance to the procedure as well as the ability to complete a successful colonoscopy preparation (KNCSG, 2018).

Studies have revealed that early age detection or CRC screening is vital in curtailing the proliferation of cancerous cells. The aim of CRC screening is therefore to detect the precancerous lesions and early cancer lesions. Currently, CRC screening is done opportunistically either based on the Health Care Worker (HCW) recommendation or

patient's request. In most occasions, the primary care physicians face challenges in the provision patient education within the constraint of busy clinical settings.

In the developing countries, inadequate access to effective screening for CRC often contributes to the high morbidity and mortality caused by the disease with the largest burden falling mostly on underserved populations in remote areas, where health care access is characterized by transport challenges, ill equipped health facilities, and lack of information access (WHO,2008). Since CRC is highly preventable with the use CRC screening tools and when found in early stages, it can easily be treated (Myers *et al*,2007).

In the United States of America (USA), studies revealed that 90% of CRC incidence and 60% of deaths can be prevented through screenings (James *et al,* 2003). Despite this, other researchers report that 38% of adults aged 50 years and older have never had sigmoidoscopy or colonoscopy and 79% have never had a FOBT (Smith *et al*,2007). In general, urban area of residence has been associated with higher rates of screening uptake in US studies (James *et al,* 2003). Contradictory results have been reported by a Swedish study which found higher CRC screening uptake in rural areas (Blom J *et al,*2008) than in the urban areas.

The screening process involves risk stratification approach where low risk patients begin with FOBT then guided screening while in high-risk patients, colonoscopy is advisable. It is recommended that persons at average risk comprising asymptomatic healthy individuals without family history should begin screening for colorectal cancer at age 45 years in Kenya (Rex *et al*, 2009).

Socioeconomic, cultural, and educational disparities affect awareness and uptake of CRCS. Community-based studies allow researchers to identify specific demographic groups (e.g., based on race, income, education, or geography) with lower screening rates. These findings can inform targeted awareness campaigns, public health policies, and resource allocation to reduce disparities (Wools A, Dapper EA, de Leeuw JR., 2016).

The CRC burden in developing countries has been amplified by the increased growth in population and aging, entrenchment of modifiable risk factors such as physical inactivity, unhealthy diets, unhealthy reproductive behaviors, increased consumption of alcohol and cigarettes smoking and more exposures to infectious agents. The increasing burden can be attributed to late presentation for screening and diagnosis thus the advanced stage of colorectal cancer presentation associated with poor survival outcomes (NGMCK, 2013).

European Commission (EC) considered a minimum CRC screening uptake of 45% in average-risk population as an acceptable goal and 65% as a desirable rate (Moss et al,2010). On the other hand, for the American Cancer Society (ACS), the desirable goal is 75% of the average-risk population (Gimeno-Garcia et al,2009).

Compliance to screening and accuracy of the screening tests are the two major determinants of the effectiveness of a screening program (Hewitson *et al*, 2008). Currently there is limited information available on the level of CRC screening uptake in Kenya which is the essence of this study. In the SSA studies documenting the uptake levels of CRC screening are limited (Ferlay *et al*, 2013). It is also worth noting that very minimal data exists on the uptake of CRC screening in Kenya (KNCCS,2011-2016). However, the uptake of CRC screening services amongst adults in the SSA remains low.

2.5 Trends in CRC screening services uptake and Awareness

Colorectal cancer is one of the most common cancers worldwide and its incidence is reported to be increasing in resource limited countries probably due to acquisition of western lifestyles (Chalya et al., 2013). This trend is consistent with Saidi et al.,2008 who reported that despite a 2.7-fold increase in the CRC incidences between 1993 and 2005 in Nairobi, the capital of Kenya the uptake of the screening services remains dismal.

According to the patterns and trends observed in CRC incidence and mortality, most of this increase will occur in the less developed regions of the world at 62% (Arnold *et al.*, 2017). It is worth noting that these regions are ill equipped to deal with the rapidly increasing demand for CRC screening and treatment. Concerted efforts to control CRC are therefore of great importance globally (GLOBOCAN, 2018).

Previous studies have shown that CRC incidence and mortality are decreasing in some HIC while at the same time, the rates LMIC are on the rise and yet the uptake of CRC screening still remains dismal (WHO, 2017). It is worth noting that CRC incidences increase with advances age and with an inflexion point around age fifty years with recent trends demonstrating an increasing incidence of CRC in people younger than fifty years in the USA (Siegel RL, *et al*, 2020).

In the US guidelines have recommended starting CRC screening at age 45 years for all men and women at average risk (Singh H, *et al* 2010. In the developed countries, routine screening for CRC has led to early detection and management of the disease but the status of CRC

screening in developing countries particularly in Africa has remained low leading to reduced detection rates, poor management and increased mortality from the disease (WHO, 2008).

In the last 20 years, screening for CRC has undergone a paradigm shift with the recognition of its prevention potential. It is progressing from parochial *ad hoc* opportunistic activities led by clinical champions to a structured, organized public health priority tailored to specific health-care environments in population-based settings (Graem,2009). The recent past has also witnessed a dramatic shift from information–based health education towards participatory approaches in recognition of health as a socially negotiated phenomenon strongly influenced by group based social identities especially peer identities (Katsidzira *et al*, 2017). The emerging strategy entails provision of an effective evidence-based CRC test in an organized, high quality, tightly monitored, structured program directed at an informed and responsive population (WHO,2008).

Studies conducted in the implementation of interventions in real-life settings such as the Scottish CRC screening program reported that CRC screening uptake has steadily increased over the period of intervention (Quyn *et al,*2018). In Africa the population is projected to increase by 50% between 2010 and 2030 and of more significance is that fact that the projection for increase for age 60 and above is 90% yet this is the most vulnerable age for CRC (GLOBOCAN, 2018).

A community-based approach allows for a deep understanding of local barriers, including lack of knowledge, fear of diagnosis, limited access to healthcare services and misconceptions about screening. Identifying factors that hinder or promote screening uptake through a community study is key to designing cost-effective public health interventions. Given that colorectal cancer is preventable and treatable when detected early, increasing screening rates leads to long-term savings in healthcare costs by reducing the need for expensive treatments for advanced disease (Lansdorp-Vogelaar I, Knudsen AB, Brenner H, 2010)

In the recent past studies have reported that multifaceted interventions combining multiple strategies such as patient education, provider reminders, and system-level changes have been effective in increasing CRC screening rates (Sabatino *et al.* 2012). Patient navigation programs involving trained personnel guiding individuals through the CRC screening process, addressing barriers, providing education and facilitating access to screening have been shown to improve screening adherence, particularly among underserved populations (Natale-Pereira *et al.* 2008).

Implementation of organized, population-based CRC screening programs employing centralized invitation systems, reminders and follow-up procedures to reach eligible individuals and promote participation has been effective in increasing screening rates at the population level (Schreuders *et al*. 2015).From previous situation analysis of CRC in Kenya 2011(PB, 2011), the major policy concern is that the Government of Kenya (MOPHS) has not designated programs or budget lines for addressing CRC among other non-communicable diseases that are silent killers.

Addressing structural barriers such as lack of insurance coverage, out-of-pocket costs, transportation issues, and limited access to screening facilities can help improve screening rates, particularly among vulnerable populations (ACS, 2011). Policy changes, insurance coverage expansions, and community-based initiatives can help reduce these barriers and promote equitable access to screening services (Subramanian *et al.* 2019). The foregoing therefore underscores the need for an investigation on the trends of awareness and uptake of CRC screening uptake amongst the local populations to bring out the contextual position in Kenya especially Mt. Elgon Sub County for provision of empirical evidence.

2.6 Peer-led Health Education (Peer Education)

Peer Education also known as Peer-led health education or Peer health promotion involves the training and utilization of peers (individuals who share similar characteristics, backgrounds, or experiences) to deliver health education and promote healthy behaviours within their own communities or social networks (Milburn K,1995). Peer education is a model where trained individuals from the same community or demographic group deliver health information and encourage behavior change among their peers. This approach is particularly effective in overcoming barriers related to trust, communication, and access that often hinder CRCS uptake.

In peer-led health education programs, peers serve as educators, role models and sources of support for their peers sharing information, skills and resources to empower others to make informed choices about their health. This concept is underpinned on the Diffusion of Innovation Behavioral Theory (Rogers E.M, 2003)

Peer education interventions have increasingly gained recognition as effective strategies to promote health behaviors, including colorectal cancer screening (CRCS) Larkey et al. (2012). A study by Vernon SW, Meissner H, Klabunde C, Rimer BK, 2014 also reported that peer educators successfully facilitated group discussions, provided follow-up reminders and

assisted with navigating the healthcare system thus addressing practical barriers such as scheduling and transportation

Peer education was also reported as able to overcome mistrust associated with the healthcare system, especially among minority and underserved groups (Levin TR, Corley DA, Jensen CD, et al.2018). Many populations, particularly racial and ethnic minorities, have historically been underserved by or discriminated against by healthcare providers, leading to a lack of trust in medical recommendations, including CRCS. Peer educators, who are seen as insiders, can act as trustworthy sources of information and alleviate fears related to healthcare exploitation or mistreatment.

Peer educators can effectively increase knowledge and awareness about colorectal cancer screening Robinson et al. (2016). Studies have shown that individuals receiving information from peers tend to be more receptive to learning about screening procedures, the importance of early detection, and the availability of screening options like fecal occult blood tests (FOBT), colonoscopy, or sigmoidoscopy. Peer educators can bridge the knowledge gap by simplifying complex medical information and delivering it in culturally relevant ways (Mackert M, Donovan EE, Bernhardt JM, et al,2020).

Peer-led health education has been successfully implemented in various settings including schools, workplaces, community organizations and healthcare settings to address a wide range of health issues such as HIV/AIDS prevention, sexual health education, substance abuse prevention, chronic disease management and healthy lifestyle promotion (Minkler & Wallerstein Eds, 2011). Overall, peer-led health education harnesses the power of peer influence and social networks to promote health and wellness with the potential to reach and positively impact diverse populations (Medley et *al* (2019). The Peer -led Education has been discussed under four thematic areas namely: *The Peer Education Model, the Peer Education Spiral, the tenets of Peer Education and the mechanism of Peer Education.*

2.6.1. The Peer Education Model

Peer education is a model where trained individuals from the same community or demographic group deliver health information and encourage behavior change among their peers. This approach is particularly effective in overcoming barriers related to trust, communication, and access that often hinder CRCS uptake. Figure 2.2 below depicts the peer education model, the intervention that was tested for effectiveness in increasing awareness and uptake of colorectal cancer screening.

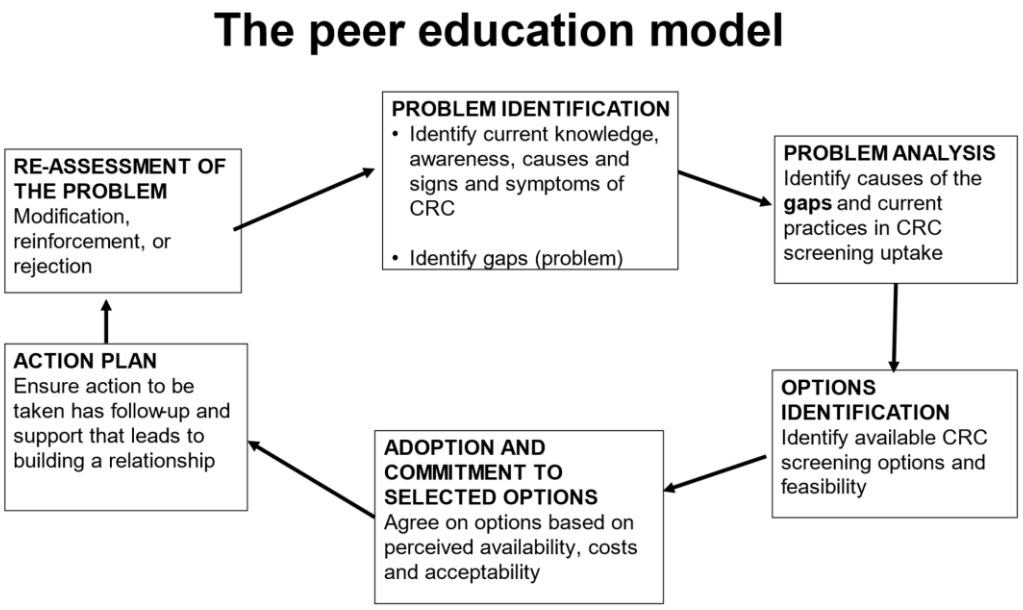

Figure 2.2: Peer Education Model

The Peer Education Model cycle is composed of distinct phases that are step by step progression as follows:

Step 1: Problem identification

The initial step was to identify the performance problems and gaps concerning awareness and uptake of CRC then work towards provision of solutions based on the assessment and the target audience. It established that the training was necessary and planned on relevant competencies and how each one was to be achieved (Hicks, 2006).

Step 2: Problem analysis

A Training Needs Assessment concept was developed outlining the background, rationale, objectives, scope, limitations, stakeholders/target group, methodology outputs including baseline data instruments and expected outcomes. The concept precisely defined the scope along with the target group in order to remain accurate to the intended objectives of the assessment. This stage helped in identifying the gaps and current practices in CRC screening awareness and uptake.

Step 3: Options identification

This step was followed by epidemiological diagnosis of the community where the CRC-related health issues that could have bearings on the outcomes of the study were unpacked and judiciously incorporated into the document to allow a smooth running of the study. This step culminated in the identification of available CRC screening options and feasibility

Step 4: Adoption and commitment to selected options

Agree on options based on perceived availability, costs and acceptability. Assessments was done via survey and interview methods or informal by probing some queries to the persons involved

Step 5: Action plan

Ensure action to be taken has follow-up and support that leads to building a relationship. Peer Education increases the quantity and immediacy of feedback to the learner. Explicit reinforcement might stem from the partnership through verbal and/or non-verbal praise, social acknowledgement and status, official accreditation or even more tangible reward

Step 6: Re-assessment of the problem

CRC screening services or any other related pertinent issues were identified in the reassessment and incorporated into the intervention under modification, reinforcement or rejection. As this occurs, both the Peer Educators and participants give feedback to one another both implicitly and or explicitly. Implicit feedback is likely to have already occurred spontaneously in the earlier stages. However, reinforcement which is indiscriminate or predominantly for effort risks over-weighting the significance of the reinforced concept in the network of understandings of the learner. As the learning relationship develops, the Peer Educators and the participants become increasingly more consciously aware of what is happening in their learning interaction and become more able to monitor and regulate the effectiveness of their own learning strategies in different contexts.

2.6.2. The Peer Education Spiral (Practical Guidelines)

Figure 2.3 below illustrates a spiral description of the practical guidelines that were used in training of peer educators and application of the knowledge and competencies to facilitate an organized approach to increasing CRC screening and uptake among the participants. This is followed by a description of each step.

The significance of depicting this figure as a spiral instead of a cycle is pegged on the fact that consecutive cycles take place in a different situation and are not repetitions of the same thing. Every time the process is repeated CRC awareness and uptake are changed and implementation is at a higher level of surrounding. The upward growth of the spiral depicts the gradual progress of the community towards increased awareness and uptake of CRC screening.

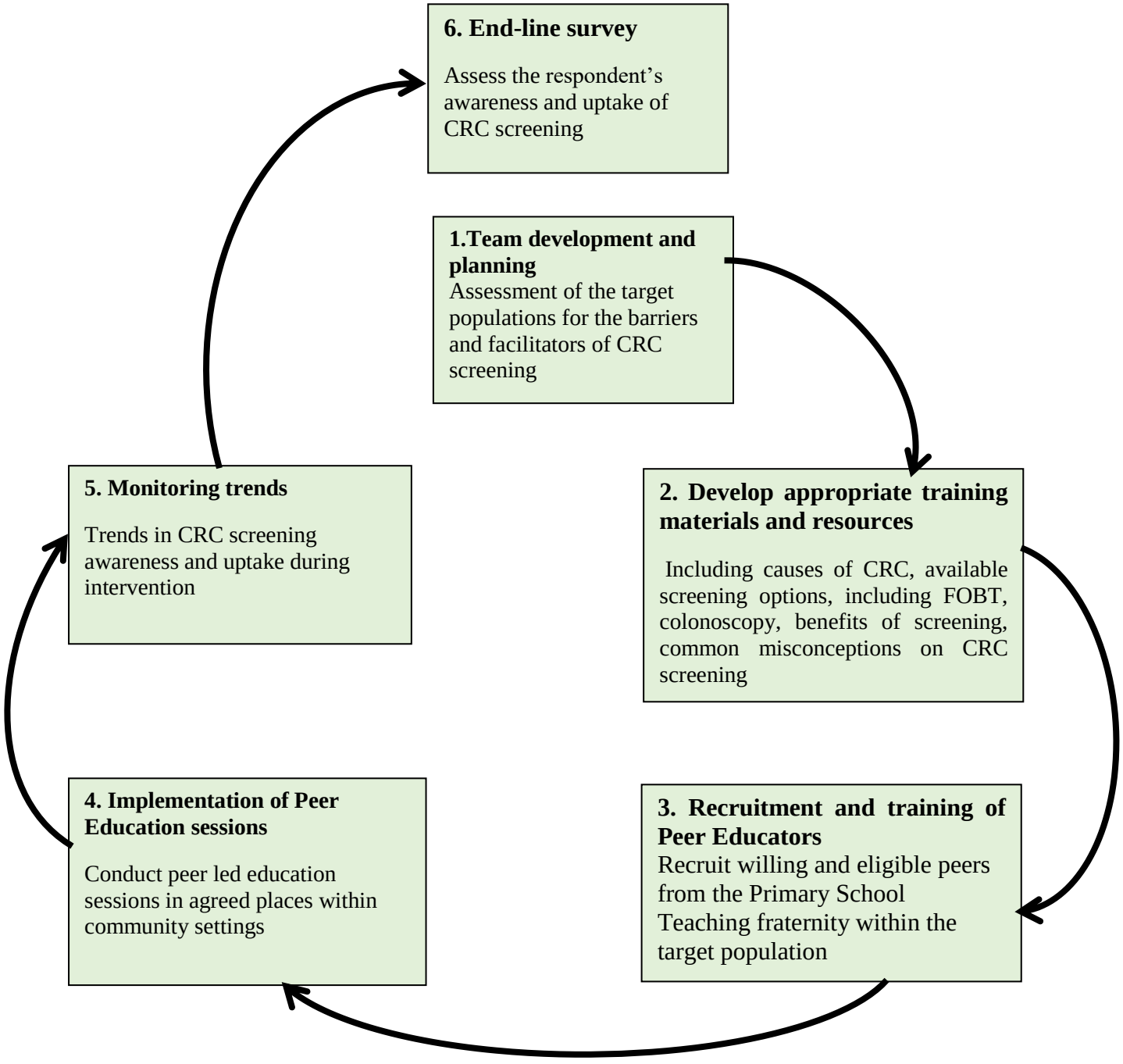

Figure 2.3 The Peer Education Spiral

Source: Sabatino *et al* 2012; Walsh *et al* 2016; Shokar *et al* 2011; Rawl *et al* 2012

1) **Planning and Preparation /Baseline and needs Assessment**

This was achieved through constitution of the research team. This included the recruitment and training of research assistants. Thereafter, conducting quantitative baseline survey, key informant interviews and focus group discussions to assess knowledge, attitudes, and barriers to awareness and uptake of CRC screening within the target population (Residents of Mt. Elgon Sub County).

2) **Development of appropriate training materials and resources**

Appropriate educational materials and resources were developed on CRC, screening options, and the importance of early detection.

3) **Recruitment and Training of Peer Educators**

Some 50 volunteer Peer Educators were enrolled from the Primary schools teaching (PSTs) population. The Peer Educators were purposively selected based on desired characteristics including being age 45 years and above and having the flexibility to allow availability for the entire study duration and were contracted for the study using a pre-designed contract form ((Appendix X). The selected teachers were given 3-day long training by the Oncology Nurse (the In-charge of the Cancer Clinic in BCRH) on definition, symptoms, prevention, screening, treatment and healthy living with CRC as stated in the Peer Education Intervention Curriculum (Appendix III). After the training they were issued with Peer Educators tool kit containing key health messages on awareness and CRC screening. These activities were carried out in strict adherence to covid-19 protocols (Appendix IX)

4) **Implementation of the intervention sessions**

Peer-led education sessions were conducted in community settings, workplaces and other venues that were selected by the Peer educators in concurrence with the participants. Interactive methods such as group discussions, role plays and visual aids were used to engage participants. Information was provided about available screening options, including FOBT, fecal immunochemical testing (FIT), colonoscopy, and stool DNA testing. Common misconceptions and concerns about screening procedures were addressed and fears allayed.

5) **Periodic monitoring of changes in CRC screening awareness and uptake**

Change was monitored during the 10^{th}, 20^{th} and 30^{th} week of the intervention. The impact of the peer-led education program was evaluated on awareness and uptake of CRC screening among participants. Feedback was also collected from participants to help identify areas for

improvement. They also monitored the participations in the trainings using the attendance registers (XVIII). The research team also monitored the content coverage during the trainings. Monthly meetings were held by the research team and the Peer Educators at the Marambachi Social Hall, Cheptais town to share reports on the activities of and the outcomes

6) **End-line survey**

Assessment of the respondent's awareness and uptake of CRC screening after the intervention (30^{th} week of the intervention

2.6.3. The tenets of Peer Education

Peer-led health education is guided by several tenets that underpin its effectiveness in promoting health behaviour change and empowering communities These tenets serve as guiding principles for the design, implementation, and evaluation of peer-led health education programs, contributing to their effectiveness in promoting health behaviour change and empowering communities to improve their health outcomes. The Peer Education intervention curriculum that was developed for this study was anchored on these tenets.

i) *Credibility and Relatability*: Peer educators are perceived as credible and relatable sources of information and support because they share similar characteristics, backgrounds, or experiences with their peers. This enhances trust and receptivity to health messages. (Ssali *et al* 2009).

ii) Cultural Sensitivity: Peer-led health education programs are culturally sensitive and tailored to the specific needs, preferences, and norms of the target population. Cultural relevance increases engagement and effectiveness in promoting health behaviour change. (Israel *et al* 2018).

iii) *Empowerment and Ownership*: Peer-led health education empowers individuals to take an active role in their own health and well-being. By involving community members as educators and advocates, peer-led programs foster a sense of ownership and responsibility for health promotion initiatives (Viswanathan *et al* 2004).

iv) *Participatory Approach*: Peer-led health education programs employ a participatory approach, involving community members in the planning, implementation, and evaluation of health promotion activities. This participatory process enhances relevance, buy-in, and sustainability. (Minkler & Wallerstein (Eds.). (2011).

v) *Peer Support Networks*: Peer-led health education leverages existing social networks and peer support structures within communities to disseminate health information, share

resources, and provide encouragement and motivation for behavior change. (Latkin, & Knowlton, 2003).

vi) *Skill Building and Capacity Development*: Peer-led health education programs build the knowledge, skills, and confidence of peer educators to effectively communicate health messages, facilitate behavior change, and serve as advocates for health promotion within their communities. (Campbell & MacPhail 2002).

vii) *Continuous Learning and Adaptation*: Peer-led health education programs engage in continuous learning and adaptation based on feedback, evaluation findings, and changing community needs and contexts. This iterative process ensures relevance, effectiveness, and sustainability over time. (Pluye & Denis, 2004).

2.6.4. The Mechanism of Peer Education

Behavior changes are majorly voluntary health promotion activities and are more likely to be effective when undertaken in participatory ways. Peer Education has been described as a "method in search of a theory" by Turner &Shepherd, 1999 and suffers from inadequately specified theoretical base (Milburn, 1995). Peer education draws on the Diffusion of Innovation Behavioral Theory (Rogers E.M, 2003) which states that "certain individuals from a given population act as agents of change by disseminating information and influencing group norms in their community".

Peer Education has grown in popularity and practice in recent years in the field of health promotion. For instance, in the United States, interest in peer-teaching has also been recognized with a survey in 2010 demonstrating that 76% of the 130 respondent medical schools utilized their medical students in some form of peer-teaching during the medical program (Soriano *et al*, 2010). The success this intervention was attributed to the fact that peer-teachers and their colleagues share a similar knowledge base and experiences, otherwise known as "cognitive congruence", which allows the peer-teachers to use language that their peers understand and to explain concepts at an appropriate level that is context-specific (Yu Tzu-Chieh *et al*, 2011).

In this study, the Peer Education curriculum (the intervention) was developed to specifically to influence the behavior changes so as to increase the awareness and uptake of CRC screening by targeting the predisposing factors, the enablers and the reinforcing factors since they have "social congruence" with the target age bracket (45-75years).

A study on CRC in South Asia reported that peer-to-peer interactions during focus groups facilitates the sharing of screening experiences and learning, including sensitive information

about the various CRC screening methods (Crawford *et al*., 2015b). In the same study, it was reported that South Asian immigrants felt most comfortable receiving information about CRC screening through community education sessions, seminars or discussion circles in temples, recreation centers, or specific South Asian community programs and peer health educators (Crawford *et al*., 2015a, b). Another study also posited that recommendation of behavioral changes to groups by peers have improved their ways amongst them (Campbell, 1995).

It has also been reported that peer health educators combined with other interventions like small media or invitation yielded significantly better CRC screening uptake (Brouwers *et al.*, 2011). It instructive to note that for the purposes of positive decision-making a good level of education which increases level of understanding coupled with social identity has motivated the choice of teachers as peer trainers and change agents (Tajfel, 1981).

Community-based research fosters trust and engagement with local populations. When communities are involved in the research process, there is a greater likelihood of fostering ownership of the screening programs, which improves participation and compliance. Engaging trusted local organizations or leaders in health promotion enhances the effectiveness of interventions. (Israel BA, Schulz AJ, Parker EA, Becker AB,.1998)

Jeihooni, Hidarnia, Kaveh, Hajizadeh, & Askari (2015) reported that educational intervention increased perceived benefits and reduced perceived barriers in a population. In their findings, he most important external cues to action were physicians, health workers, family members and friends who in the case of this study are the peers.

Teachers are role models and sources of knowledge in the society with very strong social identity and therefore the importance of equipping them with relevant information on CRC cannot be underestimated. The teachers also have the capacity to lobby and drive the demand for the services once they have been effectively sensitized. The impact of PSTs in educating their peers and even the communities about health activities is likely to improve the overall population health. The rationale of Peer Education is that the educators take control of the program content to encourage the target groups to own the processes and outcomes (Myers *et al*, 2007). A fundamental of Peer Education is the development of personal skills for delivering messages appropriately to the audiences as shown in Figure 2.3 (Miller and MacGilchrist,1996).

Therefore, there have been efforts globally, regionally and nationally to promote CRC screening services uptake using different strategies. However, the effectiveness of Peer Education in accelerating awareness and uptake of the CRC screening has not been tested in

Kenya and for this reason, this study set out to evaluate the effectiveness of Peer Education intervention in increasing the awareness and uptake of CRC screening.

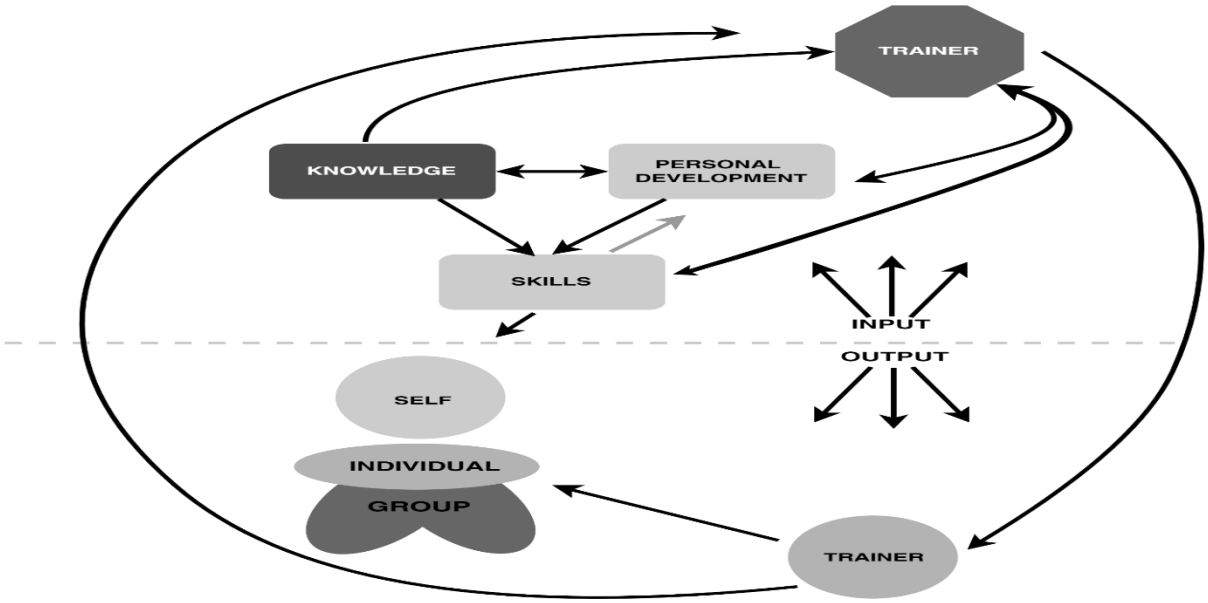

Figure 2.4 The Mechanism of Peer Education (Modified from Miller and MacGilchrist, 1996)

2.7 Theoretical Framework of the Study

Theories are used to provide tools for designing interventions that clearly have in mind specific behavioral outcomes and also provide the bases for planning and evaluation. They seek to analyze and explain how changes occur at the individual, community and social levels and emphasize the interconnection and interdependence of individuals and the external environment. In this study, several theories have been examined for appropriateness and relevance in understanding why and how people adopt new behaviors and to explain the importance of peer education. Two theories were selected as most appropriate for anchoring theoretical concepts and interpreting findings and these are: the Diffusion of Innovations (DOI) and the Health Belief Model (HBM) and are described below.

2.7.1 The Theory of Diffusion of Innovations

Diffusion of Innovations (Rogers, 2003) is a research model that describes how a positive health behavior spreads through a community or social structure. The model's founder, Everett Rogers, depicted how innovations are diffused through a social system over time as illustrated in Figure 2.3. The diffusion of an innovation depends on characteristics of the innovation, communication channels, time and the social system. Rogers (1983), defined innovation as "an idea, practice, or object that is perceived as new", and diffusion as "the

process by which an innovation is communicated through certain channels over time among the members of a social system". As a new idea or innovation is shared throughout a population there will be individuals that adopt the innovation sooner than others. The readiness to take advice in modeling of one's behavior on what others do reflects an emotional desire for status and that allows the decision maker in reducing the uncertainty that are associated with new ways of doing things.

This is the role which the Peer Educators play in minimizing the uncertainties. Potential adopters also perceive the relevance of interventions when it is embraced by peers adopt an imitative effect which may be as result of having the same job title, same type of employer, common training, age or shared beliefs or practices. All these can influence adopters to reject or adopt interventions.

Five classifications of individuals when it comes to the adoption of an innovation are explained. The very first people to adopt the innovation are known as the innovators, followed by the early adopters, early majority, late majority and followed lastly by the laggards. Innovators are keen to change and try new things and represent a very small percentage of the population. Early adopters are the opinion leaders in a community that other people will observe to determine if an innovation is worthwhile and this informed the choice of PSTs as the "champions of change" for this study. The people in the early majority group take more time to consider if they will try an innovation than the early adopters, while those in the late majority group tend to adopt an innovation only after the majority of individuals have already done so. The laggards are the last group to adopt an innovation after everyone else has accepted the change and some individuals in this group may never adopt the innovation. (Sahin, 2006).

The five main stages identified in the intervention diffusion process: knowledge; persuasion; decision; implementation; and confirmation. Rogers stated that "knowledge occurs when an individual is exposed to the intervention's existence and gains some understanding of how it functions". At the knowledge stage an individual want to know what the innovation is and how and why it works. "Persuasion occurs when an individual forms a favorable or unfavorable attitude toward the innovation" (Rogers, 1983). During this stage people want to decrease the uncertainty about the outcome of adopting an intervention. People want to know the advantages and disadvantages of an intervention and how its use would ultimately affect them. The decision stage is the stage where a choice is made whether or not to implement an intervention. The Peer Education is designed to fight any negativities that may be attached to

the screening service uptake in a friendlier atmosphere without prejudices of a 'foreign facilitator' as it happens in the conventional models of training on new interventions.

Factors that may hinder or facilitate the decision to adopt an intervention are related to the perceived attributes of the intervention which include its relative advantage, compatibility, complexity, trialability and observability. These perceived attributes of an intervention are what makes it more or less appealing (Rogers, 2003). The relative advantage is the degree to which an intervention is perceived as better than the current practice. It is the perception of how beneficial the change will be and inform how fast the respondents adopt the screening service. These are the focus areas to be shaped by the trainings from the Peer Educators. Compatibility is the degree of fit between the proposed change and the individuals or organization that is undergoing the change (Horner, *et al.,* 2004). This relates to how consistent the intervention is with individual and communal "values, beliefs, past experiences, and needs". These issues were identified at the baseline and appropriately addressed during the intervention by the Peer Educators.

The complexity is the degree to which an intervention is perceived as difficult to understand or use by the intended audience. Trialability refers to the availability of opportunities to test the intervention before wide-scale adoption and observability refers to the extent that the results are visible to others. Interventions with a high degree of observability tend to be adopted faster than those where the results are not highly visible (Rogers, 1983)

In a nutshell, diffusion of innovations offers a set of concepts and approaches that can be used to explain receptivity to health interventions by individuals and organizations. Understanding the diffusion principles can therefore be operationalized to offer explanations on the rate of adoption of interventions how to and broaden the reach of health innovations

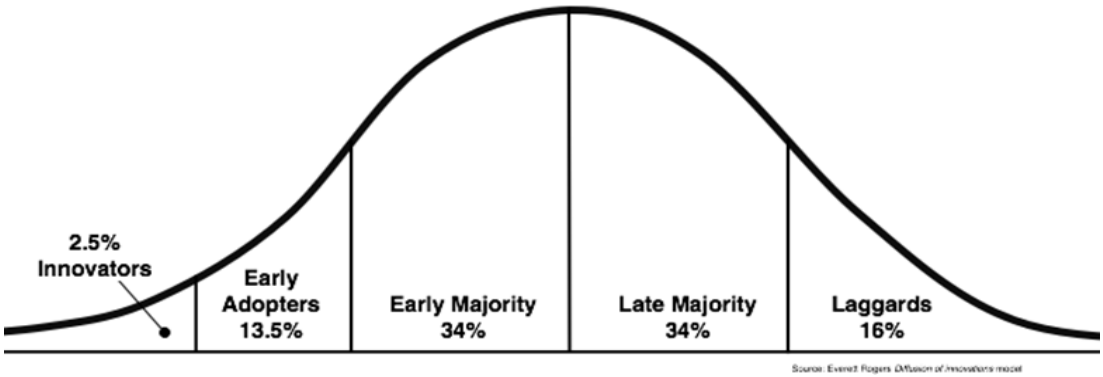

Figure 2. 5 Diffusion of Innovations Curve (Modified from Rogers E.M, 2003)

In order to establish trends in uptake of screening services and awareness during the Peer Education intervention, implementers track the progress of their social and behavior change

interventions by creating similar graphs as results of the program are evaluated. The theory of Diffusion of Innovation works better with adoption of behaviors rather than cessation or prevention of behaviors and this was observed as the model's strength in this study.

2.7.2 Health Belief Model

The Health Belief Model (HBM) was developed in the early 1950s by social scientists namely Stephen Kegels, Godfrey Hochbaum and Irwin Rosenstock at the U.S. Public Health Service in order to understand the failure of people to adopt disease prevention strategies or screening tests for the early detection of disease (Figure 2.6). HBM is an individual-level behavior model with a long history in behavioral research in CRC screening and is suitable for explaining behaviors of healthy and asymptomatic individuals who engage in non-medical and medical activities (Rosenstock *et al*.1988). Basically, this model theorizes on people's beliefs regarding the risk of a health problem and their perceptions on the benefits of taking actions to avoid it, analyzes their readiness to take action.

Additionally, individual factors such as age, gender, ethnicity, socioeconomic status, individual's awareness, cues of action, the benefits and ease of adopting a behavior can help to predict whether preventive measures will be adopted. Awareness constructs espoused in the HBM will help individuals in decision-making which may result in either adopting a new behavior or not. The HBM posits that the threat of a medical condition combined with a belief in the effectiveness of a proposed mitigation, this study the preventive measures predict the likelihood of undergoing the CRC screening. The overall premise of HBM is that awareness of the condition will bring change. In this study the awareness was brought to target audiences (study participants) through the Peer education.

According to this model, awareness of the medical condition (perceived susceptibility) is key in the establishment of rational assessment of threat (perceived benefits) of a medical condition and thereafter determine whether a behavior change is necessary (cues to action). The HBM suggests that a person's belief in a personal threat of an illness or disease (perceived severity) together with a person's belief in the effectiveness (perceived benefits) of the recommended health behavior or action will predict the likelihood the person will adopt the behavior (self-efficacy).

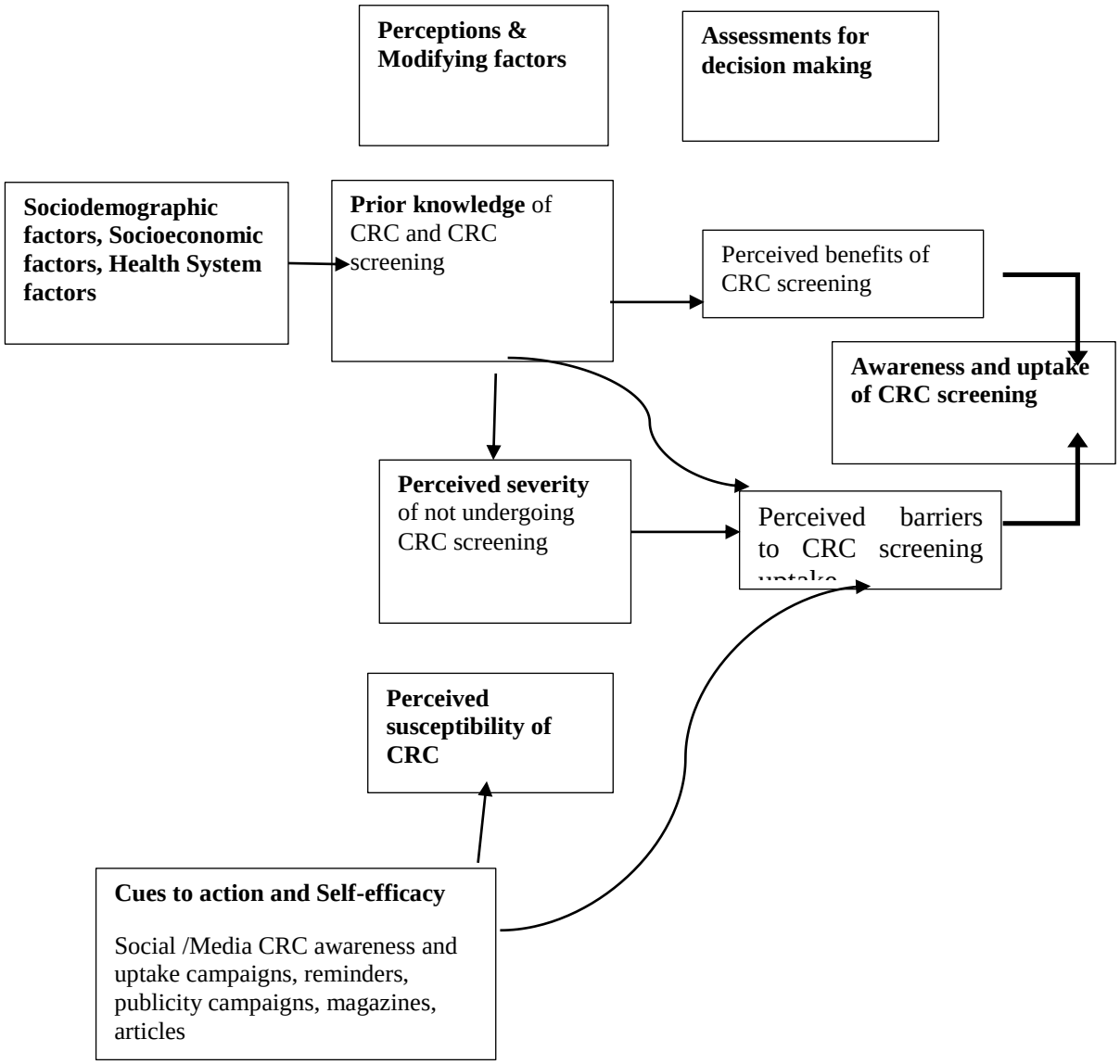

Figure 2. 6 The Health Belief Model (Rosenstock *et al*.1988)

The HBM posits that the two components of health-related behavior are the desire to avoid illness or conversely get well if already ill and the belief that a specific health action will prevent or cure the illness. Ultimately, an individual's course of action often depends on the person's perceptions of the benefits and barriers related to the health activity in question. In this study, the Peer Education intervention aimed at reinforcing these basic tenets and subsequently result in making decisions which help in accepting the proposed behavioral changes.

The HBM, as the core construct for this intervention, provided the basis for the Peer Education intervention. The Peer Education intervention specifically targeted the barriers, enablers and the reinforcing factors in the continuum of decision making in the awareness and uptake of the CRC screening services. In the context of this research, the new behavior refers to the increased awareness that leads to increase in uptake of CRC screening.

The HBM reflects theoretical understanding at an intrapersonal level whereby six important mediators to understand individual behaviors include the individual's perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and cues to action. The above constructs of the HBM of which the first four constructs were developed as the original tenets of the HBM while the last two were added as research about the HBM evolved.

In this context, the awareness of CRC in terms of the individual's susceptibility to CRC is mainly about the individual's perception on whether he or she is at a risk of suffering the health problem and is a factor that influences the possibility of adopting a protective behavior. In this study, feelings of susceptibility to CRC had a bearing on the likely levels of uptake of the CRC screening service. This component essentially looks at the individual's ability to internalize information drawn from the external environment, the ability to maintain health and or the likelihood of becoming ill.

Perceived severity refers to a person's subjective feelings on the seriousness or consequences of contracting an illness or disease or leaving the illness or disease untreated. This too had a bearing on a person's feelings of severity of the health condition. People consider the medical consequences like death or disability and also the social consequences such as family life and social relationships when evaluating the severity of the health condition. The lack of recognition of the severity of CRC has been suggested as a factor of low participation in CRC screening. Peer Education helped the respondents in understanding the severity of a late diagnosis of CRC.

On the other hand, perceived benefits refer to a person's perception of the advantages of adopting certain actions in reducing the risks for the disease severity, morbidity and mortality. In this study, the consideration for adopting CRC screening is hinged on perceived benefits of early detection which is associated with better treatment outcomes. Several qualitative studies have also revealed that perceptions and limited knowledge about the benefits of CRC screening influence uptake of CRC screening (ACS, 2011).

The actions a person takes in preventing or curing illness or disease depends on consideration of both perceived susceptibility and perceived benefits. People accept recommended health actions if they perceived them as beneficial in terms of improving or maintaining health. This construct was concerned with the possible benefits of Peer Education intervention. The Peer Education therefore served to highlight these two

components which were very key in decision making on whether or not to take up the CRC screening.

Additionally, perceived barriers reflected the feelings of the obstacles to performing the recommended health action and had a variety of constructs including the person's feelings of barriers or impediments which then led to a cost/benefit analysis. The individuals weighed the benefits of the intended actions against the perceptions that it may be expensive, dangerous in terms of the side or adverse effects, uncomfortable as a result of the painful nature, time-consuming or inconvenient. Such barriers provided the understanding as to why people with negative attitudes such as anxiety, disinterest, fear of screening, subjective perception of pain, fear of screening outcomes and lack of time may be reluctant to participate in screening programs.

Many people lack clear understanding of the interpretation of the screening results and tend to believe that an abnormal screening result means that someone already has advanced stages of CRC and therefore have fear for screening (Wardle *et al*, 2000). In this regard, the Peer Education was aimed at reduction of the perceived barriers through demystification of any conservative attitudes, re-assurance, correction of misinformation, incentives and assistance. In the context of this study, this concept is relevant because peoples' attitudes are largely influenced by what their peers do and think.

The cues to action represented the stimulus needed to trigger the decision-making process towards accepting a recommended health action (in this case CRC screening). These may be Peer Education like this, public or social events that signal the importance of taking the action can be internal like gastrointestinal pains or external like advice from others, illness of family member, newspaper article or an intervention.

Finally, self-efficacy which implied the level of a person's confidence in his or her ability to successfully perform and sustain the recommended behavior. Self-efficacy is a construct in many behavioral theories as it directly relates to whether a person performs the desired behavior. The component is associated with a person's belief that they can accomplish a certain health behavior with little or no assistance from others. Through the successful integration of beliefs and provided information, participants can adjust behaviors accordingly based on the information provided thereby improving the uptake of CRC screening.

The HBM as a model is limited by the fact that context-specific reasons are essential components in understanding the association between belief concepts, motives and intentions

on one side and the individual behavior yet are not encompassed in the model. It does not account for environmental or economic factors that may prohibit or promote the recommended action. It assumes that everyone has access to equal amounts of information on the illness or disease which is indeed very untrue especially in the LMICs and the SSA under which our study area falls. It assumes that cues to action are widely prevalent in encouraging people to act and that "health" actions are the main goal in the decision-making process.

A conceptual framework in the subsequent section operationalizes the HBM and also cures the inadequacies of since it lacked the emotional and socio-environmental context which are critical in addressing the reasons for CRC screening uptakes decision-making and which may have constrained its application (Champion & Skinner, 2008).

2.8 Conceptual framework of the study

A conceptual framework (Figure2.4) is a concise description of the phenomena under study accompanied by a graphic or visual depiction of the major variables of the study (Mugenda and Mugenda, 2003). CRC screening decision-making process can be conceptualized as the outcome of the Peer Education intervention on the different constructs of awareness of the study participants and the uptake of CRC screening service. The factors for investigation in this context include the factors that are associated with respondent's screening decision on a broad range. Socioeconomic, ethnic and sociological influences and organizational barriers have also been identified as factors influencing CRC screening adherence.

Awareness on CRC screening services was examined on different constructs; the respondent's literacy of CRC screening including; awareness of CRC screening, awareness of screening methods, awareness of the suitable age for screening, awareness on the frequency of screening and where to go for it, awareness of risks associated with not screening, awareness of the benefits and barrier of CRC screening. These factors influence the likelihood of a respondent to undergo CRC screening presently or in the future; while health systems factors awareness included to offer advice on the importance of CRC screening and to perform the procedures. Decision-making process is finally influenced by the healthcare background in which the intervention is promoted, how screening programs are carried out, how preventive measures are presented and screening actions are performed. Knowledge of the different CRC screening examinations available and their different invasiveness level can also be a relevant factor for uptake.

In the socio-demographics, the age, level of education, marital status, religion, ethnic background, years in employment, income levels and previous exposure to CRC through a family member, friend or self-having the disease or having had a previous examination may impact on knowledge of CRC. Other factors that may influence the uptake of CRC screening include limited knowledge of CRC, lack of access to screening services, beliefs, attitudes, embarrassment and fear of a positive diagnosis.

Moreover, levels of knowledge and attitude on CRC are influenced by socio-demographic factors such as age, family history, health seeking behavior, lifestyles, diet and the living and working environment which impact on CRC screening. The peer education intervention therefore aims at positively influencing the knowledge, attitudes and perceptions resulting in an increase in uptake of CRC screening.

Encouragement and personalized recommendations from physicians have been associated with higher screening rates coupled with provider reminder systems and decision support tools can also help ensure that screening recommendations are consistently communicated to eligible patients (Sabatino *et al.* 2012). Still on health system factors, it is equally worth noting that there is low awareness of risk factors, common prevention and control strategies among the general populations and even the healthy-care providers. This may partially be attributed to limited research and data that is necessary to inform policy formulation and the overconcentration of CRC services in urban areas.

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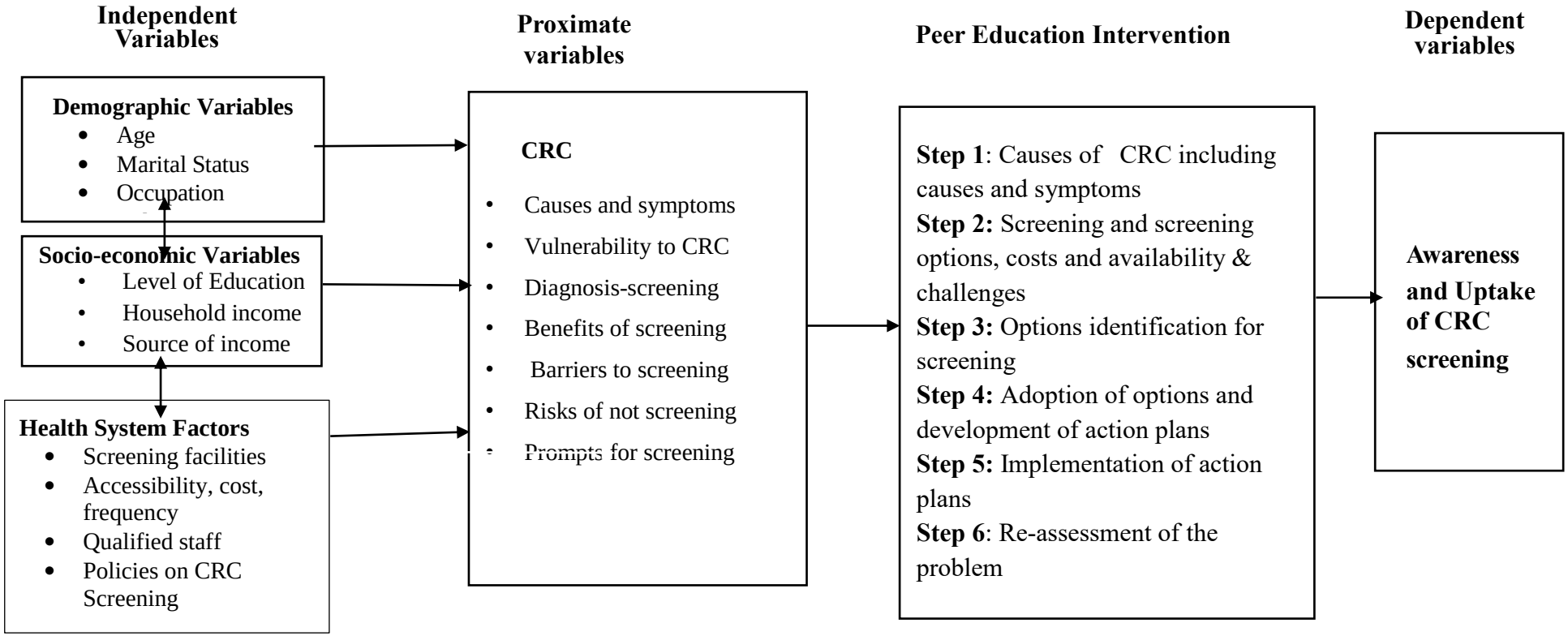

Figure 2. 7 Conceptual Framework: Interaction between Peer Education Intervention and the study Variables (Self)

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the study area, study population, sample size estimation, study design, sampling procedures, data collection, analysis and presentation, study limitations as well as the ethical considerations.

3.2 Study Area

3.2.1 The study Location

The study was conducted in the Mt. Elgon Sub County, Bungoma County, Kenya. Mt. Elgon Sub County borders the Republic of Uganda to the North West, Trans-Nzoia County to the North East, Kanduyi Sub County to the East and Kimilili Sub County South East and lies between latitude 00° 28’ and 10° 30’ north and longitude 340° 20’ East and 350° 15’ East of the Greenwich Meridian (Appendix I). Bungoma County is listed among the counties in Kenya that were unable to meet their annual health targets in the year 2015/2016 (World Bank/GOK Health Service Delivery Index Report of 2016). Mt. Elgon Sub-County has poorest health infrastructure and health indicators coupled with low literacy levels, poor health seeking behaviour and strong cultural inclinations (Bungoma CIDP 2013-2017)

The choice of this study area was motivated by the unique nature of the Sub County in terms of poor healthcare system infrastructure with poorly staffed facilities that are very few and quite long distances from one another. Key health outcome indicators have remained poor in comparison to the national averages. The residents are a socially disadvantaged group with low literacy levels. The topography/landscape also limits the movement of persons and this may affect accessibility to the healthcare services. The Sub County has poor physical and social infrastructural facilities such as roads, electricity, water and other social amenities. Most rural access roads in the Sub County are inaccessible during rainy season

3.2.2 Ecology

Ecological conditions refer to the state of the physical, chemical and biological characteristic of the environment, and the processes and interactions that connect them. Mt. Elgon sub county is within the Lake Victoria Basin, rising over4,321 miters. The forested areas also

provide soil nutrients through the decomposition of biomass, consequently supporting both soil and terrestrial species.

3.2.3 Socio-demographic Characteristics

It had a projected population of 220,064 (Male at 110,121 and females at 109,943) for year 2017 with a growth rate of 3.1% annually and density of 230 persons per Square Km (KNBS, 2010). The region's continued population growth accelerates the depletion of natural resources exacerbating the effects poor living conditions of the inhabitants with low economic diversification, low agricultural productivity. Population distribution by wards is as follows:

Table 3.1: Population distribution of Mt. Elgon Sub County by the wards

Ward	Total Population	Area Square Kms
Cheptais	36,752	41.5
Chesikaki	30,715	39.5
Chepyuk	32,480	94
Kapkateny	36,599	48.4
Kaptama	46,873	684
Elgon	40,676	55.6

Source: IEBC (2012), Final Report

The Sub-County has low levels of skilled and unskilled labour with 35% unemployment rate and 63% of the working population engaged in formal and informal activities (County Council of Bungoma, 2009). In the poverty index, 28% of urban population live in absolute poverty without adequate shelter with 70% urban population in Peri-urban informal settlements lacking basic services. The sub county comprises of many landless families who are vulnerable to several socio-economic challenges especially abject poverty, malnutrition, food insecurity, diseases, social crimes, defilements, HIV/AIDS and poor access to health facilities The Sub County has poor physical and social infrastructural facilities such as roads, electricity, water and other social amenities. Most rural access roads in the Sub County are inaccessible during rainy season.

3.2.4 Health services

In terms of health infrastructure, it has inadequate infrastructure, personnel, health products, health information, equipment and limited financing incapable of handling complex medical cases (County Government of Bungoma, CIDP-2013-2017). Mt. Elgon Sub County hospital is the best equipped facility in the Sub-County but lacks a Cancer diagnostics centre. There is insufficient capacity and unavailable Health services in Mt. Elgon Sub County hospital.

3.2.5 Epidemiological trends

The most common diseases are malaria fever (40%), respiratory tract infections (19%), skin disease (7%), diarrheal (4%) and typhoid (3%). It is instructive to note that the prevalence rates for CRC are not documented although a cursory discussion with the County Director of Health Services, County Government of Bungoma revealed that there are reported cases especially from Mt. Elgon Sub County of the Bungoma County.

3.3 Study Design

A longitudinal interventional study (pre-post study) design adopting both the quantitative and qualitative approaches to data collection, analysis and presentation (Mugenda and Mugenda, 2003) was employed. The rationale for this choice was because it enables the capture of information based on data collected over a period of time and is useful for demonstrating temporal changes in behavior during and after the intervention period. The study was conducted in five phases over a period of eight months. A phased approach was adopted for practical, logistical and operational efficiency. The study phases were:

i) Formative phase
ii) Recruitment and training of peer educators and the establishment of Community Based Health Information Management System (CBHIS) as evidenced by Appendix VI,
iii) Baseline phase which comprised the identification and recruitment of the respondents and the baseline survey
iv) Intervention phase and longitudinal Monitoring of the trends in changes and finally end line phase.
v) End-line survey phase

The flow representing the participants navigation algorithm during the study chart of the Peer Education intervention procedure is shown in Figure 3.1.

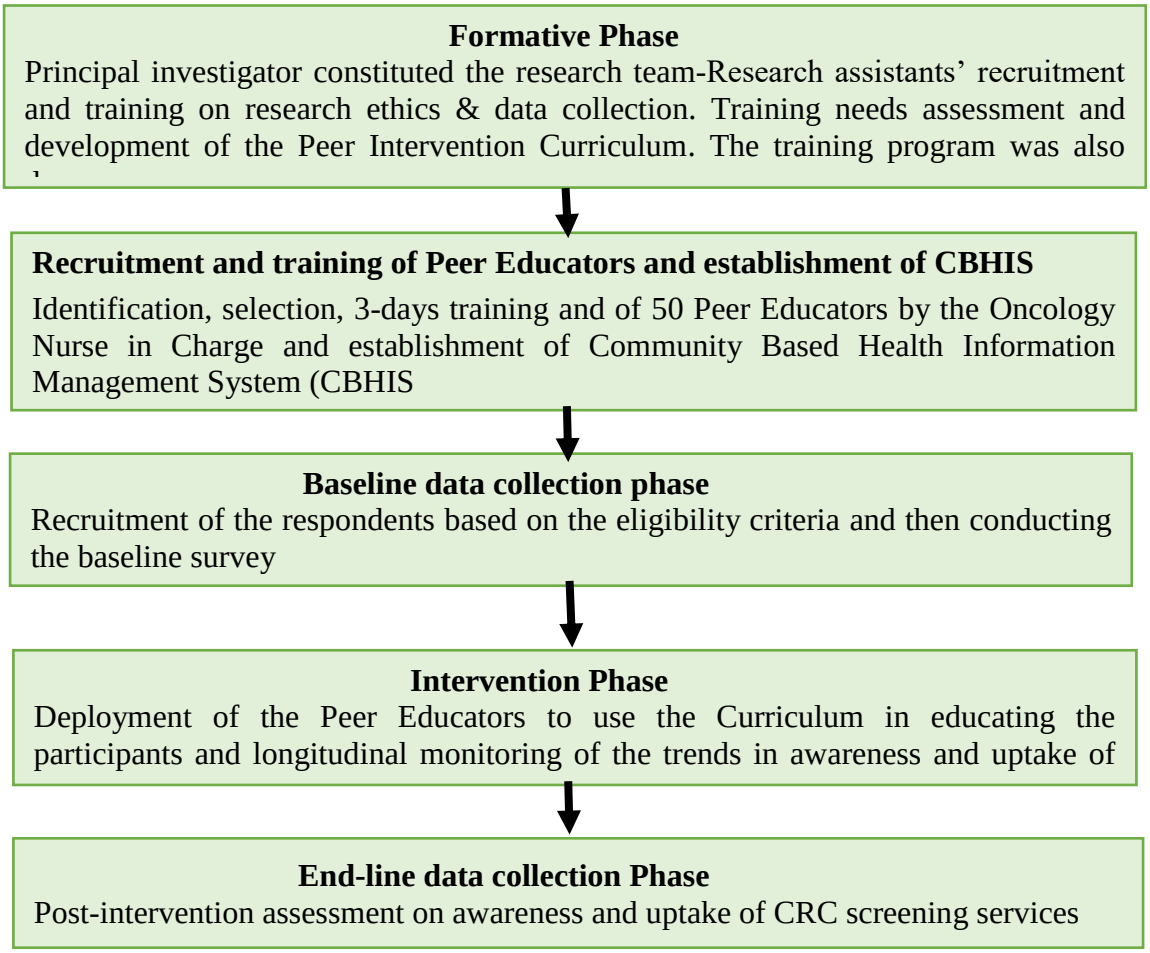

Figure 3.1 Flow chart of the Study phases

i. The formative phase

In this phase, the research team was constituted, and the study area clearly defined. The team comprised of the Principal Investigator and four research assistants who were undergraduate students in the School of Public Health Maseno University. The research assistants were given a 2-day training on ethical issues in data collection including consenting processes, data tools, data collection and the administration of the Community Based Health Information tool. This phase also focused on administrative and organizational concerns of the study for clarity in understanding of the study and the study area. The researcher also established contacts with the staff at the cancer clinic the BCRH for seamless handling of the participants who sought screening. This phase provided the starting point to the research team including the resources assessment and mobilization and establishment of essential contacts for community entry.

The essential contacts included the local administrators who were useful in identification and mobilization of the participants from the community units.to the designated meeting spots in conducive environments for the Peer Educators to conduct the sessions. The local administrators were important for reassurance to the communities on the importance of the study. During this phase, there was also training needs assessment and the development of the Peer Intervention Curriculum (Appendix III).

A training needs assessment (TNA) provides groundwork for determining the group's factual needs and in what way the staff will best obtain the vital training. The TNA should focus on skill proficiency and its application to performance (Jake Wengroff, 2021). The gaps exposed in this enquiry were used to define the types of training that the PSTs/communities truly need in regard to awareness and screening uptake of CRC. The needs were elicited through targeted surveys, interviews, observation, secondary data and/or workshops and focus group discussion (FGD) (Okereke & Ahonsi, 2021). The data on the status prior to introducing an educational intervention to the evaluation in the latter part of the training cycle as it serves as the baseline data.

The Principal Investigator with the assistance of the staff from the Cancer clinic/Oncology department at the Bungoma County Referral Hospital developed the Peer Education Intervention Curriculum (Appendix III) after the aforementioned training needs assessment.

The development of the Intervention Curriculum also captured inputs from 3 specialists (outside the research team) in health education and promotion (2 people) and Biostastician (1 person). The Peer Education curriculum was then validated by an independent team of 10 experts (2 Epidemiologists, 1 Endoscopist, 2 Curriculum Support Officers from Ministry of Education,2 Oncology Nurses,1 Clinical Oncologist, 1 Medical Officer of Health and 1 Biostastician). Based on Lawshe’s table (Table 4.3), a Content Validity Ratio value of 0.7 was obtained (higher than acceptable value of 0.62 for evaluation by 10 experts).

These sessions resulted in the appropriate context -specific Peer Education training curriculum which was then used to influence behavioral changes among the participants drawn from the community. The educational program was performed by Nurse Oncologist in charge of the Cancer Centre in the BCRH.In these sessions, CRC its cause, its risk factors, symptoms, diagnosis, side-effects and its severity, understanding about CRC and its importance, benefits, and barriers and screening were discussed. In one of the educational sessions, a 58 years old man suffering from CRC was invited to talk about CRC, its risk

factors, symptoms, and side effects A training program was also drawn for the Peer Educators was also drawn and attached to the Peer Educator's Intervention Curriculum (Appendix III). This phase also involved the budget development (Appendix VIII), the development of study's implementation timetable modalities of the overall flow of study activities coordination.

Preliminary literature reviews included both qualitative and quantitative evidence from relevant published and unpublished research works. The findings from the formative phase largely dwelt on awareness beliefs, attitudes, facilitators and barriers towards uptake of CRC screening services and informed the quantitative study. This phase therefore identified all the circumstances that could hinder or facilitate the study and proposed ways that ensured that the study was feasible. It was at this phase that the study's limitations and constraints were teased out and the mitigations put in place to ensure that the objectives were answered. These activities were carried out in strict adherence to covid-19 protocols (Appendix IX)

ii. Recruitment and training of Peer Educators and establishment of CBHIS

This phase involved the identification, selection and training of Peer Educators and establishment of CBHIS (Appendix VII) for the longitudinal monitoring of changes during the intervention. Some 50 volunteer Peer Educators were enrolled from the Primary schools teaching (PSTs) population. The Peer Educators were purposively selected based on desired characteristics including being age 45 years and above and having the flexibility to allow availability for the entire study duration and were contracted for the study using a pre-designed contract form ((Appendix X). The selection of teachers was motivated by the fact that they are role models and sources of knowledge in the society with very strong social identity and therefore the importance of equipping them with relevant information on CRC cannot be underestimated. The teachers also have the capacity to lobby and drive the demand for the services once they have been effectively sensitized. The impact of PSTs in educating their peers and even the communities about health activities is likely to improve the overall population health.

The selected teachers were given 3-day long training by the Oncology Nurse (the In-charge of the Cancer Clinic) on definition, symptoms, prevention, screening, treatment and healthy living with CRC as stated in the Peer Education Intervention Curriculum (Appendix III). After the training they were issued with Peer Educators tool kit containing key health

messages on awareness and CRC screening. These activities were carried out in strict adherence to covid-19 protocols (Appendix IX).

iii. Baseline survey

This phase comprised the identification and recruitment of the study participants and the baseline survey which was conducted on the awareness and uptake of CRC screening services before the intervention using the Interviewer administered semi-structured questionnaires (Appendix IV). The use of Focus Group Discussion guides (FGD Guide-Appendix V) engaged the participants in open dialogue to get information. KII (Appendix VI) was conducted with select health workers. These activities were carried out in strict adherence to covid-19 protocols (Appendix IX). During this phase, the female participants who accepted to take up the CRC screening were asked to wait 3 days from the end of menstruation before providing a stool sample.

iv. Intervention phase and longitudinal Monitoring of trends

At the intervention phase, the trained Peer Educators were deployed and proceeded to educate the respondents using the Peer Educators manual (Appendix XII). Each Peer Educator was assigned between 8-10 participants depending on the logistical convenience. They offered 3 hours training and follow up face-to-face group sessions were used as the intervention delivery mode on a weekly basis for 30 weeks to the study respondents at designated places. During the group sessions, participants were able to obtain knowledge from the Peer Educators and also have the time to interact with group members for deeper insights on the thematic areas. The Peer Education coupled with the influence of group members influenced the CRC screening awareness and uptake behavior of the participants. Audio– visual materials, reading materials were used alongside the Peer Education curriculum as the primary educational material. Each lesson had a 15-minute period for clarifications and feedbacks.

During the intervention period, there was longitudinal monitoring of the temporal behavioral changes in the awareness and uptake of CRC screening uptake using same data collection tools that were used at the beginning. While this process was ongoing, the CBHIS tool (Appendix VI) was used to track the progress of the intervention to ensure that the flow of activities was in sync with the expectations for accuracy of the findings. The tracking helped in the determination as to whether the intervention is proceeding according to plan or needs

to modify in order to produce the expected outcomes. During the intervention period, the Principal Investigator and the research assistants regularly participated in the training sessions to share their experiences and challenges for purposes of ensuring impactful training sessions. They also monitored the participations in the trainings using the attendance registers (XVIII). The research team also monitored the content coverage during the trainings. Monthly meetings were held by the research team and the Peer Educators at the Marambachi Social Hall, Cheptais town to share reports on the activities of and the outcomes These activities were carried out in strict adherence to covid-19 protocols (Appendix IX)

v. The end line survey

During this phase, data was collected on the awareness and uptake of CRC screening services after the intervention using the same Interviewer administered semi-structured questionnaires that were used at the baseline phase (Appendix IV) and with the same group of participants. The use of FGDs were used to engage the participants in open dialogue within guidelines to get information on any changes (FGD Guide-Appendix IV). The key outcomes of the Peer Education intervention included the possibility of dropping out of the study at any stage before the completion, the possibility of increased awareness leading to the respondent being screened for CRC and also possibility of awareness increase but not leading to the respondent's uptake of CRC screening. These activities were carried out in strict adherence to covid-19 protocols (Appendix IX)

3.5 Study Population

A study population is the actual number of individuals in a population that are of interest to a study**.** The target population comprised the of adults aged 45-75 years in Mt. Elgon Sub County which was 22,372 (KPHC Vol III,2019). The choice of this age bracket was in conformation to the MOH recommended age for CRC screening being 45-75 years (NCSG,2018).

3.5.1 Inclusion Criteria

i) Mt. Elgon sub county residents ages 45-75 years (MOH recommended age for CRC screening as stated in the National Cancer Screening Guidelines,2018)).

ii) Respondents were limited to those who Mt. Elgon Sub County residents gave informed consent

iii) Residents who committed to stay continuously for at least one year in Mt. Elgon Sub County at the time of the study

3.5.2 Exclusion Criteria

i) Residents who had major disabling medical conditions at the time of the study hence were unable to cooperate

ii) Those declined to participate in the study at any stage during the study

3.6 Study Variables

3.6.1 Independent variables

The independent variables of the study were:

The study independent variables included socio-demographics such as age, gender, religion, marital status, level of education, household income, source of income or occupation.

3.6.2 Dependent variables

The dependent variables of the study were: Awareness and uptake of CRC screening

3.7 Sample Size Estimation

The sample size was determined from the target population of the 22,372 persons from aged 45-75 years in Mt. Elgon Sub County (KPHC Vol III,2019). Yamane's Equation (1967) was used in sample size estimation to get a representative sample size as shown below. Yamane's equation is ideal when the target population is known.

. n= $\frac{N}{1+N(e)^2}$

Where: n = Desired Sample size

N = Population size

e= Level of precision or sampling of error which is ±5%

[Since the awareness and uptake of CRC screening in Mt. Elgon Sub County, Bungoma County is not established, 50% was taken].

n = 22,372

1+22,372 *(0.05*0.05)

=399.5 =400

To the estimated sample size, an additional 10% (40) was factored to take care non-response or drop-outs (Niang *et al*., 2006). A total of 440 respondents were enrolled for the study

3.8 Sampling Procedure

Multi-stage sampling was adopted for selection of participants from the data collection units. First, 3 Assembly Wards (Cheptais, Chesikaki and Kapkateny Wards) were randomly selected which represented above 50% of the wards and from which eight sublocations again representing 50% of the total number of sublocations were selected for the study findings to be generalizable (Mugenda and Mugenda, 2003).

The choice of the County Assembly Wards as the focal points for conducting research is motivated by the fact that they constitute important implementation units for development programs following the enactment of the 2010 constitution. To find the total number of respondents to be interviewed in each sublocation, proportionate sampling was employed. This was done by dividing the total eligible respondents in the sublocation A by the total eligible in the Wards using a formula illustrated.

ni ——— Where ni = eligible respondents in a Ward

n = total eligible in Mt. Elgon sub county. In order to generate the sample size for the Ward, this proportion will then be multiplied by the desired sample size for the study (440 respondents): $\frac{ni}{n}$ x N as shown in the formula below (table 3.1):

Probability Proportional to Sample (PPS) sampling was used to determine the sample size per Ward then Sub location and eventually to the households in the villages. This was necessary since the samples were from Wards and Sub locations that had different population sizes.

This strategy ruled out the possibilities that selecting a member from a smaller group would be higher than the chances of selecting a member from a larger group (Skinner, 2016; WHO, 2017). The study adopted random sampling for selecting the respondents in each village until the required sample for each was met.

Table 3.2: Sampling Frame showing number of eligible respondents to be sampled in the 8 Sublocations in the three wards

Ward Name	**Sublocations selected ≥ (50%)**	**No. of eligible persons (45-75 years)**	**Sublocation sample size**	**Villages sample size≥50%**	**Households samp**
Cheptais	Chebwek Chepkube	610 937	50 77	13 11	Participants were identified from eligible households in the selected villages using the PPS
Chesikaki	Chesikaki Chemondi	1221 608	101 50	7 13	Participants were identified from eligible households
Kapkateny	Cheptonon Kamneru Sacho Towyondet	476 467 263 742	39 39 22 62	9 8 8 12	Participants were identified from eligible households
Total	**8**	**5324**	**440**	**81**	**440**

3.9 Validity and Reliability of Instruments for Data collection

3.9.1 Validity of the Instruments

Validity is a measure of the accuracy and meaningfulness of inferences based on the results and measures the extent to which results obtained from the analysis of data represent the phenomenon under study (Mugenda and Mugenda, 2003). Validity refers to the extent to which an instrument measures what it is intended to measure. In order to ensure validity of the data collection instruments for this study, the tools were examined by School supervisors from the Department of Public Health, Maseno University.

To ensure instrument validity with a high degree of accuracy, the researcher ensured that the contents was relevant to the variables under study and able to answer the study objectives accordingly. Content validity was determined by evaluating test items against the test specifications drawn up through a thorough examination of the subject domain so as to ensure that it covered the items to be measured. The responses from different participants were analyzed to come up with a general position that supports validity as shown in Table 3.3.

Table 3.3: The Lawshe Table for minimum Values of content validity Ratio.

No. of Panelists	Minimum Value
5	0.99
6	0.99
7	0.99
8	0.75
9	0.78
10	**0.62**
11	0.59
12	0.56
13	0.54
14	0.51
15	0.49
20	0.42
25	0.37
30	0.33
35	0.31
40	0.29

3.9.2 Reliability of the study instruments

Reliability is defined as the extent to which the results obtained are consistent over time and an accurate representation of total population under study (Joppe, 2002). Reliability therefore is the degree to which a tool produces stable and consistent results. To test for reliability of data collection instrument in this study, test- retest technique was applied. The results gathered from the pilot study were plotted on Crouchback's alpha scale (Nunnally, 1978). This test involved 10% of the sample population (40 respondents) recruited from Kabura and Chepyuk sub-locations in Chepyuk Ward, one of the Wards in Mt. Elgon sub-county but not sampled for the main study. The semi-structured questionnaires were administered twice to the same group of participants after an interval of two weeks. A score above 0.70 was obtained and this was considered ideal.

The Cronbach's Alpha reliability test was done to ascertain internal consistency of the research instrument. A coefficient of between 0.7-1.0 was deemed acceptable for consistency. All the study variables achieved a Cronbach's Alpha of above 0.7 hence the results are highly reproducible. Validity of the research findings was enhanced by employing pretest findings to improve accuracy of the data collection tools.

In addition to this, the tools were examined by School supervisors from the Department of Public Health, Maseno University. MOH officials from the Oncology Department, BCRH, the inputs of specialists in health education and promotion (2 persons) and biostatics (1 person) were employed were also consulted to ensure the content covered in the tools was adequate and relevant for the research. The total reliability of the research tool with the calculation of Cronbach's alpha was 0. 811.The reliability test results are shown in Table 3.4

Table 3.4: Results of the reliability test

Variable	Sample Size	Cronbach Alpha	No. of questions
Socio-demographic characteristics	40	0.769	4
Socio-economic characteristics	40	0.832	5
Awareness of CRC screening	40	0.814	7
Uptake of CRC screening	40	0.817	8
Overall reliability	40	0.811	24

3.10 Pilot Study

A pilot study was conducted prior to the main study. This included 10% (44 respondents) of the study population (Mugenda and Mugenda, 2003) selected for the reliability test above. The piloting was carried out in Kabura and Chepyuk sub-locations in Chepyuk Ward which is Mt. Elgon Sub County but is not included in the main study. It helped in establishing the clarity, comprehensiveness and objectivity of each item in the instruments and also determined the estimated time required to collect the required data

The sampling tools were pre-tested on the 44 respondents (10% of the study population) from Kabura and Chepyuk sub-locations in Chepyuk a non-participating Ward but within the study area to to check for vagueness or items that could have come out as being insensitive to the respondent and also to familiarize with its content. It also ensured accuracy of the instruments, clarity of words and questions and assisted in detection and correction of biasness. Important questions and suggestions were captured from respondents to enable the researcher improve efficiency of the instruments and adjust strategies and approaches in order to maximize the response rate (Kothari,2003). Necessary changes were made in the sampling tools before final administration.

3.11 Data Collection

Data collection tools translate the research objectives into specific questions which evoke responses useful in providing data for achieving the research objectives (Mugenda and Mugenda, 2003). The Researcher assisted by four trained research assistants collected the data. The four research assistants were undergraduate students at the Maseno University and underwent a 2-days training on the study protocols which included: the purpose of the research, capacity building on interactions with the interviewees, administration and filling of questionnaires and how to avoid the introduction of bias in the data collection. They were also trained on consenting procedures and other ethical aspects of research including voluntary participation with ability to withdraw at any point during the study, anonymity and confidentiality.

The principal researcher carried out weekly support supervision visits to confirm progress, note any challenges and to provide clarity whenever necessary. Participants who intended to undergo screening were referred to the Bungoma County Referral Hospital where they were given a container for stool sample and they were asked to submit the stool within a week. Those who did not send their samples within the one week were considered as non-response

for the screening test. Delivered stool samples were tested using FOBT kit by laboratory assistants in the Referral Facility. Those who got positive FOBT results were advised to seek confirmatory colonoscopy tests. This study was conducted between December 2021 and August 2022.

Both primary and secondary data were collected using both qualitative and quantitative data collection methods. The principal investigator interviewed the KII.The data collection process was undertaken in two weeks at the baseline and two weeks for end line. The study tools that were used before Peer Education intervention were the same tools that were used at end-line. In addition, the respondents to the baseline tools were the same respondents for the end line study. Permission to access the administrative units for data collection was sought and obtained from the respective administrative heads. Once eligible participants were identified, their consent was sought and obtained and then questionnaire administered as appropriate.

Filled up questionnaires were reviewed daily to ensure accuracy and completeness. For qualitative data, permission was sought from the respective key informants prior to interviews. All the activities were undertaken with strict compliance to Covid -19 mitigation guidelines (Appendix IX).

3.11.1 Quantitative Data Collection

Quantitative approaches entailing the use of researcher administered pre-tested questionnaires (Appendix IV) at the baseline. All the information for the items of the questionnaire was based the American Cancer Society (ACS) (ACS,2019). The CBHIS tool for the longitudinal monitoring was used to monitor trends during the intervention period at the 10^{th} ,20^{th} and 30^{th} weeks of the intervention. Questionnaires were used because of their low costs, ensures anonymity, permits the use of standardized questions with uniform procedures and also provides the respondents with time to think through their responses and are easy to score (Kothari, 2004). Questionnaires are also used in research due to their ability to give similar or standardized questions to the subjects thereby allowing triangulation by comparing responses from different participants on same questions (Kerlinger, 1973).

Data on awareness and CRC screening services uptake before and after the intervention on screening uptake and awareness were collected using interviewer-administered pre-tested questionnaires (Mugenda and Mugenda, 2003) to the study respondents at the baseline and at

the end of the study. The measurement constructs (statements) for awareness were developed by the Principal Investigator and validated by the MOH experts from the Department of Health in Bungoma County were used to demonstrate awareness levels in terms of responses to the asked questions.

To determine the awareness of CRC screening, a modified Likert scale was used (Likert Rensis ,*1932).*Awareness was measured when a participant responds "yes" to the question "have you ever heard of CRC screening services" and chose at least **four** correct answers out of the **seven**. Each correct response to a question was assigned a score of 1.0 and each incorrect score was allocated 0.0, then the overall score was calculated for all the **seven** awareness questions for each respondent. The maximum expected score was **seven**. The cut-off point was set at **four** out of the maximum **seven.** Anyone scoring 3 or less (any value<mean) was termed as unaware while anyone scoring 4 and above ((values>mean) was classified as being aware of CRC screening. These are well articulated in the questionnaire (Appendix iv)

The questionnaires and the FGD tools were administered simultaneously to the respondents. Primary data on independent variables such as socio-demographic, socio-economic factors and health system factors and were captured. Participants were advised to visit the Bungoma County Referral Hospital for CRC screening. Those who visited were given stool collection tubes and appropriately advised (with written and verbal instructions) on how to provide uncontaminated stool specimens and to bring back within forty-eight hours of evacuation of the stool for processing.

Participants who turned out positive for CRC were counselled and referred for further investigations and appropriate management. Those who turned out negative for the CRC screening were counselled on how to live healthily in avoidance of CRC. During the study period, data was collected at the 10^{th},20^{th} and the 30^{th} week to establish the trends I awareness and uptake of CRC screening services using the same tools to establish. At the end of the 30^{th} week of the intervention, data was again collected using the same tools to establish the outcomes.

3.11.2 Qualitative Data Collection

Qualitative interviews were embedded on the quantitative. Ten (10) Focus Group Discussions (FGDs) consisting between 8-12 participants were held. The selected participants took part in the in-depth qualitative interviews which helped in providing deeper insights during and after

the Peer Education intervention using the FGD guides (Appendix V). The FGDs were held at the baseline, during the study and at the end line phases of the study. As recommended by Mugenda and Mugenda (2003) on the use of FGDs, the researcher developed a list of themes that guided participants during data collection, and this improved the accuracy of study findings.

They brought out insights in the differences based on the cultural and demographic diversity of the participants. The discussions were audio-taped and transcribed accordingly. This method was flexible and efficient since it allowed different types of evidence to be used to identify main concept of the effectiveness of Peer Education in increasing awareness and uptake of CRC screening (Mugenda and Mugenda 2003).

FGDs were used through dialogical interactions amongst the study participants who freely shared their views of CRC and screening to help enriching the data. In these group settings, participants shared multiple perceptions on screening methods, benefits, barriers, symptoms, own susceptibility, age at which to initiate screening, risks of not going for screening, age of starting the CRC screening and frequency, likely prompts and attitudes towards CRC. These were used to provide and ascertain the information on the realities on the ground and enhance accuracy since they were the current activities without complications of past or future projections of the respondents (Orodho,2004).

Key Informant interviews Schedules (Appendix VI) were held at the baseline. The semi-structured KII Guides were administered to the Key Informants on face-to-face to Bungoma County Director of Health Services, the Medical Superintendent for Mt. Elgon Sub County Hospital and the head of Oncology Unit at the Bungoma Referral Hospital to provide in-depth information. The KIIs were purposively sampled.

3.11.3 Longitudinal Monitoring Tool (The CBHIS Tool)

Longitudinal Monitoring Tool (Appendix VI) was developed and used for monitoring trends on a 10-weekly basis (trends on and the level of awareness and uptake of CRC screening services) amongst the study respondents during the intervention period.

3.11.4 Secondary Data Collection

Information on the awareness and uptake of CRC screening service was obtained from the Bungoma County Referral Hospital using retrospective investigations to determine the awareness and CRC screening service uptake patterns within the County. Additional material

was obtained from local and international journals, articles, books, newspapers and electronically stored information. Libraries in Maseno University and other institutions of higher learning were visited for more reference material**.** Table 3.2 gives details on objectives, data collection tools together and the data sources of the study**.**

Table 3. 3: Objectives, tools for collection and data sources

Objective	**Data Collection Tools**	**Data source**
1.To assess the awareness of CRC screening and associated factors among residents of Mt. Elgon Sub County Bungoma County	• Questionnaires • KII Schedules • FGD Guides	• 402 respondents • Key informants • FGD Discussants
2. To determine level of uptake of CRC screening and associated factors among residents of Mt. Elgon Sub County	• Questionnaires • KII Schedules • FGD Guides	• 402 respondents • Key informants • FGD Discussants
3.To establish the trends in awareness and uptake of CRC screening among residents of Mt. Elgon Sub County Bungoma County during the Peer Education	• Questionnaires • CBHIS • KII Schedules • FGD Guides	▪ 402 respondents ▪ Key informants ▪ FGD Discussants ▪ Health facility records
4.To evaluate the effectiveness of the Peer Education in increasing awareness of CRC screening among residents of Mt. Elgon Sub County Bungoma	• Questionnaires • KII Schedules • FGD Guides	▪ Health facility records ▪ 402 respondents ▪ Key informants ▪ FGD Discussants

5.To evaluate the effectiveness of the Peer Education intervention in increasing uptake of CRC screening among residents of Mt. Elgon Sub County Bungoma	•Questionnaires •KII Schedules •FGD Guides	• Health facility records • 402 respondents • Key informants • FGD Discussants

3.12 Data management and analysis

Quantitative data was cleaned, coded, and entered in excel spreadsheets and exported into IBM® SPSS Statistics 19.0 (SPSS Inc. Chicago, USA) for data analyses. This was followed by analysis of the study variables using both descriptive and inferential statistics. The descriptive statistics explained associations between the socio-demographic and the socio-economic characteristics and the dependant variables namely awareness of CRC screening and the uptake CRC screening. For inferential statistics, cross tabulation with Chi square test were used to establish the existence of statistically significant associations between the independent variables that included the socio-demographic, socio-economic and health systems factors with the dependent variables which are CRC screening awareness and uptake at $\alpha \leq 0.05$ (95% confidence interval).

Data gathered by the longitudinal monitoring tool have undergone descriptive analysis to describe the trends attributable to the intervention. To establish the association between the dependent and independent variables, the proportions of the variables were compared before Peer Education intervention and after the Peer Education intervention using chi-square with a p-value of $\alpha \leq 0.05$ considered significant. Cochran Q test was used to confirm the statistical significance of the differences between the various values of awareness and uptake of CRC screening at the 10^{th} week, 20^{th} and 30^{th} weeks during the intervention.

The difference between the uptake and awareness levels after Peer Education intervention and baseline phases demonstrated the effectiveness of the Peer Education intervention on increasing the levels of awareness and uptake of CRC screening uptake. McNemar's tests has been used to ascertain the statistical significance of the observed differences in awareness and uptake of CRC screening at the baseline and end-line phases of the study. The study's results have been presented in figures and tables.

Qualitative data collected from the interviews with KII and the FGD sessions were organized into categories then subjected to NVivo application for thematic analysis and themes developed presented as verbatim (thematic summarization and categorization). The researcher audio-recorded the interviews and later converted them into text through transcription. Essentially, the transcripts accurately captured the participants' views regarding the phenomenon under study. The Principal Investigator familiarised himself with the data by reading and reviewing the transcripts multiple times. Additionally, the stage involved noting initial ideas and observations. These ideas informed subsequent coding and themes development. The researcher systematically coded the transcripts to identify labels within the data set. These initial codes depicted relevant data segments guided by the research objectives. The thematic analysis addressed the specific objectives. We documented the;

Theme 1: The awareness of CRC screening services the by 45-75 years old residents of Mt. Elgon Sub-County and the factors influencing the uptake

Theme 2: The uptake of CRC screening services by 45-75 years old residents of Mt. Elgon Sub-County and the factors influencing the uptake

Theme 3: Trends in awareness and uptake of CRC screening and the factors influencing them

Theme 4: The effectiveness of the Peer Education intervention in increasing awareness of CRC screening amongst residents of Mt. Elgon Sub County.

Theme 5: The effectiveness of the Peer Education intervention in accelerating CRC screening uptake amongst residents of Mt. Elgon Sub County.

The analysis involved the determination of the socio-demographic characteristics of the study participants. This provided a detailed understanding of the participants backgrounds. Next, we explored their awareness of CRC screening services among the participants. The aim was to identify gaps and variations in their understanding. Further, the thematic analysis evaluated the implementation of the Peer Education intervention. The focus was on how effectively it addresses gaps and enhances awareness and uptake of CRC screening uptake. The responses to each question were then grouped. The next level involved identifying and cataloguing themes to make sense of the data. Thematic analysis was undertaken to help make sense of the responses from the interviewed participants; What main points were they making? *What surprising perspectives did they have? How did their ideas differ? What were the points of*

commonality? The researcher read through each interview and 'coded' the emerging themes. This involved selecting interesting comments and putting them into containers called 'codes.' The codes developed in the thematic analysis in NVivo 14 software were systematically applied to capture meaningful aspects of the data. Further, the researcher collated the codes for further analysis. The codes were then grouped into potential themes by aggregating related codes and consolidating relevant data. This phase of the thematic analysis involved the identification of overarching themes that captured the core aspects of the data in relation to each research objective. The researcher created a thematic map to visualize the relationships between these themes.

Themes were reviewed and refined by the researcher. This was to ensure that they accurately reflect the coded extracts coupled with effectively addressed the research questions. After several iterations, the themes and subthemes developed have been presented in verbatims alongside the quantitative data. Finally, the researcher has triangulated the findings of both the quantitative and qualitative to adequately answer the research objectives. Qualitative data was then presented verbatim with the respective quantitative data. Table 3.4 provides an overview of data analysis procedure adopted for each study objective.

Table 3.4: Data analysis

Objectives	**Study Variables**	**Analysis technique**
1&2	**Independent** ▪ Age ▪ Marital status ▪ Education ▪ Occupation ▪ Religion ▪ Level of education ▪ Level of household income ▪ Source of income **Dependen**t ▪ Awareness of CRC screening ▪ Uptake of CRC screening	▪ Descriptive statistics including percentages, proportions have been used. ▪ Frequencies and descriptions used to summarize the quantitative results. ▪ Chi square test of association established statistical association between the independent variables and the dependent variable (uptake of CRC screening services). Statistical significance was evaluated at $\alpha \leq 0.05$. ▪ Qualitative data was analyzed using NVivo application for thematic summarization and presented as verbatim alongside the quantitative results.

3.(Associations)	**Independent** ▪ Age ▪ Marital status ▪ Education ▪ Occupation ▪ Religion ▪ Level of education ▪ Level of household income ▪ Source of income **Dependent** ▪ Trends in CRC Screening ▪ Trends in awareness of CRC screening	▪ Proportions use to summarize the results. ▪ Chi square test established associations between dependent and the independent variables at $\alpha \leq 0.05$. ▪ Cochran Q test used to confirm the statistical significance of the differences in awareness and uptake of CRC screening at the 10^{th} week, 20^{th} and 30^{th} weeks during the intervention. ▪ Qualitative data subjected to NVivo application for thematic analysis and presented as verbatim alongside the quantitative results.
4&5 (Effectiveness)	▪ Baseline and endline results of awareness and uptake of CRC screening ▪ Comparison of baseline and end line survey results for awareness and uptake of CRC screening (**Effectiveness)**	▪ McNemar tests established statistical significance of observed differences in awareness of CRC screening before and after intervention ▪ Qualitative data subjected to NVivo application for thematic analysis and presented as verbatim alongside the quantitative results.

3.13 Ethical Considerations

Ethical considerations of a study ensure that the study addresses issues of the respondent's confidentiality, anonymity, avoidance of physical or psychological harm and avoidance of deception (Mugenda and Mugenda, 2003).

Approval to carry out this study was sought and obtained from School of Graduate Studies Maseno University (Appendix XIII), ethical clearance was also sought and received from Maseno University Ethics and Research Committee (Appendix XIV). Permission was also sought from NACOSTI (Appendix XV) Further authority to conduct the study in Bungoma County was sought and obtained from departments of Health (Appendix XVI) and Education (Appendix XVII) in County Government of Bungoma. The administrative leaders of the Bungoma County, Mt. Elgon Sub County as well as the wards and villages were also brought on board after being adequately briefed on the study and its purpose. The health facility administrators in both Bungoma County Referral Hospital and the Mt. Elgon Sub County Referral hospitals were also informed and appropriately engaged in the study for logistics and for participation as key informants.

The respondents were screened for eligibility and those who met the inclusion criteria were informed, explained to and requested to sign the consent form before the administration of

the research questionnaire and before the interviews with key informants. These were done based on appropriate information given in the consent form and adequate time given to consider the information and ask questions.

The consent was in a written form with details on ethical considerations, procedure of the study, benefits, risks and the right not to participate or withdraw at any time for any reason (Appendix II). There were no penalties for such withdrawals and this was clarified during the consenting process. Confidentiality was maintained at all times by use of non-identifiable data formats. Also, the information recorded either in voice or video was used strictly for research purposes only. Study data has been stored in password protected computers and lockable cabinets which are accessed only by authorized researchers. Data has been analyzed and reported in formats that do not allow identification of the individual participant.

In this study, the principle of beneficence a key pillar of Medical Research Ethics articulating the need for a study to have its benefits outweighing any possible harms was reinforced by the fact that Investigators were obligated of to act for the benefit of the respondents and at all times espoused moral rules that protected and defended the respondents' rights. The researchers prevented all forms of harm whether physical, psychological or social. In alignment to this principle, this study posed no harm and but conferred benefits of improved health by advocating for early detection of the CRC through screening. Participants with test result were counselled on the result and arrangements were made for follow-up colonoscopy tests. The findings have been shared with the participants to improve their understanding of the CRC screening dynamics. Those who turned out positive for the CRC screening test were linked to the referral facilities for appropriate management depending on the stage of disease progression.

3.14 Plan for dissemination of the study findings

Dissemination refers to the processes of sharing the research findings with the stakeholders and other audiences to aid consumption of the findings for sustainability. The results have been disseminated through publication in two international journals, suggested policy briefs for decision makers and presentations to the local community groups and other stakeholders in two workshops. Instructions on CRC screening through flyer distribution, newspaper advertisements, radio advertisements and publicity have also been shared with communities in Mt. Elgon Sub County**.**

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the study response rate of the participants who returned the questionnaires, the socio-demographic characteristics of the respondents. Inferential and descriptive statistics have been used to analyze the data on study variables. Further, the chapter presents the bivariate analysis to respond to the research questions aimed at determining the relationship between the dependent variables and the independent variables. Bivariate analysis is presented in form of chi-square.

The study has also employed Cochran Q test to ascertain the statistical significances of the observed across the differences in the dependent variables during the study. McNemars test has been used to ascertain the statistical significance in the differences between the baseline and endline values observed in the dependent variables. This chapter then presents the results under thematic sub sections in relation to the study's objectives. The interpretations focus on the dependent variables namely awareness and uptake of CRC screening.

4.2 The Study Response Rate

The study attained a response rate of 91.4 % of the adjusted sample size is reported in this study. A total of 440 participants were selected for the study before Peer Education intervention, 38 participants withdrew at various stages during the research period and thus were not included in the study leaving 402 respondents.

4.3 Sociodemographic Characteristics of the Study Population

The participants' age ranged from 45-75 years, majority 142 (35.3%) were in the age category of 65 – 75 years. Majority 218 (54.2%) of respondent being females. A majority of the participants; 136 (33.8%) reported secondary level education as the highest level of education they had attained. Farming was the main source of income for most; 218 (54.2%) of the participants, whereby a majority; 192 (47.8%) reporting to have engaged in their respective income activity for a period of 11 to 20 years. A majority; 210 (52.2%) of the participants reported having a household income of more than 30,000 Kenyan Shillings (KES).

Majority 342 (85.1%) of respondents were married, and by religion, above average 225 (56.0%) of the participants were Adventists, and least 37 (9.2%) protestants as presented in Table 4.1

Table 4.1 Sociodemographic Characteristics of the Participants

Characteristic	**n=402n**	**%**
Age Group (Years)		
45-54	132	32.8
55-64	128	31.8
65-75	142	35.3
Gender		
Males	184	45.8
Females	218	54.2
Religion		
Protestant	37	9.2
Catholic	102	25.4
Adventist	225	56.0
Muslim	38	9.4
Marital Status		
Married	342	85.1
Single	36	9.0
Divorced	24	6.0

Education Level		
Primary and below	130	32.3
Secondary	136	33.8
Diploma	76	18.9
Degree	60	14.9
Source of Income		
Farming	218	54.2
Self-employment	157	39.1
Formal Employment	27	6.7
Length of income activity		
<10 years	80	19.9
11 to 20 years	192	47.8
21 to 30 years	122	30.3
31 to 40 years	8	2.0
Household Income		
10,000 to 20,000	72	17.9
21,000 to 30,000	120	29.9
>30,000	210	52.2

4.4 Objective 1: Awareness on CRC Screening and associated factors before and after the Peer Education Intervention

To determine the awareness of CRC screening, a modified Likert scale was used (Likert Rensis ,1932). In this study, awareness of CRC screening was measured by a criterion which involved the participants having to respond "YES" to the question "have you ever heard of CRC screening services" and thereafter choosing at least **four** correct answers out of the **seven** constructs of CRC screening that were placed under investigation and presented as proportions.

Qualitative interviews were embedded on the quantitative. Focus Group Discussions (FGDs) consisting between 8-12 participants were held. The selected participants took part in the in-

depth qualitative interviews which helped in providing deeper insights. This was followed by analysis of the study variables using both descriptive and inferential statistics. The descriptive statistics explained associations between the socio-demographic and the socio-economic characteristics and the dependant variables namely awareness of CRC screening and the uptake CRC screening. For inferential statistics, cross tabulation with Chi square test were used to establish the existence of statistically significant associations between the independent variables that included the socio-demographic, socio-economic and health systems factors with the dependent variables which are CRC screening awareness and uptake at $\alpha \leq 0.05$ (95% confidence interval)

4.4.1 Awareness on CRC Screening Before the Peer Education Intervention

Before the Peer Education intervention, some 30 (7.5%) had heard of CRC screening. Out of this number, only 19 (4.7%) were able to correctly state at least one of the methods that were could be used. Another 24 (6.0%) were aware of benefits of CRC screening tests and were able to correctly state at least one of the benefits. A minority 24 (6.0%) were able to state at least one of the barriers to CRC screening. A small proportion of the participants 19 (4.7%) were able to correctly identify the age at which CRC screening is supposed to start and able to state the age as 45 years of age.

A smaller proportion of the participants 14 (3.5%) were able to correctly state the age at which CRC screening is supposed to stop and able to correctly state the age as 75 years of age. In one of the *FGDs a discussant stated: "I know that CRC screening should start at age 45 years"*. On the other hand, only 24 (5.97%) were aware of risks of not undergoing CRC screening and able to correctly state at least one of the possible outcomes in the likelihood of not screening or of delayed screening like later stage detection associated with poor prognosis of the CRC. An FGD discussant affirmed: *I do not know the benefits and risks of CRC screening"* A paltry 20 (5.0%) knew where they would go for CRC screening and were able to mention the Bungoma County Referral Hospital Another 23 (5.7%) were aware of frequency and intervals of CRC screening tests and able to correctly state the intervals at which the sequence should follow. Cumulatively, only 19 (4.7%) were of aware of CRC

screening and were able to correctly answer at least four questions out of the seven that were under investigation. Table 4.2 summarizes these findings.

Table 4.2 Summary of responses to the constructs of awareness on CRC screening before the Peer Education intervention

		(%) of respondents who answered YES Four questions	(%) of respondents who answered NO to the questions
1.	Heard of CRC screening?	30 (7.5%)	70 (92.5)
2.	Stated at least one screening method	19 (4.7%)	383 (95.3%)
3.	Stated at least one benefits of screening	24(6.0%)	378(76.0%)
4.	Stated at least one barrier to screening	24(6.0%)	378(6.0%)
5.	Correctly stated age to start screening for CRC as 45 years	19(4.7%0	383(95.3)
6.	Stated one risk of not screening	24 (6.0%)	102 (25.4%)
7.	Aware of where to go for screening	19(4.7%)	383(95.3%)
8.	Aware of age to stop screening	14(3.5%)	388(96.5%)
	Cumulative awareness of CRC screening	**19 (4.7%)**	**383 (95.3%)**

4.4.2 The Association between Socio-demographic Factors and awareness on CRC screening before the Peer Education Intervention

All socio-demographic factors; age (χ^2 = 0.023, p = 0.989), gender (χ^2 = 2.429, p = 0.603), ethnic background (χ^2 = 2.009, p = 0.734) marital status (χ^2 = 2.252p = 0.283), and religious

affiliation (χ^2 = 2.693, p = 0.441), highest level of education ($\chi2$ = 0.926, p = 0.819) source of income ($\chi2$ = 2.454, p = 0.293), length of income activity ($\chi2$ = 0.421, p = 0.936), and household income ($\chi2$ = 0.829, p = 0.661) did not demonstrate significant associations with awareness of CRC screening amongst the participants (Table 4.3).

Table 4.3: Association between Socio-demographic Factors and Awareness of CRC Screening before the Peer Education Intervention

Variables	CRC screening Awareness		χ^2	p-value
	Baseline			
Socio-demographic factors	**Aware n (%)**	**Not Aware n (%)**		
Age				
45-54	6 (1.5)	126 (31.3)	0.023	0.989
55-64	6 (1.5)	122 (30.3)		
65-75	7 (1.7)	135 (33.6)		
Gender				
Male	12 (3.0)	172 (42.8)	2.429	0.603
Female	7 (1.7)	211 (52.5)		
Marital Status				
Married	17 (4.2)	325 (80.8)	2.525	0.283
Single	0 (0.0)	36 (9.0)		
Divorced	2 (0.5)	22 (5.5)		
Religious affiliation				
Adventist	0 (0.0)	37 (9.2)	2.693	0.441
Catholic	6 (1.5)	96 (23.9)		
Protestant	12 (3.0)	213 (53.0)		
Muslim	1 (0.2)	37 (9.2)		
Highest level of education				
Primary	6 (1.5)	124 (30.8)	0.926	0.819
Secondary	5 (1.2)	131 (32.6)		
Diploma	5 (1.2)	71 (17.7)		
Degree	3 (0.7)	57 (14.2)		
Source of income				
Farming	9 (2.2)	209 (52.0)	2.454	0.293
Self-employed	10 (2.5)	147 (36.6)		
Formally employed	0 (0.0)	27 (6.7)		
Length of income activity				
<10 years	4 (1.0)	76 (18.9)	0.421	0.936
11-20 years	9 (2.2)	183 (45.5)		
21-30 years	6 (1.5)	116 (28.9)		
31-40 years	0 (0.0)	8 (2.0)		

Household income level				
10000-20000	4 (1.0)	68 (16.9)	0.829	0.661
21000-30000	7 (1.7)	113 (28.1)		
>30000	8 (2.0)	202 (50.2)		

Chi-square (χ^2) test for proportionality, statistically significant Chi-square (χ^2) at $\alpha \leq 0.05$.

4.4.3 Awareness on CRC Screening after the Peer Education Intervention

At the end of the 30th week following the Peer Education intervention these number, only 288 (71.6%) were able to correctly state at least one of the screening methods. A total of 285 (70.9%) were aware of the benefits of CRC screening tests and were able to correctly state at least one of the benefits. A majority 273 (67.9%) were able to state at least one of the barriers to CRC screening. A high proportion of the participants 265 (65.9%) were able to correctly identify the age at which CRC screening is supposed to start and able to correctly state the age as 45 years of age. A majority of the participants 262 (65.2%) were able to correctly state the age at which CRC screening is supposed to stop as 75 years. On the other hand, 300 (74.6%) were aware of risks of not taking CRC screening tests and able to correctly state at least one of the possible outcomes in the likelihood of not screening or of delayed screening. Table 4.4 summarizes these findings.

Table 4.4 A Summary of responses to the constructs of awareness of CRC screening after the Peer Education Intervention

	Awareness construct	(%) of respondents who answered YES for **Four** questions	(%) of respondents who answered NO to the questions
1.	Heard of CRC screening?	402 (100.00%)	O (0.00%)
2.	Stated at least one screening method	288 (71.6%)	114 (28.4%)
3.	Stated at least one benefits of CRC screening	285(70.9%)	117(29.1%)
4.	Stated at least one barrier to CRC screening	273(67.9%)	129(32.1%)
5.	Correctly stated age to start screening as 45 years	265(65.9%0	137(34.0)
6.	Stated one risk of not taking CRC screening tests	300 (74.6%)	102 (25.4%)
7.	Aware of where to go for screening	390(97.0%)	12(3.0%)
8.	Aware of frequency and intervals screening tests	303(75.4%)	99(24.6%)
	Cumulative awareness of CRC screening	**291 (72.4%)**	**111 (27.6%)**

4.4.4 Association between socio-demographic factors and awareness on CRC screening after the Peer Education Intervention

All the socio-demographic factors showed no significant association to awareness of CRC screening tests as follows: age ($\chi2 = 4.036$, $p = 0.074$), gender ($\chi2 = 0.71$, $p = 0.435$), marital status ($\chi2 = 2.929$, $p = 0.245$) highest level of education ($\chi2 = 4.507$, $p = 0.215$), length of time in the income activity ($\chi2 = 0.563$, $p=0.563$) and religious affiliation ($\chi2 = 3.18$, $p = 0.359$). However, the source of income and household income level demonstrated significant associations with CRC awareness after the intervention source of income ($\chi2 = 9.190$, $p = 0.008$*) and household income ($\chi2 = 0.\ 5.505$, $p = 0.020$*) respectively. Table 4.5 summarizes the findings.

Table 4.5: Association between Socio-demographic Factors and Awareness on CRC Screening after the Peer Education Intervention

Variables	Awareness of CRC screening after the intervention		χ^2	p-value
Socio-demographic factors	**Aware n (%)**	**Not Aware n (%)**		
Age				
45-54	104 (25.9)	28 (7.0)	4.036	0.074
55-64	89 (22.1)	39 (9.7)		
65-75	98 (24.4)	44 (10.9		
Gender				
Male	132 (32.8)	52 (12.9	0.071	0.438
Female	159 (39.6)	59 (14.7		
Marital Status				
Married	250 (62.2)	92 (22.9	2.929	0.245
Single	22 (5.5)	14 (3.5)		
Divorced	19 (4.7)	5 (1.2)		
Religious affiliation				
Adventist	28 (7.0)	9 (2.2)	3.180	0.359
Catholic	79 (19.7)	23 (5.7		
Protestant	155 (38.6)	70 (17		
Muslim	29 (7.2)	9 (2.2		
Level of education				
Primary	92 (22.9)	38 (9.5)	4.507	0.215
Secondary	101 (25.1)	35 (8.7)		
Diploma	60 (14.9)	16 (4.0)		

Degree	38 (9.5)	22 (5.5)		
Source of income				
Farming	165 (41.0)	53 (13.2)	9.190	0.008*
Self-employed	102 (25.4)	55 (13.7)		
Formally employed	24 (6.0)	3 (0.7)		
Length of income activity				
<10 years	59 (14.7)	21 (5.2)	0.563	0.553
11-20 years	140 (34.8)	52 (12.9)		
21-30 years	87 (21.6)	35 (8.7)		
31-40 years	5 (1.2)	3 (0.7)		
Household income level				
10000-20000	58 (14.4)	14 (3.5)	5.505	0.020*
21000-30000	91 (22.6)	29 (7.2)		
>30000	142 (35.3)	68(16.)		

Chi-square (χ^2) test for proportionality,
*Statistically significant Chi-square (χ^2) at $\alpha \leq 0.05$.

4.5 Objective 2: Uptake of CRC Screening and associated factors before and after Peer Education Intervention

The descriptive statistics explained associations between the socio-demographic and the dependant variables namely awareness of CRC screening and the uptake CRC screening. Descriptive statistics including percentages, proportions have been used to present the data. Frequencies and descriptions have been used to summarize the results. Chi square test conducted to establish associations between dependent and the independent variables at statistical significance of $\alpha \leq 0.05$. Qualitative data collected from the interviews with KII and the FGD sessions were organized into categories then subjected to NVivo application for thematic analysis and themes developed presented as verbatim (thematic summarization and categorization) alongside the quantitative results.

4.5.1 Uptake of CRC Screening before Peer Education Intervention

A paltry 5 (1.2%) of the participants reported to have ever taken a stool test with FOBT kit, whereas only 4 (1.0%) reported to have ever done any other CRC test. Cumulatively, the pre-intervention uptake level of the CRC screening uptake was at 2.2%. (Table 4.6)

Table 4.6: Uptake of CRC Screening by Participants before the Peer Education

n=402

		%
Uptake of CRC Screening Service		
Stool Test with FOBT Kit		
Yes	5	1.2
No	397	98.8
Ever done any other CRC Test		
Yes	4	1.0
No	398	99.0
Cumulative Total	9	
	2.2	

4.5.2 Association between the socio-demographic factors and the uptake of CRC screening (FOBT) before the Peer Education Intervention

Chi-square test was performed to establish association between socio-demographic factors and uptake of CRC screening services (FOBT) at $\alpha \leq 0.05$ at the start of the study. As shown in age ($\chi^2 = 2.781$, $p = 0.249$), gender ($\chi^2 = 1.355$, $p = 0.244$), marital status ($\chi^2 = 1.007$, $p = 0.604$) and religious affiliation ($\chi^2 = 1.192$, $p = 0.755$). education level ($\chi 2 = 0.386$, $p = 0.943$) source of income ($\chi 2 = 1.431$, $p = 0.489$) and household income ($\chi 2 = 2.494$, $p = 0.228$) (Table 4.7)

In the qualitative aspects, the participants, during the KIIs were also asked for their opinion on how different types of CRC tests may influence CRC screening uptake levels. The following was the view: "*The type of CRC screening is directly associated with the CRC screening uptake level. For example, a less invasive procedure that is affordable will attract more clients and can easily result in higher CRC screening services uptake among the*

residents (Participant 2, KII). Still in the qualitative data, the KIIs were asked whether content of the peer education may stimulate better CRC screening uptake behavior among the residents of Mt Elgon Sub County.

The following was the view of Participant 2, KII: *To some extent because very few persons have awareness of CRC screening amongst the residents of Mt. Elgon Sub County and therefore the content will serve as a crucial information to drive awareness and uptake of CRC screening. Additionally, with this era of internet and mobile phone devices that support browsing on the internet, some residents may access contents on CRC screening, and this may positively influence their screening uptake behaviors.*

Table 4.7 Association between the Uptake of CRC Screening (by FOBT) and the Socio-Demographic Factors before Peer Education Intervention

n=402				
	Uptake of CRC screening (FOBT)		**$\chi 2$**	**P-value**
	Yes n (%)	**No n (%)**		
Age				
45-54	3 (0.7)	129 (32.1)	2.781	0.249
55-64	0 (0.0)	128 (31.8)		
65-75	2 (0.5)	140 (34.8)		
Gender				
Male	1 (0.3)	183 (45.5)	1.355	0.244
Female	4 (1.0)	214 (53.2)		
Marital Status				
Married	4 (1.0)	338 (84.1)	1.007	0.604
Single	1 (0.3)	35 (8.7)		
Divorced	0 (0.0)	24 (5.9)		
Religion				
Protestants	1 (0.3)	36 (8.9)	1.192	0.755
Catholic	1 (0.3)	101 (25.1)		
Adventist	3 (0.7)	222 (55.3)		
Muslim	0 (0.0)	38 (9.4)		
Highest Level of Education				
Primary	1 (0.3)	129 (32.0)	0.386	0.943
Secondary	2 (0.5)	134 (33.3)		
Diploma	1 (0.3)	75 (18.6)		
Degree	1 (0.3)	59 (14.6)		
Income Source				
Farming	4 (1.0)	214 (53.2)	1.431	0.489
Self-Employed	1 (0.3)	156 (38.8)		

Formal Employment	0 (0.0)	27 (6.7)		
Household Income				
10000-20000	2 (0.3)	70 (17.6)	2.949	0.229
21000-30000	0 (0.0)	120 (29.9)		
>30000	3 (0.7)	207 (51.5)		

4.5.3 Socio-Demographic Factors and Uptake of CRC Screening Services (any other CRC test) before the Peer Education Intervention

Chi-square test was performed to establish association between socio-demographic factors and uptake of CRC screening services (any other CRC test) at $\alpha \leq 0.05$ at the beginning of the study. All the factors showed no significant association to uptake of stool test for any other CRC screening tests as follows: age ($\chi^2 = 2.208$, $p = 0.332$), gender ($\chi^2 = 0.29$, $p = 0.865$), marital status ($\chi^2 = 2.861$, $p = 0.239$ and religious affiliation ($\chi^2 = 2.988$, $p = 0.560$). Other results showed Education level, source of income, and household income showed no significant association uptake of CRC screening using other methods as follows education level ($\chi2 = 2.386$, $p = 0.419$) source of income ($\chi2 = 2.771$, $p = 0.250$) and household income ($\chi2 = 1.237$, $p = 0.539$). (Table 4.8).

Table 4.8: Association between Uptake of CRC Screening (by other tests) and the Socio-Demographic Factors

n=402				
	Uptake of CRC screening (any other CRC test)			
	Yes n (%)	**No n (%)**	**chi-square**	**p-value**
Age				
45-54	2 (0.5)	130 (32.3)	2.208	0.332
55-64	2 (0.5)	126 (31.3)		
65-75	0 (0.0)	142 (35.3)		
Gender				
Male	2 (0.5)	182 (45.3)	0.29	0.865
Female	2 (0.5)	216 (53.7)		
Marital Status				
Married	3 (0.7)	339 (84.4)	2.861	0.239
Single	0 (0.0)	36 (9.0)		
Divorced	1 (0.3)	23 (5.6)		

Religion				
Adventist	1 (0.3)	36 (8.9)	3.135	0.371
Catholic	2 (0.5)	100 (24.9)		
Protestant	1 (0.3)	224 (55.7)		
Muslim	0 (0.0)	38 (9.4)		
Highest Level of Education				
Primary	1 (0.3)	129 (32.0)	2.830	0.419
Secondary	1 (0.3)	135 (33.5)		
Diploma	2 (0.5)	74 (18.4)		
Degree	0 (0.0)	60 (14.9)		
Income Source				
Farming	1 (0.3)	217 (53.9)	2.771	0.250
Self-Employed	2 (0.5)	155 (38.6)		
Formal Employment	1 (0.3)	26 (6.4)		
Household Income				
10000-20000	1 (0.3)	71 (17.6)	1.237	0.539
21000-30000	2 (0.5)	118 (29.4)		
>30000	1 (0.3)	209 (51.9)		

In addition, it was further noted that the residents have inadequate information regarding the benefits and procedures of CRC screening uptake and this may not help in accelerating the CRC screening uptake in Mt. Elgon. In the FGD 2, a participant stated that lack of information about the symptoms of the CRC and availability of screening services and its benefits could lead to non-participation in the screening program. *"Lack of information about CRC screening services, where to go for screening, risk and benefits of CRC screening and symptoms of CRC are hindrances to participation in CRC screening exercises. I have not been screened because I do not know about the existence of CRC screening or even where to go for screening (Participant 2, FGD).*

Results from FGDs alluded to the fact that high levels of unawareness of CRC screening services were linked to low CRC screening uptake amongst the communities in Mt. Elgon. To emphasize this, the *FGD revealed that lack of awareness of the CRC screening services negatively influences the uptake of CRC screening services.* Reports from the County

Director of Health services suggested *that the increasing rates of CRC in the County may be related to the introduction of a "Western diet" coupled with rising obesity, physical inactivity and tobacco use (Participant 2, FGD).* further intimating that the CRC risks may escalate in LMICs to levels as high as those seen in HICs. He further opined that *"growing incomes has the potential of adaptation to more Western-style diet and greater exposure to other important risk factors for the development of CRC" (Participant 4, FGD).* However, he also noted that the Ministry of Health has put conventional ways of sensitization on CRC screening but have not resulted into increased CRC screening uptake among the Mt. Elgon Sub County residents

4.5.4 The uptake of CRC screening after the Peer Education Intervention

As shown in figure 4.1, the uptake of CRC screening after the Peer Education Intervention reported at the end of the 30th week was at 34 (8.50%) depicting an increase of 6.3%. The Peer Education intervention may have increased the awareness levels of CRC screening services and therefore increasing the uptake. The FGDs revealed that advice from Peer Educators can contribute to the adoption of healthy behavior among the residents of Mt Elgon Sub County including the screening for CRC. *They further opined that the medics should advocate for early detection by recommending CRC screening tests on persons they suspect to be highly susceptible (Participant 2, KII).*

After the Peer Education, the FGDs acknowledged that undergoing CRC screening may lower mortality by initiating appropriate treatment upon early detection of the disease and therefore contribute in reducing deaths that may be caused by CRC.A female FGD participant who had earlier expressed unawareness of the CRC screening services and its benefits eventually went for the screening after the Peer Education stating that, *" I therefore agree that those who have reached age 45 years should go for CRC screening because the benefits outweigh any associated risks*" (Participant 2, KII).

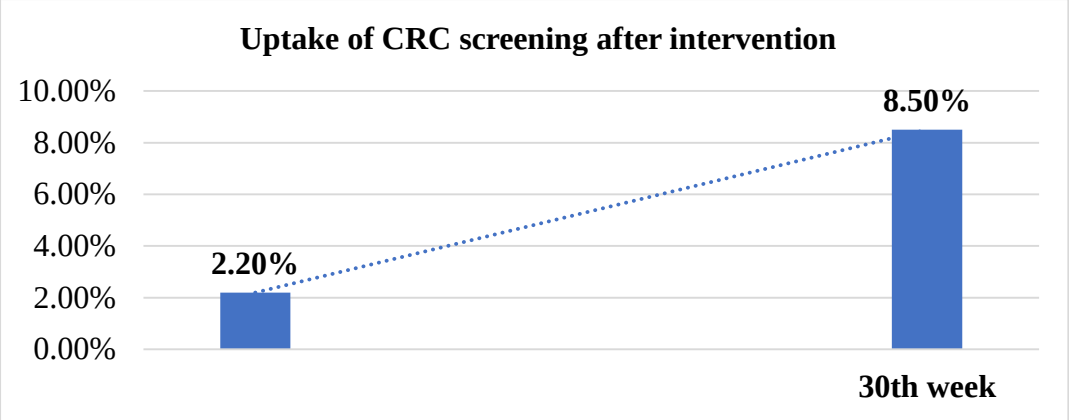

Figure 4.1The uptake of CRC screening after the intervention

4.5.5 Association between the socio-demographic factors and the uptake of CRC screening after the Peer Education Intervention

Chi-square test was performed to establish the significance of the observed associations at the 30th week at $\alpha \leq 0.05$. Age, gender, marital status and religion did not exhibit significant associations with uptake of CRC screening services (Chi-square: p=0.512, p=0.357, p=0.638, and p=0.718) respectively. (Table 4.9.).

Table 4.9 Socio-demographic Factors and uptake of CRC screening after Peer Education Intervention

	n=402				
	Uptake of CRC screening services			chi-square	p-value
	Total n (%)	Yes n (%)	No n (%)		
Age					
45-54	132 (32.8)	9 (2.2)	123 (30.6)	1.340	0.512
55-64	128 (31.8)	10 (2.4)	118 (29.4)		
65-75	142 (35.3)	15 (3.7)	127 (31.6)		
Gender					
Male	184 (45.8)	13 (3.2)	171 (42.6)	0.850	0.357
Female	218 (54.2)	21 (5.2)	197 (49.0)		
Marital Status					
Married	342 (85.1)	29 (7.2)	313 (77.9)	0.898	0.638
Single	36 (9.0)	4 (1.0)	32 (8.0)		

Divorced	24 (5.9)	1 (0.3)	23 (5.6)		
Religion					
Protestant	37 (9.2)	5 (1.2)	32 (8.0)	1.348	0.718
Catholic	102 (25.4)	8 (2.0)	94 (23.4)		
Adventist	225 (56.0)	18 (4.5)	207 (51.5)		
Muslim	38 (9.4)	3 (0.7)	35 (8.7)		
Highest Level of Education					
Primary	130 (32.3)	1 (0.3)	129(32.0)	103.997	<0.0001
Secondary	136 (33.8)	2 (0.5)	134(33.3)		
Diploma	76 (18.9)	13 (3.2)	63(15.7)		
Degree	60 (14.9)	25(6.2)	35 (8.7)		
Income Source					
Farming	218 (54.2)	16(4.0)	202(50.2)	1.000	0.607
Self-Employed	157 (39.1)	16(4.0)	141(35.1)		
Formal Employment	27 (6.7)	2(0.5)	25(6.2)		
Household Income					
10000-20000	72(17.9)	6(1.5)	66(16.4)	4.543	0.103
21000-30000	120(29.9)	5(1.3)	115(28.6)		
>30000	210(52.2)	23(5.7)	187(46.5)		

4.6 Objective 3: Trends in the uptake of CRC screening and awareness during the Peer Education

The study adopted three points at which the trends in the awareness and uptake of CRC screening were assessed after every ten weeks during the Peer Education intervention. This was aimed at monitoring any changes in the awareness and uptake of CRC screening during the Peer Education intervention. The Community Based Health Information System (Appendix VI) was employed for the longitudinal monitoring of the changes in the screening services uptake and awareness levels of CRC and to keep the study on track.The Principal Investigator did this on a ten-weekly basis (10^{th},20^{th} and 30^{th} weeks) to monitor the changes in awareness and uptake of CRC screening during implementation Peer Education sessions. Attendance registers (Appendix XVII) were used to ensure compliance to the training sessions**.**

4.6.1 Trends in awareness of CRC screening services during the Peer Education

The study reported that at the 10th week, there was a rise in awareness from 19 (4.7%) to 119 (29.6%) on awareness. This was followed by 221 (55.0%) in the 20th week and 291 (72.4%) in the 30th week as shown in Figure 4.2.

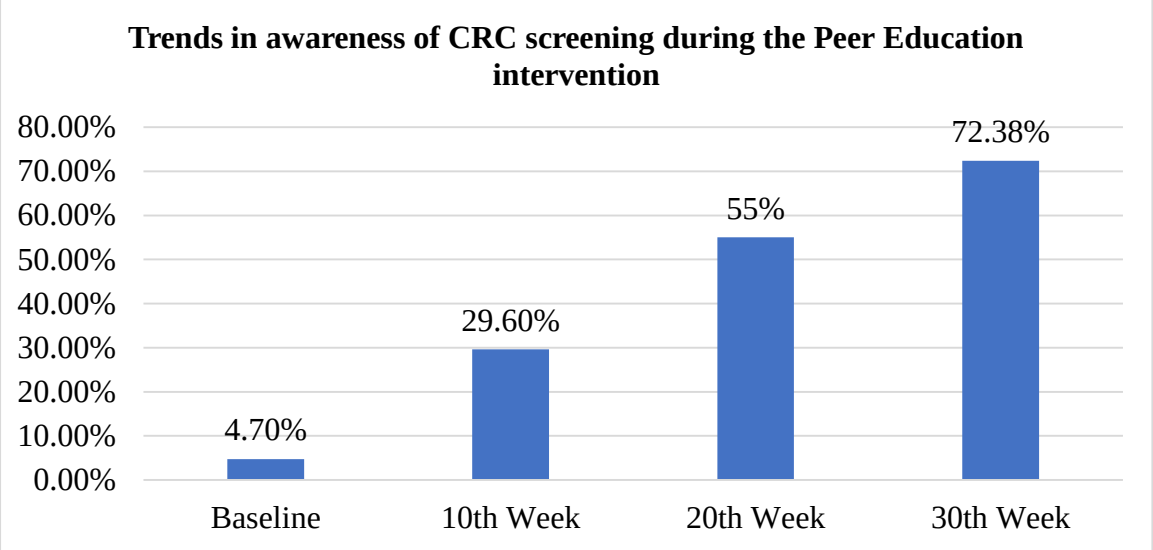

Figure 4.2: Trends in the CRC screening awareness levels during the Peer Education

Cochran's Q test was used to determine the statistical significance of the observed differences in the proportion of participants who were aware of CRC screening during the study period and this was confirmed as $\chi 2(3)449.671$, $p<0.001$ as shown in Table 4.10.

Table 4.10: Trends in awareness of CRC screening services during the Peer Education intervention.

CRC Awareness	Base line	10th week	20th week	Edline (30th week)	Cochran p-value
Aware	19 (4.7%)	119 (29.6%)	221 (55.0%)	291 (72.4%)	<0.0001
Not aware	383 (95.3%)	283 (70.4%)	181 (45.0%)	111 (27.6%)	
Proportionality in CRC awareness during the study and respective Cochran p-value					

4.6.2 Association between the Socio-Demographic Factors and Trends in Awareness of CRC Screening and the during the Peer Education Intervention

During the intervention, belonging to the age group of 45-54 increased the likelihood CRC screening awareness by 1.4 times (OR=1.355, 95% CI=1.016-1.80, p=0.038). Nonetheless, other socio-demographic factors; gender, ethnic background, marital status and religious affiliation did not demonstrate significant associations with CRC screening awareness during the intervention phase of the study (p=0.740, p=0.602, p=0.650, and p=0.948, respectively).

During the intervention, source of income had a bearing on the likelihood CRC screening awareness by 3.8 times (OR=3.787, 95% CI=1.074-13.353, p=0.038). In addition, the level of household income was positively associated with a higher CRC screening awareness by 1.5 times (OR=1.449, 95% CI=1.041-2.016, p=0.028). Nonetheless, highest level of education attained and length of income activity did not demonstrate significant associations with CRC screening awareness during the study (p=0.203 and p=0.395, respectively.

4.6.3 Trends in the Uptake of CRC Screening Services during the Peer Education Intervention

As shown in figure 4.3, there was a sharp rise in uptake CRC screening of at the point I (10th week) of assessment one as reported by 22 (5.5%) of the respondents. After that, there was a gradual rise in uptake in points II (20th week) and III (30th week), where it rose to 29 (7.20%) and to 34 (8.50%) respectively. During the intervention, *a participant stated that she underwent screening in the past one month on receiving the CRC information from the Peer Educators "After listening to the Peer Educators, I visited BCRH to enquire about CRC screening services and I was screened.".*

During the study, KII session revealed that there has been an increase in in the number of cases of CRC reported in the Bungoma County Referral Hospital over the past years but not an increase in the uptake of screening. The KIIs were also asked to explain to what extent the Government has rolled out programs towards increasing the uptake of CRC screening uptake. Responses indicated that: *This had not taken place because CRC screening has not been prioritized by the Healthcare system decision makers who are mainly focused on communicable diseases and cancers affecting reproductive systems like cancers of the breasts and cervix (among females) and prostrate (males)* (Participant 2, KII).

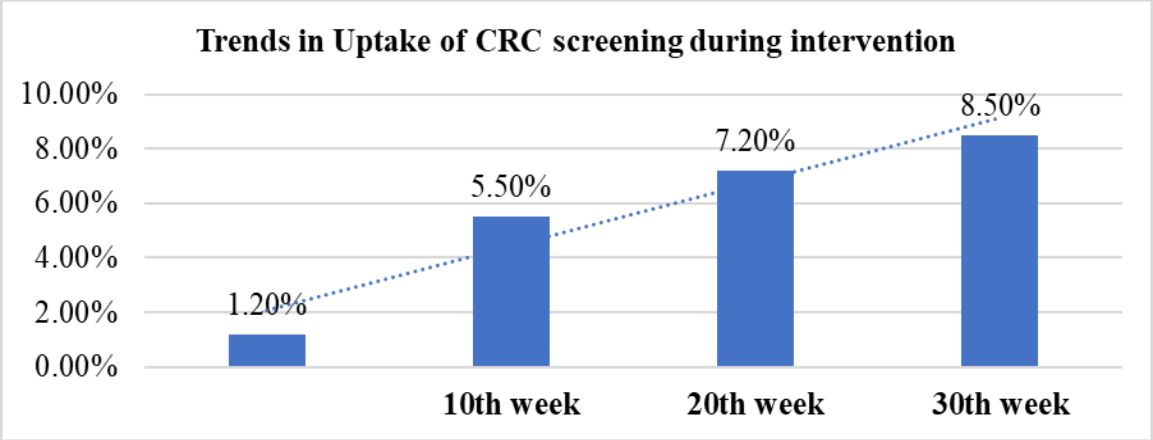

Figure 4.3 Trends in the Uptake of CRC Screening Services During the Peer Education Intervention

Cochran's Q test was used to determine the statistical significance of the differences observed in the proportion of participant's uptake of CRC screening during the study period which was confirmed at $\chi 2(3) = 61.404$, $p < 0.0001$ as shown in Table 4.11.

Table 4.11: Trends in uptake of CRC screening during the Peer Education intervention

CRC Uptake	Base line	10th week	20th week	Edline (30th week)	Cochran p-value
Yes	5 (1.2%)	22 (5.5%)	29 (7.2%)	34 (8.5%)	<0.0001
No	397 (98.8%)	380 (94.5%)	373 (92.8%)	368 (91.5%)	
Proportionality in uptake of CRC awareness during the study and respective Cochran p-value					

4.7 Objective 4: Effectiveness of the Peer Education Intervention in Accelerating Awareness and Uptake of CRC Screening

A comparison of the awareness and uptake of CRC screening among the residents of Mt Elgon Sub County before and after the Peer Education established the effectiveness of the intervention in achieving the expected changes in the levels of awareness and uptake of CRC screening services amongst the study's participants.

4.7.1 Effectiveness of the Peer Education Intervention in Accelerating CRC Awareness

Based on the results, out of the 19(4.7%) who were not aware of CRC screening before Peer Education intervention, 291 (72.38%) had become aware at the endline stage which depicted a 67.7% increment. An exact McNemar's test was used to determine whether there was a statistically significant difference in the proportion of those who were aware of CRC screening test before and after the Peer Education at $p = \leq 0.05$.

The McNemar's test established that there was a statistically significant difference in the proportion of participants who were aware pre- and post-peer education intervention, p=0.001 as shown in Table 4.12.

Table 4.12: Effectiveness of Peer Education in increasing Awareness of CRC screening

Awareness of CRC Screening service before and after Peer Education intervention					
Awareness of CRC screening Before Peer Education Intervention		**Awareness of CRC After Peer Education Intervention**		**Difference**	**McNemar P-Value**
Aware	19 (4.7%)	**Aware**	291(72.4%)		
Not Aware	383 (95.3%)	**Not Aware**	111(27.6%)	272 (67.7%)	0.001

The study concluded that there is a significant relationship between Peer Education intervention and the increase in the awareness of screening services among the respondents aged 45- 75 years in Mt. Elgon Sub-County. This study therefore adopted the alternative hypothesis (rejected the null hypothesis) based on the p-values (0.001) that were observed in tables.

4.7.2 Effectiveness of the Peer Education Intervention in Accelerating CRC Screening Uptake

Based on the results, out of the 9 (2.2%) who had undertaken CRC screening test at the beginning, a total 34 (8.5%) reported to have undertaken the test after the Peer Education. This represented an increase of 25 (6.3%) after the training. McNemar's test was used to determine whether there was a statistically significant difference in uptake of CRC screening service at $p = \leq 0.05$ during the baseline and endline periods of the study. McNemar's test established that there was a statistically significant difference in the proportion of participants who undertook CRC screening before and after the peer education intervention, p=0.001. This study therefore rejected the null hypothesis which had stated that Peer Education intervention has no significant effect or prediction on uptake of CRC screening test as shown in Table 4.13.

The FGDs also noted that after the health education, a participant from Kaptama village (FGD 5) reiterated; "*I have learnt that taking CRC screening tests is medically important to allow for early detection and early commencement of treatment and to inform appropriate*

behavioral changes in their lifestyles. To a great extent this a critical aspect of healthy living. Participants should therefore be encouraged to go for CRC screening (Participant 6, FGD).

Table 4.13 Effectiveness of Peer Education in increasing the uptake of CRC screening

Uptake of CRC screening before and after Peer Education intervention					
Uptake of CRC Screening Before Intervention		**Uptake of CRC Screening After Intervention**		**Difference**	**McNemar P-Value**
Yes	9 (2.2%)	**Yes**	34 (8.5%)	25 (6.3%)	0.001
No	393(97.8%)	**No**	368 (91.5%)		

CHAPTER FIVE

DISCUSSION

5.1. Introduction

This chapter presents discussions and opinions about the study results as well as findings of others who have investigated related topics. Concurrences to the previous studies highlighted. Similarly, the differences between the findings of this study and the previous researches are highlighted.

5.2 Awareness levels of CRC screening before and after the Peer Education intervention

The findings mirror a report by KNCSG, 2018 which revealed that Kenyans were generally unaware of CRC screening despite concerted efforts by the MOH to popularize screening of cancers as a step towards early detection to allow for early detection. This observation can be attributed to the poor healthcare infrastructure and poor health seeking behavior among the residents of Mt. Elgon Cub County.

The conventional model of sensitization and outreach programs in the region had therefore not yielded the desired outcomes across all the health indicators either. This position was corroborated by the KII as incapable of positively impacting on the awareness of CRC screening amongst the residents of Mt. Elgon who stated that MOH both at national and County levels have rolled out deliberate programs that promote awareness cancer screening services for common cancers including cervical, prostrate and even CRC albeit using the conventional health promotion models.

These findings indicated low awareness among the respondents on CRC on all the constructs that were investigated. These outcomes may be partially linked to the poor health-seeking behaviors among the 45–75-year-old residents of Mt. Elgon Sub County which limits their interaction with healthcare personnel who are the likely sources of information on CRC screening. This finding may also be attributed to the utilization of the less effective conventional health education strategies which often fall short in improving awareness and uptake of CRC screening particularly among underserved or high-risk populations (Gupta S, Tong L, Allison J, et al,2009). The low awareness of CRC screening can also be related to the resident's traditional lifestyle which entails the over-reliance on natural herbs for the management of diseases since this primarily prohibit the communities of Mt. Elgon sub county from visiting healthcare facilities which are the sources of information on CRC

screening. The KII further opined that Mt. Elgon Sub County residents do not openly hold conversations on screening of cancers since they are largely.

These results obtained before Peer Education intervention speak to the lack of interactive educational models, such as face-to-face conversations, community health outreach, or peer-led group discussions that may encourage active participation resulting in better retention of information and higher rates of health behavior change in Mt Elgon Sub County as was reported by the study conducted by Ruffin MT IV, Gorenflo DW, Woodman B (2000).

This study's post-intervention findings on awareness and uptake of CRC screening services mirror those of earlier studies in Europe where participants had fair levels of awareness of the CRC screening procedures but on still recorded low CRC screening services uptakes (Champion,2008). This lent credence to the fact that increase in awareness may not necessarily translate into a behavioral change like increased uptake of screening services.

Despite the increase in awareness, there were barriers that prohibited a corresponding increase in uptake of the CRC screening tests. In the case of Mt. Elgon Sub County residents, cues to go for screening may have been challenged by logistical and financial challenges involved in going to the Bungoma County Referral Hospital where the screening services (FOBT) is available.

In further concurrence with the HBM, this current study's findings also echo the earlier results posted by Chen, Basch, Yamada, (2010) and Griffith et al. (2009) which reported that screening by patients referred was significantly higher than the control group which reaffirmed the effects of health talks on increasing the possibilities of screening test uptake.

In relating to the HBM, it is worth mentioning that a study conducted in Iran that assessed the influence of HBM-based education also reported a significant increase in CRC screening awareness following the education intervention (Gholampour Y et al,2018). Therefore, both studies lend support to the application of the HBM constructs in accelerating behavioral changes among communities.

5.3 The CRC Screening uptake before and after the Peer Education Intervention

This figure is close to the levels of close to CRC screening uptake rates of approximately 1% previously reported Kenyan population (KNCSG, 2018)). The results also closely resonate with those obtained from a multicenter study involving 14 Asia-Pacific countries (Koo *et al*.,

2012) which reported that Malaysia another SSA had the second lowest rate of previous CRC testing (3%). This reaffirms the widely held view that the uptake of the CRC screening is still dismal in such LMICs countries.

The lack of awareness of CRC screening on the foregoing attributes have been suggested as barriers to CRC screening services uptake especially in areas with opportunistic screening than in those with well-organized programs (ACS, 2011). Reports from the KIIs also noted that the Ministry of Health have put in place the conventional sensitization program that advocate for increased CRC screening uptake among the Mt. Elgon Sub County residents although the uptake of CRC screening remains dismal.

A study by Robinson et al. (2016) similarly found that peer educators were instrumental in increasing CRC screening uptake among African Americans, a group that experiences disproportionate CRC mortality rates but lower screening participation. The study found that culturally tailored interventions, delivered by peer educators who shared similar backgrounds, led to an increase in the completion of both FOBT and colonoscopy screenings

In Kenya, the Mathare Youth Sports Association (MYSA) in a slum area of Nairobi offers reproductive health education while operating football teams, garbage collection and other community projects using the peer group facilitation model. This model proved to be very effective for adoption of good sexual behaviour among the participating team members.

The peers have a strong social identity a reference term to "the knowledge that we belong to particular groups, together with emotional and value significance of group membership" (Tajfel, 1981). It is worth noting that group norms help to shape or constrain the behaviors of the members as opposed to the generally held views that health related decisions are determined by individual rational choices (Stockdale, 1995). When undertaking a Peer Education programme, the objectives are often to reinforce positive behaviors, to develop new recommended behaviors, or to change risky behaviors in a target group using their peers.

The findings of this study resonate with the recommendations drawn by the National Cancer Monitoring and Evaluation Technical Working Group (NCMETWG) a body which was formed in 2018 to provide strategic leadership in the development of cancer research policy, ensure effective coordination of cancer research and also to monitor and evaluate the National Cancer Control Strategies (NCCS) implementation. In their (NCMETWG) 2023 report, they have recommended that due to the low uptake of CRC screening, a national

Colorectal Cancer screening program needs to be established at population level starting with pilot studies in selected Counties in Kenya. This lends credence to the justification for the establishment of structured sensitization and outreach programs on CRC screening. The foregoing literature underscores the significance of population screening for CRC in reducing the CRC burden in the communities.

The current study results are also consistent with the Nigerian study by Oladimeji *et al.*, 2010 which also reported that low awareness of prostate cancer screening services led to low uptake levels among the respondents before the intervention. In concurring to this, earlier researchers also reported that barriers towards CRC screening uptake included lack of knowledge of the cancers coupled with inaccessible and unaffordable screening facilities (Ely, Levy, Daly, & Xu, 2016).

The qualitative findings (FGDs) on the availability of the conventional outreach programs resonate with a study done by Katz, Young, Zimmermann, Tatum, and Paskett (2018) which revealed that CRC screening was not a priority to the health policy makers in most SSA countries that would warrant focused attention. According to the KII reports, context-specific strategies that may increase participation in the uptake of CRC screening services should be rolled out for the residents of Mt. Elgon Cub County. This argument corroborates the position reported in the KNSG,2018 which states that CRC screening have not been largely advocated for by the MOH team in Kenya generally.

Hasan *et al.* (2017) in a study also reported that the majority of study participants would have a colonoscopy screening if their doctor told them to and that they just don't know enough about colorectal cancer to make an informed decision. This may explain the low uptake since the voice of medical practitioners was lacking due to their poor health seeking habits which limited interactions with healthcare workers. Whereas the lack of CRC screening awareness is likely to be a significant deterrent to the uptake of CRC screening the improvement of knowledge among populations has not positively enhanced the decision-making process regarding CRC screening.

In revealing that FOBT was the preferred method of screening by the respondents, the results of this study contradicted the findings of a study conducted by Hol *et al.* (2010) where the authors found that flexible sigmoidoscopy and colonoscopy were the preferred methods over stool-based approaches for repeat screenings as well as those who had never been screened before. This observation may be associated with the different methodologies that were used

in the two studies. Whereas in this study the initial CRC screening services values focused on single-study observation at the baseline, the uptake of CRC screening services amongst the study participants in the study reported by Hol *et al* (2010) adopted a systematic review approach that quantitatively assessed the levels of CRC screening uptake as well as relative preferences of the different screening methods for many previous studies conducted over a period of time.

This observation may be related to the CRC screening resource limitations in Mt. Elgon Sub County, Bungoma County unlike the HICs where the other study was done. In low resource settings like Mt. Elgon Sub County in Bungoma County, only FOBT may be readily available for opportunistic screening. The contrasting reports can further be affirmed by the discrepancies in the availability and costs of the screening methods in resource constrained countries and the more developed countries where there is better availability and accessibility of the services where the systematic reviews were conducted.

These study's findings depicting the low CRC screening uptake levels before Peer Education have contradicted the outcomes of another study in the United States of America which reported that only 38% of adults aged 50 years and older have never had sigmoidoscopy or colonoscopy. This American study however reported that 79% of the respondents have never had a FOBT (Smith *et al*,2007). A possible explanation is hinged on the fact that in the USA, the sigmoidoscopy and colonoscopy services that have higher sensitivity are more readily available at affordable rates hence the motivation for their choices. In this study, the KIIs gave their opinions on how different types of CRC screening tests may influence CRC screening uptake levels and noted that the type of CRC screening is may be directly associated with the CRC screening uptake level with less invasive procedures attracting higher compliance.

This study's outcomes also agree with Saidi *et al*,2008 which alluded to the fact that there are many reasons for delays in undergoing CRC screening in low resource settings such as Mt. Elgon sub county particularly lack of awareness of CRC screening and its benefits among populations. In contrast, the reasons for adherence to screening services in studies conducted in Singapore and Thailand (Saengow *et al.,* 2015; Yong *et al.,* 2016) were attributed to the participants having clarity of the screening purposes and benefits. These outcomes reaffirmed those of earlier research by Wang *et al*,2012 which also reported that barriers towards the

CRC screening uptake are related to the fact that discussions on terminal malignancies are taboo subjects for many people in the SSA thus minimizing awareness of such.

This study results corroborate an earlier finding that rural area of residences was associated with low rates of CRC screening uptake in US studies (James *et al*, 2003) but contradicted the results reported by a Swedish study which found higher CRC screening uptake in rural areas (Blom *et al*,2008). These results may be attributed to the fact that in the US, the urban populations are highly aware of the possible symptoms of CRC and therefore less interested in asymptomatic screening for CRC. For the Swedish study, the higher likelihood of CRC screening in the rural areas may be attributed to the possibilities that more awareness campaigns targeted the rural populations. A possible interpretation for this observation lies in the higher levels of social support in marital life for improved health status in the HICs and the easier access to CRC screening facilities than in the LMICs.

The research results agree with reports from the Tenwek Hospital, a regional cancer referral facility that asymptomatic patients are rarely screened for CRC in Kenya. In the Tenwek Hospital, most patients of CRC present with advances stages of CRC Parker et.al, (2019). These two observations imply that the low awareness and low uptake of CRC screening services is a cross-cutting problem in the Kenya health sector and can be attributed to lack of focused campaigns on the CRC awareness and screening uptake. The study's findings therefore buttress the fact that there are delays in receiving CRC screening in low-resource settings especially the SSA.

This study results indicated that the education level showed significant association with awareness at Chi square p.0.014 while the source of income and household income showed no significant association uptake of stool test for FOBT (Chi square p=0.250, and p=0.539 respectively). This outcome differs with the results of a study conducted on the effects of the source of income and household income variables and their likelihood to influence the undergoing of CRC screening in Hong Kong and China (Kang and Qiao,2014). The Hong Kong and China studies revealed a positive relationship for education and household income with the uptake of CRC screening. This observation could be explained by the ease of availability and accessibility of the CRC screening programs in the two countries (China and Hong Kong) as opposed to Kenya.

The impact of age on CRC screening among the participants was not significant in the Mt. Elgon Sub County study which is contrary to findings by other studies that have been used to

advocate for people above age 50 to commence CRC screening (Durand *et al.*, 2021). This study's findings contradict the results of a Spanish study which indicated that increasing age showed a positive relationship with uptake of CRC screening (Gimeno-García *et al,*2011).
A plausible reason is that since CRC incidence increases with age, the advancement in age may likely result in a higher demand for CRC screening. This is a contradiction of earlier results showing that increasing age was associated with lower knowledge of CRC (Kang and Qiao,2014). While the explanations for these associations may not be clear, it is tenable that in the current technological advancements, younger people are likely to access more information about CRC screening than older counterparts.
After the Peer Education intervention, this study posted results that all the sociodemographic factors showed no significant association to uptake of stool test for any other CRC screening tests as follows. These finding disagree with an earlier study by Sahin *et al,* 2017 that alluded to the fact that the source of income and household income were significantly associated with uptake of CRC screening services uptake. This may be attributed to unavailability coupled with inaccessibility of CRC screening resources as opined by the KII reports.

5.4 Trends in Awareness and Uptake of CRC Screening during the Intervention

Despite the global trends, there is scarcity of data on the awareness and uptake of screening services among populations in SSA during interventions aimed at increasing them. The trends in awareness and uptake of CRC screening services among communities in Kenya have not yet been determined in general and specifically among the residents of Mt. Elgon sub county. The trends in awareness and uptake of CRC screening services during Peer Education intervention among populations had not been tested and documented for Mt. Elgon Sub County, Bungoma County, Kenya.

There was a disproportionate increase in awareness and uptake of CRC in this study whereby there was a lager margin of increment in awareness in comparison to that in the uptake. These findings resonate with the trends posted by Nyangasi *et al.* (2018) that also acknowledge that despite high awareness of cancer of the cervix screening services, the uptake of screening services for cervical cancer did not show correspondingly high rates in Kenya and therefore the strategies should be in place aiming at improving the uptake through health messages targeting the susceptible populations).

In this study the respondents were found to be of very poor health seeking behavior a factor that hindered access to health facilities where they could access information on awareness of

CRC screening. These results notably agree with earlier ones from studies which reckoned that lack of health education and inaccessible CRC screening are barriers to CRC screening awareness (Takahashi & Nakao, 2021) and (Sahin, Aker, and Arslan ,2017).

Similar findings were posted by Barasa et al (2017) which revealed that improving access to awareness of cancers and treatment in Kenya is hindered by poor health seeking-behaviors among the populations. On the reasons for increasing awareness of CRC screening during the intervention, the KIIs revealed that the P. E served to change the traditional health and beliefs in natural herbs in curing diseases that primarily inhibit the communities of Mt. Elgon people from engaging in the conventional preventive health care behavior such as CRC screening uptake.

These findings agree with the position stated as stated by theory of Diffusion of Innovations (Rogers E.M, 2003) which is a research model that describes how a positive health behavior spreads through a community or social structure. This theory opines that the innovators (at 2.5%) are keen to change, try new things and represent a very small percentage of the population while in this study the innovators represent 3.3% which close.

However, the findings are in congruence with an earlier study conducted in the implementation of interventions in real-life settings such as the Scottish CRC screening program reported that CRC screening uptake has steadily increased over the period of intervention (Quyn *et al*,2018).The qualitative findings also reported that the multiple requirements associated with CRC screening protocols such as FOBT entails the patients avoiding the consumption foods such as vegetables and meat before stool collection hence instigating negative attitudes amongst the Mt. Elgon communities. This fact may explain the large discrepancies between the observed CRC awareness and the recorded CRC screening uptake.

Findings by this study that Peer Education can gradually increase the CRC screening uptake provide a good solution to the observations from another study that CRC is on the rise and during the recent years it has reported a 2.7-fold increase between 1993 and 2005 in Nairobi, Kenya in Eastern Africa (Saidi *et al*, 2008). These are pointers to the need for increased CRC screening for early detection.

Our study further reported that during the Peer Education, the uptake of CRC screening has relationship with the participants' education status is in consonance with findings of an earlier

study by Wools A, Dapper EA, de Leeuw JR (2016) which reported that education may define health-seeking behaviors amongst communities. These findings presented here showing that during the intervention increase in uptake of CRC screening was associated with education and resonate well with findings from a Chinese study that also reported that higher educational level was an important factor that positively influences the likelihood of CRC screening participation and compliance (Choi *et al*,2014).

These findings concur with the current trends that have witnessed dramatic shift from information –based health education towards participatory approaches in recognition of health as a socially negotiated phenomenon strongly influenced by group based social identities especially peer identities (Myers *et al*,2007).

In both instances, trends during peer intervention have proved to be an effective approach in escalating the uptake of CRC screening services. Factors that may hinder or facilitate the decision to adopt an intervention are related to the perceived attributes of the intervention which include its relative advantage, compatibility, complexity, trialability, and observability (Roger, 2003). These issues are identified at the baseline and appropriately addressed as the focus areas for the trainings from the Peer Educators.

However, the outcomes of this study during the intervention indicating that education positively influences uptake of screening are in agreement with a European study by Champion,2008 that was carried out in 953 average-risk participants and reported that uptake of CRC screening was more than four times higher among participants with high education level. This lends credence to the possibility that education helps in bringing clarity to the constructs of awareness and the benefits of CRC screening and therefore boosting the capacity for decisions to undergo the CRC screening exercise.

5.5 Effectiveness of the Peer Education Intervention in accelerating Awareness on CRC screening

This study found a large increase of 72.4% in awareness of CRC screening. This finding is at variance with those by a study done by Birhanu *et al.* (2012) in Ethiopia which posted a direct correlation of awareness of CRC screening with its uptake. These differences in the findings may be attributed to the levels of development in the health infrastructures and the health seeking behaviors in the two research areas. Whereas the Mt. Elgon sub county residents have very poorly developed and understaffed health infrastructure, coupled with

poor health seeking behaviors, the Ethiopian population was endowed with better developed health infrastructure with CRC screening services at being offered even at lower-level health facilities.

This study also reported that health education delivered by Peer Educators can increase awareness of CRC screening services and this is in consonance to another earlier study by Todorov *et al, (*2018) in which education programs and subsequent referrals were found to be able to enhance the participant's morale and desire to take up the screening tests.

Results of this study have shown that Peer Education results in the increase in awareness of CRC screening and therefore empowers communities to seek the services from the health system. This calls for availability and accessibility of CRC in the health facilities. It presupposes that for purposes of achieving higher uptake of CRC screening, the linkage between the respondents and health systems ought to be strengthened.

Based on the results from McNemar's test, out of the 19 (4.7%) who were not aware on matters CRC before Peer Education intervention, 272 (67.7%) had become aware at the endline stage (post-intervention). McNemar's test further established that there was a statistically significant difference in the proportion of participants who were aware pre- and post-peer education intervention, p=0.001.In addition, the KIIs posited that increased awareness of CRC screening may not necessarily result in a corresponding increase in uptake of CRC screening because screening may involve endoscopic protocols or indirect measures such as stool tests which may discourage the participation in screening exercise. They further reported that in BCRH only the FOBT was available. In addition, it was further noted that the residents have inadequate information regarding the benefits and procedures of CRC screening uptake and this may not help in accelerating the CRC screening uptake in Mt. Elgon.

These study's results provide impetus for mainstreaming the peer educators into the health systems of the developing countries going by the observations by CDC Africa that by 2030, Africa will face a shortage of six million health workers thus creating the need for other forms of informal health assistants a key component for bridging the continent's needs (World Health Organization ,2018). Besides this, the focus of the CHP has mainly been on maternal and infant mortality and communicable diseases the with little emphasis on NCDs with the deployment ratio of one CHP to 5000 households compromises their capacity to be effective (Africa CDC,2018).

The outcomes of our current study disagree with those of earlier studies which showed that cultural norms of secrecy that bar individuals from discussing issues of CRC leads to low gain in awareness about the importance of CRC screening (Robb *et al,*2004). In the earlier study, there was no significant knowledge gain in CRC from the discussions since they were held under conditions of mistrust.

The study's outcomes are however similar to those that were obtained in the United States where the success of a similar intervention was attributed to the fact that peer-teachers and their colleagues share a similar knowledge base and experiences, otherwise known as "cognitive congruence", which allows the peer-teachers to use language that their peers understand and to explain concepts at an appropriate level that is context-specific (Yu Tzu-Chieh *et al,* 2011). In a similar design but in Nigeria, Peer Education has been used successfully on cervical cancer prevention and was shown to increase self-awareness among Urban residential women in South East Nigeria (Mbachu *et al,* 2017).

These findings resonate with the facts that the Peer Education is designed to fight any negativities that may be attached to the screening service uptake in a friendlier atmosphere without prejudices of a 'foreign facilitator' as it happens in the conventional models of training on new interventions (Yu Tzu-Chieh *et al,* 2011). Results of this study mirror the outcomes of an earlier research on African-American women which reported that women identifying themselves as moderately susceptible were more likely to adhere to screening than women in the high susceptibility group or those who did not know their susceptibility (Lisa *et al,*2015).

This study has confirmed that peer education has a direct and measurable impact on colorectal cancer screening uptake as was witnessed by numerous earlier interventions that depicted significant improvements in screening behaviors after individuals participate in peer-led programs Vernon *et al.* (2014).This study analyzed the effects of community-based interventions on CRC screening rates, finding that peer education interventions led to a substantial increase in both initial screening and follow-up adherence

This study also avers that Peer Education has the effects of increasing awareness as was the outcomes of another related research which reported that high rates of screening uptake can be achieved by modifying the phases of the behavior process by increasing the awareness about the important features of CRC and by reducing the barriers while amplifying the

perceived benefits of undergoing screening with the outcome of such interventions being to increase possibilities of scheduling appointments for CRC screening (Rodriguez MA, Bustamante AV, Ang A, *et al.* 2018).

This study fails to appreciate the fact that other barriers towards screening may include existence of alternative medicine that are highly dependent on individual income levels despite availability of government subsidies, poor health-seeking behaviors, poor patient-provider communication deficient economic and moral support from family and peers as was reported by KEMRI (2006).

The findings are also in sync with earlier studies which had reported that some of the reasons for not participating in CRC screening have pointed to low self-perceived risk, dislike of the test, low confidence, and lack of social support (NGMCK, 2013) and therefore in support of the HBM constructs that perceived risk is a determinant of the likelihood of a behavioral change.

5.6 Effectiveness of Peer Education intervention in accelerating CRC screening uptake

This study recorded an increase of 8.5% in uptake of CRC screening. This result mirrors that of an earlier study by Bevan & Rutter, 2018 in Durham (United Kingdom) which also reported that a peer education intervention, the combined post-intervention uptake level for CRC screening rose significantly to levels close to the recommendation by WHO that a country should conduct CRC screening to 70% of the population at risk (World Health Organization, 2007). However, in the UK study, there was a larger increase than the Mt. Elgon Study a fact that may be attributed to several factors including the higher availability and accessibility of the screening services in the UK than in our local resource constrained settings.

The results of this study therefore confirm that Peer Education is an important booster of CRC screening uptake. One of the vital results of the study was that majority of the participants did not undergo CRC screening even after implementation of Peer Education. The main reason given for low uptake was fear of the outcome. Some respondents asserted that they feared the stigma that accompanies a positive result.

In a similar design but in Nigeria, Peer Education was used successfully on cervical cancer prevention and was shown to increase awareness and uptake of screening among Urban residential women in South East Nigeria (Mbachu et al, 2017). Studies in both Nigeria and

Ghana, through the West African Youth Initiative, youth worked as Peer Educators and were involved in programme planning, design, implementation, and evaluation. As a result of the intervention, reproductive health knowledge, ability to use contraceptives and proportion of youths reporting use of a modern contraceptive increased significantly.

Additionally, the selection of Peer Educators from the local teaching fraternity positioned them better in understanding and therefore mitigating any barriers to CRC screening uptake that exist in the community. The Peer Education is implemented on the assumption that most respondents can access screening facilities. It is however important to note that uptake of CRC screening is a multifactorial phenomenon involving individual, social, and structural factors. It is therefore concluded that concerted efforts of many players of different disciplines including health, water, nutrition, social services and others can hasten change in CRC screening uptake.

These results are also similar to those of an earlier community-based participatory research (CBPR) study by Rodriguez et al. (2018) which demonstrated how the integration of peer education into local health organizations in Hispanic communities led to sustainable improvements in CRC screening rates over a period of five years. The study emphasized that the peer educators continued their work long after the formal research project had ended, highlighting the potential for lasting change (Rodriguez MA, Bustamante AV, Ang A, et al. 2018). For our study too, the peer trainers who are residents in the locality are also expected to continue with discussion with community well after the study.

The outcomes of this study affirm the outcomes of earlier studies on CRC in South Asia which reported that peer-to-peer interactions during focus groups facilitates the sharing of screening experiences and learning, including sensitive information about the various CRC screening methods (Crawford *et al*., 2015b). After the Peer Education, a motivation for agreeing to CRC screening was the awareness of the possibly its benefits a fact which resonates well with the propositions by the HBM.

However, considering the level of increase in awareness in comparison to the amount of increase in the uptake of CRC screening, current study posits that increasing awareness of CRC screening might play a minor role in influencing the screening services uptake among the participants contrary to HBM. This might be explained in part by conservative cultural values of the residents of Mt. Elgon Sub County which persuades them to seek alternative

healthcare methods that are largely traditional thus minimizing their visits to conventional medical facilities.

These results are in consonance with those from a study by Rodriguez MA, Bustamante AV, Ang A, et al,2018 which reported that peer education interventions can play a critical role in increasing awareness and uptake of colorectal cancer screening. These results were attributed to the fact that peer education leverages on the trust and cultural competence of peer educators, these interventions can effectively address barriers to screening, such as lack of knowledge, fear, mistrust, and logistical challenges. Because of the minimum costs involved, peer education is particularly effective in reaching underserved and minority populations like the Mt Elgon Sub County residents where it can lead to more equitable health outcomes.

This study also reported that health education delivered by Peer Educators can increase CRC screening services uptake through referrals after the training and this is in consonance to another earlier studies (Todorov *et al.,* 2018) in which education programs and subsequent referrals were found to be able to enhance the participant's morale and desire to not only take up the screening tests but also alter their behaviors by refraining from alcohol and adhering to dietary and physical exercise coordination plans during and after treatment.

Of great significance are the findings showing that still after the intervention 91.3% of the respondents were still unwilling to take-up CRC screening. The higher unwillingness levels to screen for CRC in Mt. Elgon Sub County may be attributed to the low awareness of the possibility of the CRC occurrence amongst the Mt. Elgon residents. Taken together these findings suggest that there was a low level of willingness for screening for CRC among the population. This resonated with earlier results by Hasan *et al.* (2017) which reported that a general awareness deficit about CRC may prevent patients from making an informed decision whether to receive CRC screening or not.

The results disagree with a recent study reported that awareness was directly associated with uptake CRC screening in older Chinese adults (Choi *et al,*2014). In the present research, awareness marginally influenced the uptake of CRC screening just like in previous reports from related studies which demonstrated strong, consistent association between contact with medical provider and the likelihood of CRC screening among Chinese people.

Findings from related studies but on cervical cancer undertaken in Kenya and in Northern Nigeria found that cervical cancer screening uptake increased significantly following the

utilization of a training model spearheaded by community health educators (Ndinda, Nzioki and Karama,2020 &Abiodun *et al* 2014). These two studies share the underpinning model on diffusions of innovations with the only difference being in the types of persons used for training the target populations. Whereas in this study PSTs were to accelerate the uptake of CRC screening services uptake, the study used the conventional health workers to accelerate the uptake of cervical screening services uptake.

In both cases, the Diffusion of Innovations Theory as proposed by Roger,2003 was adhered to where an initial group was empowered with relevant information on behavioral change (awareness and uptake of CRC screening services) for onward transmission to the target audiences related study by Jisa (2021) which sought to find out factors influencing uptake of cervical cancer screening services among women in found out that low level of awareness on cervical cancer screening was significantly associated with non-participation in screening services.

In our current study, the increased awareness of CRC was not a critical factor in creating a large increase in screening services uptake. This finding reinforces the importance of a support system from the healthcare professionals to create client's awareness of various methods of CRC screening services. The results are in tandem with evidence from the foregoing studies documented have shown that even though population screening is an effective way CRC management, the institution of mechanisms to accelerate the uptake of screening services, the participation in screening may remain poor with compliance rates lower than 50% in population-based programs carried out in Europe and USA (Levin *et al*,2008).

These outcomes are like the findings from a study that was conducted in the US where culturally targeted educational programs about CRC for Blacks and Latinos including education about screening and peer testimony given by a colonoscopy-adherent person and pre- and post-knowledge assessment were found to be effective in accelerating CRC screening services uptake (M Crookes *et al,* 2014). The observed effectiveness of the intervention implies that the intervention was able to highlight the health implications of not going for CRC test and this revelation resonates well with the outcomes of a study carried out in a large representative sample of UK, participants who answered that their risk was higher than average-risk population were more willing to participate in CRC screening (98%) than those who answered same risk (84%) or lower risk (74%) (GLOBOCCAN, 2018).

In addition, a community-focused education program was evaluated and found to be a potential prevention activity for reducing the poor adherence and was capable of making the patient an active participant in their CRC care programs (Tucker A and Tucker P,2012).Results from this study have further demonstrated that increased awareness after the intervention has the effects of increasing the possibilities of participation in the screening programs as was reported by a study on factors influencing uptake of CRC screening services where findings revealed that increased awareness of CRC symptoms was associated with utilization of CRC procedures (OR 6.46, CI 95% (4.28–9.74)) or up-to-date screening (OR 7.23, CI 95% (4.36–11.98) (Carlo *et al*,2004).

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents a summary, conclusions and recommendations of the study based on the preceding chapters. Major conclusions are highlighted in line with the study objectives. Recommendations from the study have been made in two key areas namely: recommendations for policymaking and programming and the recommendations for further research.

6.2 Summary of the findings

The study reported a 67.7% increment in awareness of CRC screening. McNemar's test confirmed that the increase in the proportion of those who were aware of CRC screening test before and after the Peer Education was a statistically significant at $p = \leq 0.05$ at p=0. 001.All socio-demographic factors did not demonstrate significant associations with awareness of CRC screening amongst the participants before the Peer Education intervention. It is equally worth noting that in the qualitative data gathered using the FGDs, Mt. Elgon Sub County residents reported similarly low awareness of CRC screening

Before the Peer Education, uptake of CRC screening uptake was at 2.2%. All socio-demographic factors did not demonstrate significant associations with uptake of CRC screening amongst the participants. There was an increase of 25 (6.3%) after the training. McNemar's test established that this increase was a statistically, p=0.001.

On trends of awareness and uptake of CRC screening during the intervention, the study observed a consistent positive trajectory in awareness and minimal increase in uptake meaning that the intervention had more influence on awareness as opposed to uptake. Cochran's Q test confirmed the statistical significance of the observed differences in the proportion of participants who were aware of CRC screening during the study as $\chi 2(3)449.671$, $p<0.001$ and for screening uptake at $\chi 2(3) = 61.404$, $p < 0.0001$.

The study further revealed that during the intervention, belonging to the age group of 45-54 increased the likelihood CRC screening awareness by 1.4 times (OR=1.355, 95% CI=1.016-1.80, p=0.038). Nonetheless, other socio-demographic factors had no statistically significant associations with CRC screening awareness during the intervention.

6.3 Conclusions

The study concluded that there is a significant relationship between Peer Education intervention and the increase in the awareness and uptake of screening among the respondents aged 45- 75 years in Mt. Elgon Sub-County

The studies concludes that Peer Education anchored on HBM and DOI attained statistically significant increases in awareness and uptake and can be relied upon as frameworks for anchoring advocacies on behavioral changes in CRC screening awareness and uptake amongst the residents of Mt. Elgon Sub County, Bungoma County.

This study further noted that Peer Education is effective for disproportionately increasing the awareness and uptake of CRC screening services among residents of Mt. Elgon Sub County in Bungoma County, Kenya with a larger increase in awareness than for uptake of CRC screening. Peer Educators should therefore be recognized as suitable health advocacy model in disseminating information aimed at accelerating awareness and uptake of CRC screening.

In conclusion, the findings of this study suggest that health education anchored on HBM and delivered by Peer Educators during group meetings can be a fundamental cog in improving the awareness and uptake of CRC screening amongst residents of Mt. Elgon Sub County in Kenya.

This study therefore contends that Peer Education is a strategy for increasing the CRC screening uptake but need to be integrated with complementary strategies higher CRC screening uptake.

6.3 Recommendations

Recommendations from the study have been made in two key areas namely: recommendations for further research and recommendations for policy and programming.

6.3.1 Recommendations for Policy and and Programming

1. On awareness of CRC screening, the health policy makers in Bungoma county should strengthen integrated programs for promoting awareness of CRC screening
2. These findings call for MOH policy makers to mainstream Peer Educators in the roles of provision of CRC screening health information in programs of CRC awareness and uptake promotion. These should target key at risk populations in the bid to increase awareness and uptake of CRC. This model of intervention shall leverage on the existing primary healthcare structures in Kenya.
3. On trends awareness of CRC Screening, policy makers should consider strengthening innovative service delivery models such as Peer Educators in alignment to witnessed dramatic shift from information –based health education towards participatory approaches. Policy makers ought to review existing frameworks for the provision of CRC screening at the community level using alternative strategies in recognition of health as a socially negotiated phenomenon that is strongly influenced by group based social identities.
4. On effectiveness of Peer Education in increasing uptake of CRC Screening, Bungoma County health department should consider integrating information on uptake of CRC screening in the health services during regular hospital (reproductive Health, HIV, Outpatient Department, Maternal and Child Health among the high-risk groups)

6.3.2 Recommendations for further research

1. After the Peer Education in the community the awareness of CRC screening recorded a bigger change than witnessed for uptake of CRC screening. This study therefore, recommends further research be undertaken by Directorate of Health Promotion and Education (Kenya) research to provide an in-depth understanding of the barriers and

facilitators of the uptake of CRC screening and possibly recommend other complementary strategies that may accelerate the CRC screening uptake.

2. A study be conducted to determine the extent of follow-up tests uptake after positive CRC screening results (should be high for the intervention to be considered effective)
3. The Ministry of Health -National Cancer Control Programs (MOH-NCCP), Civil Society and other partners should consider the provision of organized cancer screening at all health facilities through integration, use of digital technologies and innovative service delivery models such as use of Peer Educators in the mobile screening outreach services. These recommendations may warrant the consideration of decentralization of CRC screening services to lower-level facilities including Mt. Elgon Sub County hospital and also the training non-physician endoscopists to perform screening in the lower-level hospital facilities.

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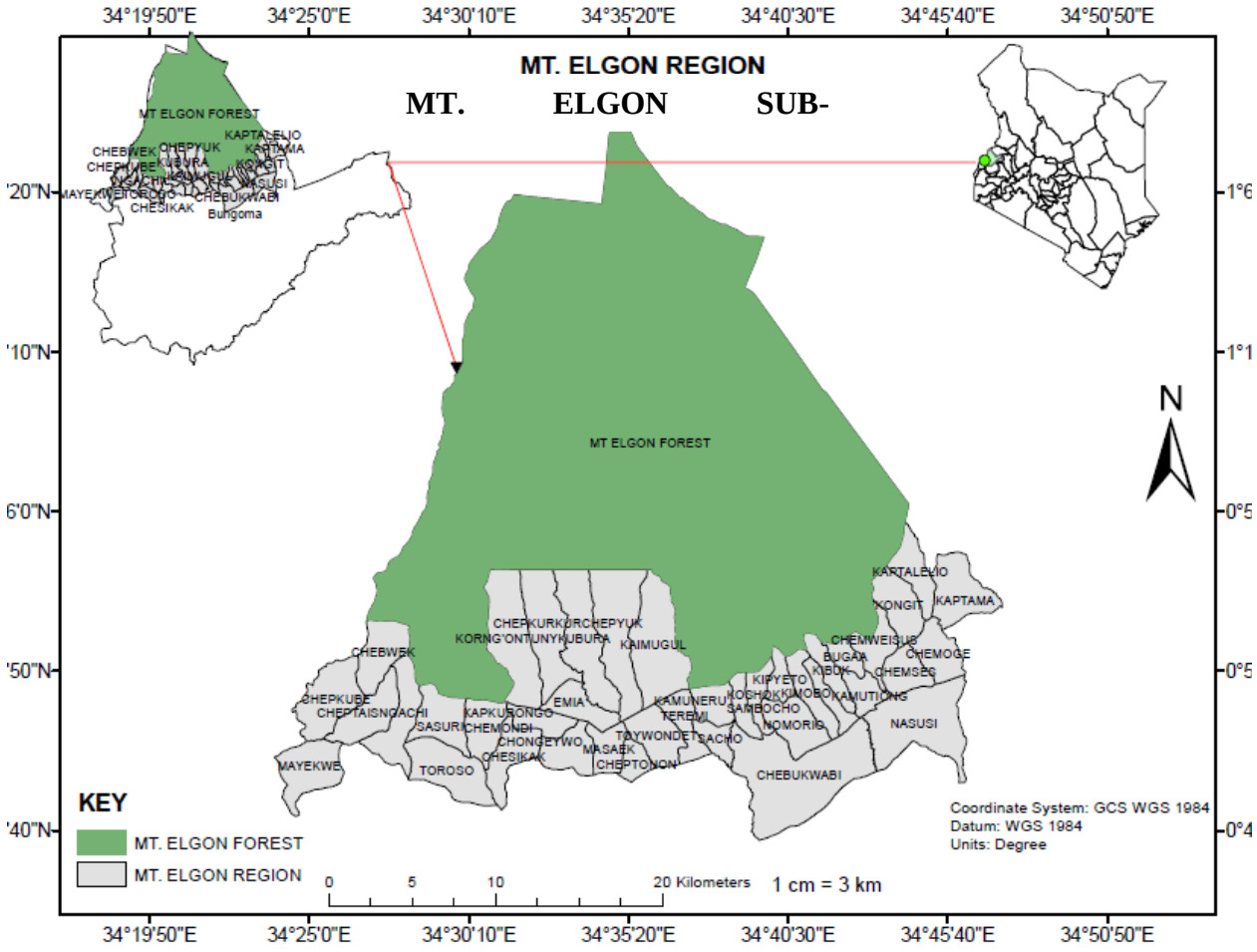
APPENDICES

APPENDIX I: A MAP OF KENYA SHOWING THE POSITION OF MT. ELGON SUB COUNTY OF BUNGOMA COUNTY



APPENDIX II: INFORMED CONSENT

Instructions.

The respondent MUST be an adult of 45-75 years of age residing in Mt. Elgon Sub County, Bungoma County.

Introduction

Hello. My name is Chrispine O. Ngwawe. I am a PhD Candidate at Maseno University.

I am carrying out a study on the **EFFECTIVENESS OF PEER EDUCATION INTERVENTION IN INCREASING UPTAKE OF COLORECTAL CANCER SCREENING AMONGST RESIDENTS OF MT. ELGON SUB COUNTY BUNGOMA COUNTY, KENYA**

Your participation is voluntary. In the event that you wish to opt of the study, you will be at liberty to withdraw your participation at any stage of the study. The study is set to improve the quality of life for the resident by increasing the awareness and uptake of Colorectal cancer screening as described.

Please be assured that your personal identification details will be held with confidentially by the researcher and will not be disclosed including during the dissemination of study results.

Kindly sign on the spaces below if you fully understand the motive and agree to participate in the research

Name……

Signature……..

Date……

APPENDIX III: THE PEER EDUCATION INTERVENTION CURRICULUM AND THE TRAINING PROGRAM

Introduction

TRAINING MANUAL FOR TRAINING OF THE PEERS EDUCATORS AND RESIDENTS OF MT. ELGON SUB COUNTY

STUDY OF: PEER EDUCATION INTERVENTION FOR INCREASING UPTAKE OF COLORECTAL CANCER SCREENING AMONGST RESIDENTS OF MT. ELGON SUB COUNTY, BUNGOMA COUNTY, KENYA

BY

NGWAWE OCHIENG CHRISPINE

SCHOOL OF PUBLIC HEALTH

MASENO UNIVERSITY

NOVEMBER 2021

Introduction

Colorectal cancer is a leading cause of cancer morbidity and mortality worldwide In Kenya it is among the top cancers affecting both men and women, with the number of new cases estimated at 2,316 and deaths at 1,466 (GLOBOCAN, 2018). It is preventable since most colorectal cancers develop from precancerous polyps which when detected early can be removed. It can also be cured if diagnosed early. Patients normally present with a change in bowel habits (diarrhea or constipation), per rectal bleeding, persistent abdominal discomfort (cramps, bloating/flatulence, abdominal pain), tenesmus (feeling of incomplete bowel emptying), weakness or fatigue or unexplained weight loss, iron-deficiency anemia and intestinal obstruction. However, many people with colon cancer experience no symptoms in the early stages of the disease. When symptoms appear, they will likely vary, depending on the size of the cancer and location in the large intestine. The symptoms are relatively non-specific and may mimic other conditions such as gastro-intestinal infections and other inflammatory conditions. Therefore, a high index of suspicion is required. Majority of colorectal cancers arise from polyps. The two classes of precancerous lesions that predispose to colorectal cancer are conventional adenomas and serrated polyps

KEY RECOMMENDATIONS

• Age to begin screening is 45 years for average-risk persons and to stop screening 75 years for average-risk persons.

• FOBT is the recommended screening test in average-risk persons

• Colonoscopy is recommended for high-risk persons

• More frequent screening in high-risk persons - on average, every 5 years.

• Genetic testing for familial

RISK FACTORS

Non-modifiable risk factors

• Older age - greater than 45 years old

• Inflammatory bowel disease such as Crohn’s disease or ulcerative colitis.

• A family history of colorectal cancer or colorectal polyps.

• Presence of genetic syndromes like familial adenomatous polyposis (FAP) or hereditary non-polyposis colorectal cancer (Lynch syndrome)

Modifiable risk factors

• Intake of red and processed meats

• Physical inactivity

• Low fruit and vegetable intake

• A low-fiber and high-fat diet

• Obesity

• Alcohol intake

• Tobacco use

RATIONALE FOR SCREENING

Colorectal cancer is associated with high morbidity and mortality rates in Kenya. Majority of colorectal cancer cases are locally invasive or distantly metastatic at diagnosis. Screening provides an opportunity for detection and removal of pre-cancerous lesions which prevent or delay the occurrence of colorectal cancer. In addition, detection of early-stage disease allows early therapeutic intervention/treatment with good clinical outcomes. The aim of colorectal cancer screening is the detection of precancerous lesions (adenomas and serrated polyps) and early cancer lesions.

Colonoscopy

Colonoscopy involves using an endoscope inserted via the anus to visualize the entire colon and rectum directly.

The advantages of colonoscopy include:

• High sensitivity for cancer and all classes of precancerous lesions

• Diagnosis and treatment can be done in a single session

• It allows for long intervals between examinations (10 years) in subjects with normal findings. One or 2 negative examinations may signal lifetime protection against CRC.

It is ideal for patients who value the highest level of sensitivity in detection of precancerous lesions and are willing to undergo invasive screening.

Disadvantages of colonoscopy include the need for thorough bowel cleansing and procedure-related complications like perforation and sedation risks. However, these are rare when the procedure is done by skilled personnel.

Fecal occult blood testing (FOBT)

Fecal occult blood testing can be either guaic fecal occult blood (gFOBT) testing or Fecal immunochemical Test (FIT). In Kenya, gFOBT is the most widely available test.

Advantages of FOBT

include its noninvasive nature and low cost.

FIT is more sensitive than gFOBT. FOBT is recommended annually and is commonly the test of choice in programmatic screening. It is also one of the tests that can be used in sequential or multiple-options approach.

Disadvantages of FOBT include

the need for repeated testing and poor sensitivity for some precursor lesions.

Flexible sigmoidoscopy

This can be an option to colonoscopy in settings lacking adequate infrastructure to support a full colonoscopy.

Advantages of flexible sigmoidoscopy include:

• Lower cost and risk compared with colonoscopy

• Limited bowel preparation required

• No need for sedation

Disadvantages of flexible sigmoidoscopy include:

• Lower benefit in protection against right-sided colon cancer compared to colonoscopy.

• Relative patient discomfort due to lack of sedation Flexible sigmoidoscopy, when used, is often recommended at 5-year intervals. Patients with a positive FOBT and negative flexible sigmoidoscopy should have a full colonoscopy done since it is possible that they may be having a right-sided adenoma or cancer.

Double Contrast Barium Enema (DCBE)

The DCBE is a relatively low risk procedure, less invasive and more affordable than colonoscopy. It can be easily done in any facility with an X-ray machine. However, a negative result does not rule out abnormalities or colorectal cancer. Therefore, the patient still requires a follow-up colonoscopy.

The disadvantages of the procedure include allergic reactions and procedure-related risks.

Virtual (CT) colonoscopy

This is a reconstruction of the colon from CT scan images. It may be used as an alternative to DCBE and in settings where contraindications to colonoscopy may exist.

Advantages:

• Minimally invasive screening procedure therefore lower complication rate

• Takes less time

• Less vigorous bowel preparation due to tagging of residual stool and fluid

• Can visualize colon beyond an obstruction or narrowing

• Detects both colonic and extra-colonic pathology

Disadvantages:

• Small risk of perforation

• High cost as compared to DCBE and FOBT

• Any positive findings will require conventional colonoscopy for confirmation

• Exposure to low-level ionizing radiation

• Any residual/untagged fecal matter can give rise to wrong interpretation

• There is currently no evidence to test and demonstrate survival

Screening is conducted in asymptomatic patients without prior colonoscopy unlike surveillance where colonoscopy is performed in patients with previous precancerous or dysplastic lesions, inflammatory bowel disease or after another positive screening test. Persons at average risk (asymptomatic healthy individuals without family history) should begin screening for colorectal cancer at age 45 years in Kenya (Rex et al, 2009).

The recommended screening modality is annual FOBT followed by colonoscopy. If the initial colonoscopy findings are normal, repeat the colonoscopy after 10 years. If the screening is done using FOBT, screen the patient annually. Other screening options include a flexible sigmoidoscopy, Virtual colonoscopy or a double-contrast barium enema every 5 years

If any of the alternative tests are positive, the patient should have a colonoscopy done. Persons with a family history of CRC or a documented advanced adenoma in a first-degree relative age 50 years

• 10-yearly colonoscopy from 40 years of age, or 10 years earlier than the youngest relative diagnosed with CRC, whichever comes earlier

• 5-yearly colonoscopy from 50 years of age, or 10 years earlier than the youngest relative diagnosed with CRC whichever comes earlier 3. High risk

• Hereditary or genetic predisposition, e.g. FAP, polyposis syndrome,

• Non-hereditary polyposis

• Inflammatory bowel disease

• Genetic counselling and testing

• Colonoscopy should be done from age of 10 years with FAP, 18 years for HNPCC, 10 years earlier than the affected relative Summary of Risk Stratification

Discontinuation of screening should be considered when persons up to date with screening, who have prior negative screening (particularly colonoscopy), reach age 75 or have less than 10 years life expectancy. Persons without prior screening before the age of 75 years should be considered for screening up to age 85, depending on comorbidities.

WHO DOES THE SCREENING?

FOBT can be performed in an appropriately equipped laboratory. A level III facility and above should be able to do this test. If positive, the patient should have a colonoscopy. Colonoscopy: A trained endoscopist should perform the colonoscopy. Genetic testing: This should also be done in an appropriately equipped laboratory.

SCREEENING AT VARIOUS HEALTHCARE LEVELS

Colonoscopy and sigmoidoscopy should be offered from a Level 5 facility or higher complications of sedation or gut perforation. The recommendation for colonoscopy at Level 5 or higher is informed by staffing and safety considerations as well as the need to create high volume centers.

Training Program for Peer Educators
***EFFECTIVENESS OF PEER EDUCATION INTERVENTION IN INCREASING UPTAKE OF COLORECTAL CANCER (CRC) SCREENING AMONG RESIDENTS OF MT. ELGON SUB COUNTY, BUNGOMA COUNTY, KENYA* held at MARAMBACHI SOCIAL HALL, CHEPTAIS TOWN**
Date-14th-16th NOVEMBER-2021

AIMS OF THE TRAINING-

The ultimate purpose of ongoing training was to equip the Peer Educators with accurate information on CRC screening services to enable them pass this information to the study's respondents so as to influence their awareness and uptake of CRC screening services. The training the Peer Educators also helps them by providing more in-depth information about peer education training techniques and theory

LEARNIG RESOURCES

1. Master Training Manual
2. Participant's handouts
3. Power point slides
4. Overhead Projector
5. Flip Charts/ Flip chart Board
6. Audio– visual materials
7. Note Books and Markers
8. White board
9. Assortment of reference materials, reading materials

10. Ground rules

Confidentiality Respect each participant's personal information, only sharing general information outside the session, without using a participant's name.

Respect You must respect everyone in the group.

Attentiveness Listen to what other people are saying. You will not only learn something but also make the people who are speaking feel more comfortable.

Openness To get the most out of the session, people should be encouraged to speak about their own experiences and not to speak for others.

Drawn by:

Chrispine O. Ngwawe

Principal Investigator

Training Program for Peer Educators held at held at MARAMBACHI SOCIAL HALL, CHEPTAIS TOWN MT. ELGON SUB COUNTY Date-14th-16th NOVEMBER-2021

	DAYS 1-3		
DAY	**/ACTIVITY**		**FACILITATOR**
DAY 1	Arrival and Registration Lesson 1	▪ Introduction and Climate setting- ▪ What is Colorectal cancer (CRC)- ▪ CRC-Definition and consequences to public health ▪ Epidemiology of CRC-signs and symptoms ▪ What are the risk factors? ▪ Modifiable and non-modifiable factors ▪ Who is at the risk for CRC	**Hotel Management** **Principal Investigator, Caroline Wasike/CRC survivor** ,
DAY 2	Lesson 2,3 and 4	▪ What is Screening for CRC? ▪ What are the methods of screening for CRC? ▪ What Benefits of Screening for CRC? ▪ What are the likely barriers for CRC? ▪ CRC screening benefits and where to get services ▪ Changing perceptions towards CRC? ▪ Awareness and risks factors for CRC? ▪ Preventive measures against CRC? ▪ Where is screening conducted and who does the screening, ▪ What are the costs ▪ Support for the identified patients	**Caroline Wasike Celestine Situma (CRC survivor)** **Janet Awando**
DAY 3		▪ ***Theory to Practice in Peer Education*** reviews the definition of peer education and its rationale and value in the context of different	**Janet Awando** **Caroline Wasike** **All team**

		behavior change theories and models. ▪ Roles of Peer Educators in increasing uptake of screening services Improving knowledge of CRC Management? ▪ What are the treatment options for CRC-Chemotherapy and Radiotherapy treatments ▪ Colostomy care? ▪ Palliative care in CRC management? **REVISION** ▪ Questions and Answer Session ▪ Review and closing Important activities and time lines ▪ Deployment to the field for the Baseline survey and then the Peer Education Intervention ▪ Copies of the Baseline and End-line questionnaire will be supplied. ▪ **Vote of thanks and deployment**	**members** **CRC survivor**

Motivation-

The following activities were conducted to ensure that the Peer Educators we well motivated for the tasks

- Provision of refreshments during the sessions
- Regular visits to the Peer Educators to affirm interest in their work

- Provision of data bundles for access to electronic resources for deeper insights
- Payment of small tokens to Peer Educators for days worked
- Verbal recognition of good work or successful completion of assignments

APPENDIX IV: QUESTIONNAIRE ON CRC AWARENESS AND SCREENING SERVICES UPTAKE AMONG THE RESIDENTS OF MT. ELGON SUB COUNTY

Thank you for your interest in participating in this research study.

Your contributions will help us to learn more about CRC screening practices amongst populations in Mt. Elgon Sub County, Bungoma County, Kenya.

This information will be important to public health and health services who promote screening programs in Kenya. CRC is a disease that affects the large intestine including the colon and rectum. CRC screening is a way to check for CRC even if you do not have symptoms. By having a screening test, you can stop the disease from developing or find it early to treat it or cure it.

Participant ID _____

Date Completed _____

Surveyor Initials _____

SECTION ONE

A. Socio-demographic characteristics

1. Which age bracket do you fall under?

45 – 54 [ ] 55 – 64 [ ] 65– 75 [ ]

2.Which is your gender?

Male [ ] Female [ ]

3.What is your ethnic background?

Bukusu [ ] Tachoni [ ] Sabaot [ ]

Others, If others name……..

4.What is your marital status?

Married [ ] Single [ ] Divorced [ ]

Others If others name……..

5.To which religious denomination do you belong?

Catholic [ ] Seventh Day Adventist [ ] Catholic[ ]Muslim[ ] Protestants[ ]

Others If others name……..

B**. Socio-economic characteristics**

1. What is the highest level of education attained?

Primary [ ] Secondary [ ] Diploma [ ]

Degree [ ] Masters [ ] PhD [ ]

2. What is your source of income?

Formal Employment [ ] Farming [ ] Self-employment [ ]

3.For long have you been in this activity?

Below 10yrs [ ] 11 – 20yrs [ ] 21 – 30yrs [ ] 31 – 40yrs [ ]

4. How much is your household income

Less than 10,000 [ ] Between 10 – 20,000[ ] Between 21 – 30,000[ ] Over 30,000[ ]

B. These questions will ask about uptake of screening for CRC

I would first like to begin by asking you about screening for CRC. Screening means having a test to check for CRC even if you do not have symptoms or problems with your bowels.

The following questions are about the home stool test, a test to check for CRC.

1. Before this test description today, had you ever heard of an CRC screening?

[ ] Yes [ ] No [ ] Not sure/do not know

1a. If "yes" to "ever heard":

Have you ever had stool test using a FOBT kit?

[ ] Yes [ ] No [ ] Not sure/do not know

1b. If "yes" to "ever had":

Have you done in the last 3 years?

_____ (number 1 to 5)

[ ] Not sure/do not know

2. When did you do your most recent FOBT?

[ ] A year ago or less

[ ] More than 1 but not more than 2 years ago

[ ] More than 2 but not more than 3 years ago

[ ] More than 3 years ago

[ ] Not sure/ do not know

3. Why did you do your most recent FOBT?

[ ] Part of a routine examination or check up

[ ] Because of a symptom or health problem

[ ] Follow-up of an earlier abnormal test

[ ] Not sure/do not know

4. Have you thought about doing an FOBT in the future?

[ ] Yes

[ ] No

[ ] Not sure/do not know

5. Do you plan to have an FOBT in the future?

[ ] Yes

[ ] No

[ ] Not sure/do not know

C. The following questions will ask you about other screening tests to check for CRC.

1a. If "yes" to "ever heard about CRC screening":

Have you ever had a CRC screening test other than FOBT?

[ ] Yes [ ] No

[ ] Not sure/do not know

1b. If "yes" to "ever had":

How many examinations have you had in the last 3 years?

[1] [2] [>2]

[ ] Not sure/do not know

2. Was your most recent screening:

[ ] A year ago or less

[ ] More than 1 but not more than 2 years ago

[ ] More than 2 but not more than 3 years ago

[ ] More than 3 years ago

[ ] Not sure/ do not know

3. Why did you have your most recent screening?

[ ] Part of a routine examination or check up

[ ] Because of a symptom or health problem

[ ] Follow-up of an earlier abnormal test

[ ] Not sure/ do not know

D.The following questions will ask you about awareness or CRC Screening services

Awareness was measured when a participant responded "yes" to the question "have you heard of Colorectal Cancer (CRC) screening services" and thereafter chose at least **FOUR** correct answers among the **SEVEN** attributes of CRC;

Have you ever heard of CRC screening?

[ ] Yes [ ] No [ ] Not sure/do not know

1. Able to state at least one of the screening methods

if yes, state from the choices; Home stool [ ] Colonoscopy [ ] FOBT [ ] Sigmoidoscopy [ ]

2. Aware of any benefit of screening for CRC and state at least one

if yes, state

3.Do you know of the barriers of screening for CRC?

Yes [ ] No [ ]

If yes, state

4.Do you know of any risks of not screening for CRC?

Yes [ ] No [ ]

If yes,

5.. Aware of the age to start screening for CRC

Yes [ ] No [ ]

if yes, state

6.Aware of the frequency and intervals of screening for CRC

Yes [ ] No [ ]

if yes, state

7. Aware of where to go screening for CRC

Yes [ ] No [ ]

if yes, state

APPENDIX V: Focus Group Interview Guide

Preliminaries session to highlight the following:

To adequately explain the study intended objectives

An assurance of confidentiality

Obtaining the consent for the participation in the study

Theme 1: The uptake of CRC screening services amongst residents ages 45-75 years old residents of Mt. Elgon Sub-County and the factors influencing the uptake

I. In your views, are the factors that may influence CRC screening uptake?

In your opinions, can health discussions stimulate better CRC screening uptake behavior among the residents of Mt. Elgon sub county?

What are your thoughts/beliefs about CRC screening?

Theme 2: The awareness of CRC screening amongst residents ages 45-75 years old residents of Mt. Elgon Sub-County and the factors influencing the uptake

Are you aware CRC screening services
In your views, are the factors that may influence awareness of CRC screening?

In your opinions, can health discussions stimulate better CRC screening awareness among the residents of Mt. Elgon sub county?

What are your thoughts/beliefs about awareness of CRC screening?

Theme 3: Trends in uptake of CRC screening services

What are the likely outcomes over time within the communities regrading CRC screening uptake during and after the intervention / training?

APPENDIX VI: KEY INFORMANT INTERVIEW GUIDE

Preliminaries session to highlight the following:

To adequately explain the study intended objectives

An assurance of confidentiality

Obtaining the consent for the participation in the study

A. Identification

1.0	Designation of interviewee	
1.1	Interview venue	
1.2	Station of work	
1.3	Date of interview	
1.4	Name of interviewer	

1. Explain the extent of CRC screening services uptake in Mt. Elgon Sub County, Bungoma County
2. Explain the types of CRC screening services available for Mt. Elgon Sub County, Bungoma County
3. What are the factors that may influence CRC screening services uptake amongst residents of Mt. Elgon Sub County in Bungoma County?
4. What are the awareness levels and the associated factors of CRC screening services amongst residents of Mt. Elgon Sub County in Bungoma County?
5. What is currently being done and what more needs to be done by the health authorities to increase uptake of screening services amongst residents of Mt. Elgon Sub County in Bungoma County?
6. What is the likely impact of the ongoing Peer intervention in stimulating the uptake of the CRC screening service? Do you think it is well organized or how else could it be done?

APPENDIX VII: COMMUNITY BASED HEALTH INFORMATION SYSTEM

PHASE		Activity and Expected outputs	Means of verification	Frequency of data collection	Targets			
					Q1	Q2	Q3	Q4
ONE Formative	1	Constituting the research team and mobilization Stakeholder meeting Printing and binding of training manuals & modules	Principal investigator and research assistants in place No. of stakeholder meetings held meetings No. of Printed and bound training manuals	Once after the team constitution	100 %	N/A	N/A	N/A
TWO Baseline	2	Training of research assistants Recruitment of Peer Educators	No. of research assistants trained	Once at the beginning of the intervention	100 %	N/A	N/A	N/A
	3	Recruitment of participants Collection of baseline data	No of baseline questionnaires, No. of FGD sessions held No. of KIIs sessions held	Once before the beginning of the intervention	100 %	N/A	N/A	N/A
THREE	4	Inception meeting with Peer Educators and respondents	No Peer Educators recruited and trained	Once before the beginning of the intervention	100 %	N/A	N/A	N/A

	5	Deployment of the Peer Educators,	No of training sessions held No. of peer educators trained	Once at the beginning of the interventio n	100 %	N/A	N/A	N/ A
FOUR	6	Ten-Weekly monitoring of the progress	No. of meetings held No. of Peer Educators &participants attending inception meeting	Once at interventio n	100 %	N/A	N/A	N/ A
	7	Peer sensitization of the respondents	Attendance registers No. of respondents trained No. of peer sensitization modules covered	Continuous until Modules concluded Continuous	50 %	100 %	N/A	N/ A
			No. of new respondents going for CRC Screening test	Quarterly	25 %	50 %	75 %	100 %
			Changes in awareness of CRC among respondents	Quarterly	25 %	50 %	75 %	100 0%
FIVE	8		No. of training sessions held No of research assistants given refresher training	Once at post-interventio n	N/A	N/A	N/A	100 %
	9	Collection of end-line data	No of questionnaires, FGD and KIIs administered and collected at the end-line	Once at post-interventio n	N/A	N/A	N/A	100 %

APPENDIX IX: COVID-19 RISK MANAGEMENT PLANDURING DATA COLLECTION FOR "EFFECTIVENESS OF PEER EDUCATION INTERVENTION IN INCREASING UPTAKE OF COLORECTAL CANCER SCREENING AMONGST IN MT. ELGON SUB COUNTY RESIDENT'S YEARS, BUNGOMA COUNTY, KENYA

The Principal Investigator (PI), Peer Educators (PEs) and Research assistants (RAs) conducted in-person training during the month of NOVEMBER 2021.Thereafter the PI, PEs and the RAs were deployed to the study area to undertake the sensitization of the respondents and collect the necessary data. Following the laid out Covid-19 protocols, the training exercise was successfully completed without any Covid-19 incidence among the team members. Upon completion of the household listing exercise, the research team held a debriefing session to consider the possibility of conducting virtual trainings as compared to physical meetings. The team expressed their reservations in relation to virtual engagements as most of the study participants lived in rural areas with poor network connectivity. Access to mobile phones by some study participants was also likely to be a challenge as not all possible study participants own mobile Smartphones. The length and complexity of the questionnaire including some of key questions that require in-person details also made telephone interviews ineffective mode for the Perer Intervention and also for data collection. It was therefore decided that the intervention as well as data be collected using in-person interviews with the following COVID 19 MITIGATION measures being observed:

Activity that can generate risk	Likelihood of risk	Action to be taken in	Date of plan When Who		Frequency of review for proof action
Training of Peer Educators and research assistants	Medium to High	No more than 30 Peer Educators research assistants were trained in the same room at the same time. - The trainings were conducted in large rooms that allowed social distancing to be practiced with the windows open. The PI, Trainers and the trainees were screened for COVID19 / flu like symptoms (temperature screen and asked if they are experiencing any COVID or flu-like symptoms) During the sessions face masks and		Trainers Research assistants	Every other day

		with hand sanitizer were provided. Those with fever or symptoms were not be allowed access into the room and were be referred to the nearest healthcare facility. The first presentation in every training was be on COVID-19 risk mitigation measures that were to be implemented during the intervention The PI, Trainers, Peer Educators and research assistants wore masks during the training. – Trainers and research assistants always sanitized their hands before and after the training session. - Spare masks and sanitizers were available in case any team member would arrive at the training venue without them. - Hand sanitizers were available in the training room. - PI, Trainers, Peer Educators and research assistants maintained physical distance of at least 1.5m during the training The floors and tables, bathroom facilities and any door handles were regularly disinfected throughout the meeting. - Stationery were not be shared during the sessions. - Trainings included instructions on how to carry out the intervention and data collection while adhering to COVID-19 regulations.			

Principal Investigator, Peer Educators and other facilitators travelling to the training site	Medium to High	A vehicle was hired to transport the PI and other team members to the training site, ensuring no more than five people will sat in the van at one time. - Passengers left an empty seat between each other. - All passengers will always wore masks. - The driver sanitized the vehicle before and after each trip. - Hand sanitizers were available in the vehicle. - The windows remained open during the trip. - The day prior to travelling, the above travelling guidelines were explained to all passengers and driver.		Principal Investigator Other facilitators	On the day of the travel
Conducting face-to-face in-depth trainings (Peer Education Intervention) with enrolled study participants enrolled study participants	Medium to High	Trainings /Interviews did not take place and were postponed if either the interviewer or interviewee is experiencing enrolled study participants suspected to have covid-19/ flu like symptoms. - Peer Educators /Interviewer and respondent had to wear face masks during the interview. - Interviewer sanitized the digital voice recorders, chairs, and space where the respondents sit before and after every interview session . - Interviewer and the respondent		Team leaders Interviewers	

		sanitized their hands before a session. - Hand sanitizer and masks were available during the interview. – Peer Educators/ Interviewer had some spare masks to provide to the respondent should a respondent turn up for interview/training with no mask. - Peer Educators/ Interviewer maintained a physical distance of at least 2m with the respondent during the interview. - Peer Educators /interviewer were trained on a client script which will served as a preamble to explain the need to maintain social distance during the sessions. - Interviews will take place in open places When not possible due to privacy or weather, they will take place in large rooms with the windows open.			
Conducting focus group discussions (FGDs) with enrolled study participants	Medium to High	Discussions did not take place or were postponed if either the moderator, note-taker, or any of the participants is experiencing or suspected to have covid-19/ flu like symptoms. - For the FGDs only one moderator, one note-taker and a maximum of eight participants will be in the discussion venue at the same time. - Moderator, note-taker, and participants wore face masks during the discussion. - PI, Moderator and note-taker		Moderators Note-takers Team leaders	Every other day

		sanitized the digital voice recorders, chairs, and space where the participants sat before and after every discussion session. – PI, Moderator, note-taker, and participants sanitized their hands before a discussion session. - Hand sanitizer will be available during the discussion. – PI, Moderator and note-taker had some spare masks to provide to participants should they turn up for discussions without masks. – PI, Moderator, note-taker, and participants maintained physical distance of at least 2m with during the discussion. - PI, Moderator and note-taker were trained on a client script which served as a preamble to explain the need for maintaining social distance during the Focus Group discussions. - Discussions took place in open places Where it was not possible due to privacy or weather, they took place in large rooms with the windows open.			
Conducting Peer Intervention	Medium to High	Trainings were postponed if either the Peer Educators or the participants were experiencing or is suspected to have covid -19/ flu like symptoms. - Instead of knocking on doors, interviewers let household members know they are at the door by speaking with a loud voice . – Peer Educators and respondent		Team Leaders Interviewers	Every other day

		wore face masks during the sessions - Peer Educators sanitized the digital tablet, chairs, and space where the respondent sat before and after every interview session. - Interviewer and the respondent sanitized their hands before and interview session - Hand sanitizers were available during the sessions. - Interviewer had spare masks to provide to the respondent if one turned up for the sessions with no mask. - Peer Educators maintained physical distance of at least 2m from the respondent during the trainings - Interviewer were trained on a client script which served as a preamble to explain the need to maintain social distance during the interview. - Interviews took place in open spaces When not possible due to privacy or weather, they took place in large rooms with the windows open Team leaders - Peer Educators compiled a list of all households visited every day in case of any need for contact tracing.			
Research team meetings, maximum once per day to monitor the research	Medium to High	Meetings did not take place or were postponed if any of the team members was experiencing or was suspected to have covid-19/ flu like symptoms. – PI, Peer Educators and team		Interviewers Team Leader	Every other day

progress		leaders had to wear masks during the meeting. - Peer Educators and team leaders sanitized their hands before and after the meeting/sessions. -PI, Peer Educators /Team leaders had spare masks and sanitizers in case respondents arrived at the meeting without them. - PI, Peer Educators and team leaders will maintain physical distance of at least 2m from each other during the meeting. - Meetings took place in open places When they were not possible due to privacy or weather, they took place in large rooms with the windows open.			
PI, Peer Educators Research assistants travel to and from field sites	Medium to High	Peer Educators Research assistants pulled resources and hire vehicles to transport them to and from the sites of intervention and data collection, ensuring no more than half the capacity of the vehicle was filled at one time. - Passengers left an empty seat between each other. - All passengers put on masks at all times. - The driver sanitized the vehicle before and after each trip. - Hand sanitizers were available in the vehicle. - If on the day of travel any of the passengers develops COVID-19 or flulike symptoms, they were		Interviewers Team Leaders	On the days of travel

		prohibited from travelling. - If on the day of travel the driver reported symptoms of COVID-19 or flu-like symptoms, then an alternative driver was selected to drive. - The windows remained open during the trips. - Whenever hiring a vehicle was not possible, individual research assistants used their transport allowances to hire a motorbike, which will reduce the number of people one might come in contact with.			
PI, Peer Educators Research assistants travel within field sites	Medium to High	For shorter distances between households/interviewees, research assistants will walk. - For longer distances between households/interviewees, research assistants will use their transport allowance to hire a motorbike, which will reduce the number of people one might come in contact with. - Research assistants will wear masks at all times.		Interviewers Team Leaders	On the days of travel

APPENDIX X: CONTRACT OF ENGAGEMENT FOR PEER EDUCATORS

THIS AGREEMENT is made on the …… between **Chrispine O. Ngwawe** of **MASENO UNIVERSITY**, P.O Box 333, Maseno within the Republic of Kenya (hereinafter called "Principal investigators" which expression shall where the context so admits include its representatives, successors and assigns) of the one part and ……..of I.D.NO …… of P.O Box …… (herein called "PEER EDUCATOR")

It is hereby agreed as follows;

1. WORK The Principal investigators shall engage the said person in the position of a PEER EDUCATOR and require them to render their services for training of the study respondents, hereinafter with effect from ……. to …… upon the terms and conditions herein set out. It is further agreed that this fixed term contract does not create any expectation of a renewal/extension of the contract

2. RESPONSIBILITIES DESCRIPTION The above-named person shall serve the in the capacity of a PEER EDUCATOR and shall carry out duties as the client may from time to time direct.

3. HOURS OF WORK You are required to work 8 hours per day with one-hour lunch break for six days in a week.

4. NOTICE PERIOD As this is a project-based assignment, either party may terminate this contract by giving the other party a 7-days' notice.

5. CONDUCT The Peer Educator will be expected to maintain high moral and professional standards while on duty.

Ensure that you;

i. Observe Health and Safety guidelines by safeguarding your health, clients and any other persons

ii. You should not be under the influence of any illegal substances while on duty. You should not engage in any conduct detrimental to the interests of the Researcher

iii. If you are unable to report to work for any reason you must advise both the client and the Recruitment Agency to enable the client make alternative work arrangements.

iv. The employee commits not to engage in any form of corruption and/ or illegal activities.

6.REMUNERATION The Peer Educator shall be NOT paid any amount of money and this is purely a voluntary exercise. However, a token of appreciation may be extended for services rendered in kind.

7. RESTRICTION ON ENGAGEMENT During your engagement period, you will be party to confidential information concerning the client's research activities.

(a) The Peer Educator shall not at any time during or after the term of this contract disclose or allow the disclosure of any confidential information.

(c) The Peer Educator shall not make any statements to the press in regard to any of the assignments undertaken within the course of this employment.

8. TERMINATION OF CONTRACT

Any of the matters herein mentioned shall amount to misconduct justifying the termination by the Researcher of this appointment, that is to say; any of the matters such as

(a) Without leave or other lawful cause, an employee absents himself from the place appointed for the performance of his work;

(b) During working hours, by becoming or being intoxicated, an employee renders himself unwilling or incapable to perform his work properly;

(c) A Peer Educator willfully neglects to perform any work which it was his duty to perform, or if he carelessly and improperly performs any work which from its nature it was his duty, under his contract, to have performed carefully and properly;

(d) A Peer Educator uses abusive or insulting language, or behaves in a manner insulting, to his employer or to a person placed in authority over him by his employer;

(e) A Peer Educator knowingly fails, or refuses, to obey a lawful and proper command which it was within the scope of his duty to obey, issued by his employer or a person placed in authority over him by his employer.

(f) In the lawful exercise of any power of arrest given by or under any written law, a Peer Educator is arrested for a cognizable offence punishable by imprisonment and is not within fourteen days either released on bail or on bond or otherwise lawfully set at liberty; or

(g) A Peer Educator commits, or on reasonable and sufficient grounds is suspected of having committed, a criminal offence against or to the substantial detriment of his employer or his employer's property. On termination of this appointment for whatsoever cause the Employee shall hand over to the client all property of the client for which he is responsible at the time of such termination including records of his work, or work for which he may be responsible together with any equipment, files or any other documentation given to him or complied by

him in the execution of his duties. Upon termination, employee will only be paid wages up to the date of such termination.

9. **RESEARCH EQUIPMENTS**. The researcher may provide you with equipment to facilitate the performance of your duties. You will be required to take good care of the equipment in your custody and return them at the end of your contract or earlier specified date. Any costs for damages that occur to the equipment during your custody or any loss shall be charged to you.

Chrispine O. Ngwawe MASENO UNIVERSITY.

APPLICABLE LAW This contract shall be governed and interpreted in all respects in accordance with the Laws of Kenya.

APPENDIX XI: KISWAHILI VERSION OF THE DATA TOOLS

Part A: IDHINI YA UTAFITI

MAAGIZO

Msailiwa lazima awe mtu mzima wa miaka kati ya 45-75 anayeishi kwenye Jimbo ndogo la Mlima Elgon, Jimbo la Bungoma.

UTAMBULISHO

Hujambo. Jina langu ni Chrispine O. Ngwawe.

Mimi ni mwanafunzi mzamifu(PhD) katika Chuo kikuu cha Maseno.

Ninafanya utafiti kuhusu **UBORA WA KUSHIRIKISHA ELIMURIKA KATIKA KUIMARISHA VIWANGO VYA UKAGUZI WA SARATANI YA UTUMBO MKUBWA NA NJIA YA UCHAFU(SUMNU) MIONGONI MWA WATU WAZIMA KATI YA MIAKA 45-59 KATIKA JIMBO DOGO LA MLIMA ELGON, JIMBO LA BUNGOMA, KENYA**

Ushiriki wako ni wa hiari. Iwapo utataka kujiondoa kwenye utafiti huu, uko huru kufanya hivyo katika hatua yoyote ya utafiti huu. Utafiti huu unanuia kuimarisha kiwango cha maisha cha wakazi kwa kuboresha ufahamu wao na kiwango chao cha kushiriki kwenye ukaguzi wa saratani ya utumbo mkubwa na njia ya uchafu kama ilivyofafanuliwa.

Ninakuhakikishia kwamba utambulisho wako binafsi utawekwa siri na mtafiti na hautafichuliwa hata wakati wa kusambaza matokeo ya utafiti.

Tafadhali weka sahihi kwenye nafasi ulizoachiwa hapo chini ikiwa unaelewa fika nia ya utafiti na umekubali kushiriki kwenye utafiti huu.

Jina……

Sahihi…….

Tarehe…….

Part B

HOJAJI KUHUSU USHIKA KATIKA HUDUMA ZA UKAGUZI WA SARATANI YA UTUMBO MKUBWA NA NJIA YA UCHAFU PAMOJA NA ELIMUJAMII

Ahsante kwa kukubali kushiriki kwenye utafiti huu.

Mchango wako utatuwezesha kujifunza mengi kuhusu desturi za ukaguzi wa SUMNU miongoni mwa watu wa Jimbo ndogo la Mlima Elgon, Jimbo la Bungoma, Kenya.

Habari hizo zitakuwa muhimu kwa kwa wahudumu wa afya ya umma na wa afya ambao huendesha program za ukaguzi nchini Kenya. SUMNU ni ugonjwa ambao huathiri utumbo mkubwa ikiwemo koloni na rektamu. Ukaguzi wa SUMNU ni njia ya kudhibiti SUMNU hata kama huonyeshi dalili.

Kwa kufanyiwa ukaguzi utaweza kuzuia ugonjwa huo kuenea au ukiugundua mapema utaweza kuutibu au kuuponya.

Kitambulisho cha Mshiriki _____

tarehe _____

Vifupisho vya Soroveya _____

SEHEMU YA KWANZA

A. Sifa za Kundi- Kijamii

1. Bainisha mpaka wa umri wako.

45 – 54 [ ] 55 – 64 [ ] 65 – 75 [ ]

2. Tambua kiwango chako cha juu cha elimu.

Msingi [ ] Upili [ ] Diploma [ ]

Digri [ ] Uzamili (Masters) [ ] Uzamifu (PhD) [ ]

3. Nini asili ya kipato chako na umeshiriki kwa muda gani kwenye shughuli hiyo?

Chini ya miaka 10 [ ] miaka 11 [ ] miaka 21 – 30 [ ]

miaka 31 – 40 [ ]

4. Nini kipato cha familia yako?

Kati ya 10 – 20,000 [ ] kati ya 21 – 30,000 [ ]

Zaidi ya 30,000 [ ]

5. i)Tambua kabla lako.

Bukusu [ ] Tachoni [ ] Sabaot [ ]

nyingine, taja……..

ii) Nini hali yako ya ndoa?

Nimeoa/ kuolewa [ ] Sijaolewa/ kuoa [ ] Nimetengana [ ]

Nyingine, taja……..

B. Maswali yafuatayo yanahusu ushiriki katika ukaguzi wa SUMNU.

Kwanza ningependa kukuuliza kuhusu kipimo cha *Fecal occult blood test* (FOBT). Ukaguzi unamaanisha kufanya kipimo kubainisha uwepo wa SUMNU hata kama huna dalili au shida na tumbo.

Maswali yafuatayo yanahusu kipimo cha nyumbani cha choo, kipimo ambacho huchunguza uwepo wa SUMNU. Kipimo hicho kinachunguza uwepo wa damu kwenye choo

1. Kabla ya ufafanuzi wa kipimo hicho leo, ulikuwa umewahi kusikia kuhusu FOBT?
[ ] Ndio [ ] la [ ] sina uhakika/sijui

1a. Ikiwa ni "ndio" hadi " Nimewahi kusikia":
Umewahi kupima choo ukitumia kiti ya FOBT?
[ ] Ndio [ ] la [ ] sina hakika/ sijui

1b. Ikiwa ni kati ya "ndio" hadi " Nimewahi kufanya":
Ulifanya katika miaka 3 iliyopita?
_____ (nambari 1 hadi 5) [ ] Sina uhakika/sijui

2. Ni lini ulifanya kipimo cha FOBT majuzi?
[ ] Mwaka uliopita au chini yake [ ] Zaidi ya mwaka 1 lakini si zaidi ya miaka 2 iliyopita [ ] zaidi ya miaka 2 lakini haipiti miaka tatu iliyopita [ ] zaidi ya miaka 3 iliyopita [ ] Sina uhakika/ Sijui

3. Kwa nini ulifanya kipimo cha hivi punde cha FOBT?
[ ] Sehemu ya uchunguzi wa kila mara/ ukaguzi [ ] kwa sababu ya dalili au tatizo la kiafya
[ ] kufuatilia kipimo cha awali cha tumbo [ ] Sina uhakika/ sijui

4. Umeshawahi kufikiri kufanya kipimo cha FOBT siku zijazo?
[ ] Ndio [ ] la [ ] Sina uhakika/ sijui

5. Je, unapanga kushiriki kipimo cha FOBT siku zijazo?
[ ] Ndio [ ] la [ ] Sina uhakika/ sijui

C. Katika maswali yafuatayo utaulizwa kuhusu vipimo vingine vya SUMNU?

1. Umeshawahi kusikia kuhusu ukaguzi wa SUMNU?

[ ] Ndio [ ] la [ ] sina uhakika/ Sijui

1a. Ikiwa ni “ndio” hadi “Nimewahi kusikia”:

Umewahi kufanyiwa ukaguzi wa SUMNU?

[ ] Ndio [ ] la [ ] Sina uhakika/sijui

1b. Ikiwa ni “Ndio” hadi “ nimewahi”:

Umefanyiwa vipimo vingapi kwa miaka mitatatu iliyopita?

[ ]1 [ ]2 [ ]>2 [ ] Sina uhakika/ sijui

2. Ukaguzi wako wa hivi karibuni ulifanywa:

[ ] Mwaka mmoja uliopita au chini yake [ ] Zaidi ya mara 1 japo si zaidi ya miaka 2 iliyopita [ ] Zaidi ya mara 2 lakini si zaidi ya miaka 3 [ ] Zaidi ya miaka 3 iliyopita [ ] Sina uhakika/ sijui

3. Kwa nini ulifanyiwa ukaguzi wako wa mwisho?

[ ] Sehemu ya ukaguzi wa mara kwa mara[ ] Kwa sababu ya dalili au tatizo la kiafya

[ ] Ili kufuatilia kipimo cha awali cha tumbo [ ] sina hakika/ sijui

4) Unamfahamu mwenzio kazini ambaye amefanyiwa ukaguzi wa SUMNU?

Ndio [ ] la [ ]

5) Je, unafahamu manufaa ya ukaguzi wa SUMNA?

Ndio [ ] la [ ]

Ikiwa ni ndio,

Manufaa mengi [ ] kadiri [ ]

6) Je, una maoni mabaya kuhusu ukaguzi wa SUMNA?

Ndio [ ] la [ ]

7)Ni taratibu zipi za ukaguzi wa SUMNA ambazo unazifahamu: Home stool [ ] Sigmoidoscopy [ ] colonoscopy FOBT [ ]

D. Kundi lifuatalo la maswali litakuuliza kuhusu sababu za wewe kutotaka kufanyiwa ukaguzi wa SUMNU.

Tafadhali nieleze ikiwa unakubaliana au haukubaliani na kauli zifuatazo ambapo:
Nakubaliana sana **(1),** Sikubaliani **(2),** Ama nakubalina au sikubaliani **(3),** Nakubaliana **(4),** Nakubaliana sana **(5)**

Majibu	1	2	3	4	5
1.Una woga wa kufanyiwa kipimo kwa sababu unaweza kugundua kasoro fulani. [ ]					
2. Kipimo cha kuskrini ni cha aibu. [ ]					
3.Huna wakati wa kufanya kipimo cha kuskrini. [ ]					
16. Huweza ukamudu gharama ya kipimo cha kuskrini. [ ]					
17.Huhitaji kufanya kipimo cha kuskrini kwa kuwa huna shida. [ ]					
18. Una hamu ya kufanyiwa ukaguzi wa kuskrini kwa kuwa hufahamu nini hasa kitafanywa. [ ]					
19. kufanyiwa ukaguzi wa kuskrini ni uchungu. [ ]					
20. Uhitaji wa lishe bora baada ya ukaguzi utakuzuia kufanya kipimo cha kuskrini. [ ]					
21.Unaogopa kuwa kufanyiwa kipimo cha kuskrini kwa sababu ya uwezekano wa kuvuja damu au kujeruhiwa kwa matumbo. [ ]					
22. Matatizo ya kiusafiri yatakuzuia kufanya kipimo cha kuskrini. [ ]					

Tafadhali nieleze ikiwa unakubaliana au hukubaliani na kauli zifuatazo:

Ambapo: sikubalini katu **(1),** Sikubaliani (2), Ama nakubalina au sikubaliani **(3),** Agree **(4),** Nakubaliana sana **(5)**

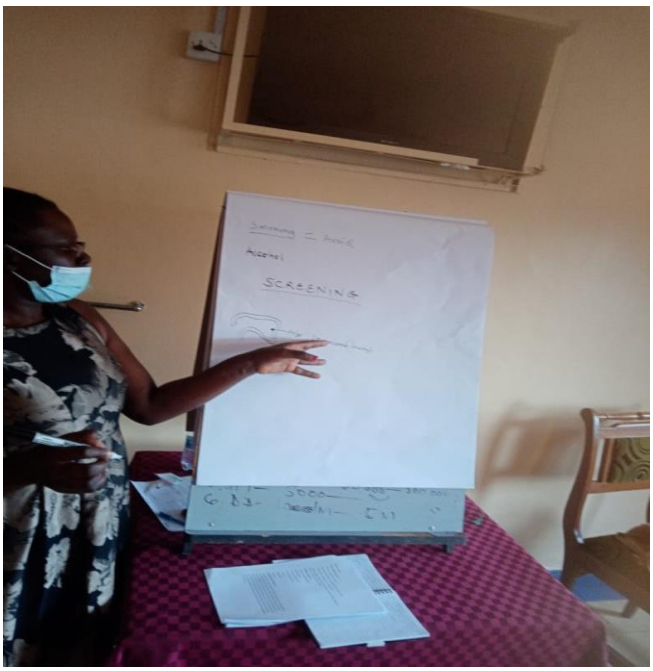
Majibu

1 2 3 4

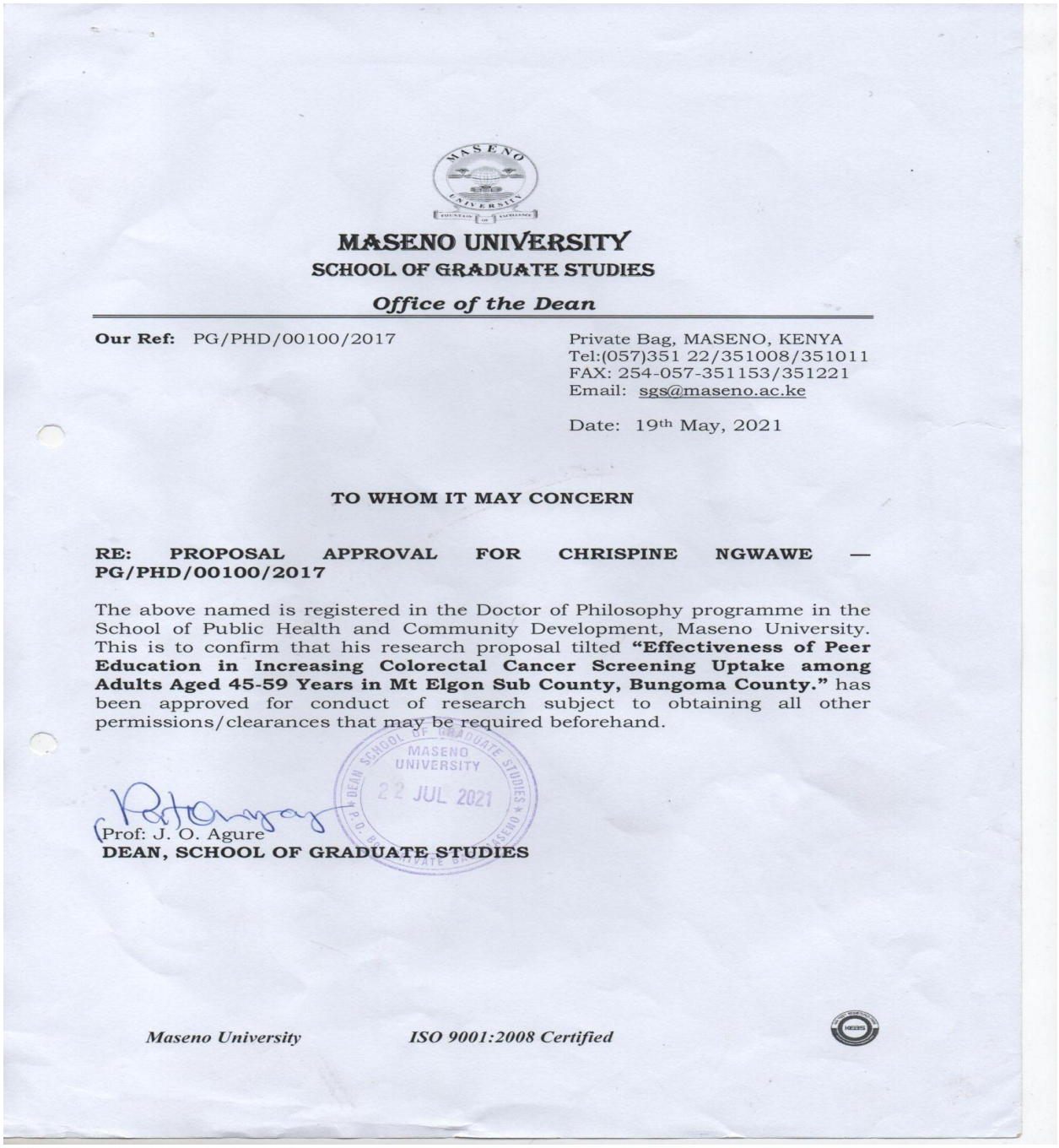
8. Ningependa kufanya yale wanafamilia yangu wanahisi ninahitajika kufanya kuhusu kipimo cha SUMNU. [ ]

9. Mtaalamu wangu wa afya anafaa kuhusishwa kabla ya kufanyiwa kipimo cha SUMNU. [ ]

APPENDIX XII: PEER EDUCATORS TRAINING ONGOING



APPENDIX XIII: SCHOOL OF GRADUATES APPROVAL LETTER



MASENO UNIVERSITY
SCHOOL OF GRADUATE STUDIES

Office of the Dean

Our Ref: PG/PHD/00100/2017

Private Bag, MASENO, KENYA
Tel:(057)351 22/351008/351011
FAX: 254-057-351153/351221
Email: sgs@maseno.ac.ke

Date: 19th May, 2021

TO WHOM IT MAY CONCERN

RE: PROPOSAL APPROVAL FOR CHRISPINE NGWAWE — PG/PHD/00100/2017

The above named is registered in the Doctor of Philosophy programme in the School of Public Health and Community Development, Maseno University. This is to confirm that his research proposal tilted **"Effectiveness of Peer Education in Increasing Colorectal Cancer Screening Uptake among Adults Aged 45-59 Years in Mt Elgon Sub County, Bungoma County."** has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.

MASENO UNIVERSITY
22 JUL 2021

Prof: J. O. Agure
DEAN, SCHOOL OF GRADUATE STUDIES

Maseno University *ISO 9001:2008 Certified*

APPENDIX XIV: MASENO UNIVERITY ETHICAL REVIEW COMMIITEE APPROVAL LETTER

MASENO UNIVERSITY ETHICS REVIEW COMMITTEE

Tel: +254 057 351 622 Ext: 3050
Fax: +254 057 351 221
Private Bag – 40105, Maseno, Kenya
Email: muerc-secretariate@maseno.ac.ke

REF: MSU/DRPI/MUERC/00988/21 **Date:** 8th September, 2021

TO: Chrispine Ochieng Ngwawe
PG/PHD/PH/00100/2017
Department of Public Health
School of Public Health and Community Development
Maseno University
P.O. Box Private Bag, Maseno, Kenya

Dear Sir,

RE: Effectiveness of Peer Education Intervention in Increasing Uptake of Colorectal Cancer Screening amongst Residents Aged 45-59 Years in Mt. Elgon Sub County, Bungoma County, Kenya

This is to inform you that **Maseno University Ethics Review Committee (MUERC)** has reviewed and approved your above research proposal. Your application approval number is MUERC/00988/21.The approval period is 8th September, 2021 – 7th September, 2022.

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by Maseno University Ethics Review Committee (MUERC).
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to Maseno University Ethics Review Committee (MUERC) within 24 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to Maseno University Ethics Review Committee (MUERC) within 24 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to Maseno University Ethics Review Committee (MUERC).

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely

Prof. Philip O. Owuor, PhD, FAAS, FKNAS
Chairman, MUERC

MASENO UNIVERSITY ETHICS REVIEW 08 SEP 2021 COMMITTEE P.O. BOX PRIVATE BAG

MASENO UNIVERSITY IS ISO 9001: CERTIFIED

APPENDIX XV: NACOSTI RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **209737**

Date of Issue: **18/November/2021**

RESEARCH LICENSE

This is to Certify that Mr.. CHRISPINE NGWAWE of Maseno University, has been licensed to conduct research in Bungoma on the topic: EFFECTIVENESS OF PEER EDUCATION INTERVENTION IN INCREASING UPTAKE OF COLORECTAL CANCER SCREENING AMONGST RESIDENTS AGED 45-59 IN MT ELGON SUB COUNTY, BUNGOMA COUNTY,KENYA for the period ending : 18/November/2022.

License No: **NACOSTI/P/21/14299**

209737

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is Guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014CONDITIONS

1. The License is valid for the proposed research, location and specified period
2. The License any rights thereunder are non-transferable
3. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research
4. Excavation, filming and collection of specimens are subject to further necessary clearence from relevant Government Agencies
5. The License does not give authority to tranfer research materials
6. NACOSTI may monitor and evaluate the licensed research project
7. The Licensee shall submit one hard copy and upload a soft copy of their final report (thesis) within one year of completion of theresearch
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice

National Commission for Science, Technology and Innovationoff Waiyaki Way, Upper Kabete,

P. O. Box 30623, 00100 Nairobi, KENYA

Land line: 020 4007000, 020 2241349, 020 3310571, 020 8001077

Mobile: 0713 788 787 / 0735 404 245

E-mail:

dg@nacosti.go.ke /

registry@nacosti.go.

keWebsite:

www.nacosti.go.ke

APPENDIX XVI: DIRECTOR OF HEALTH BUNGOMA COUNTY APPROVAL LETTER

REPUBLIC OF KENYA

COUNTY GOVERNMENT OF BUNGOMA
MINISTRY OF HEALTH
OFFICE OF THE COUNTY DIRECTOR HEALTH

Telegrams: "MEDICAL", BUNGOMA
Telephone: (055) 30230 Fax: (055) 30650
E-mail: docakatu@yahoo.com
When replaying please quote

COUNTY DIRECTOR OF HEALTH
BUNGOMA COUNTY
P. O. BOX 18 – 50200
BUNGOMA

OUR REF: CG/BGM/CDH/RESRC/VOL.1(85) **DATE:** 9TH NOVEMBER, 2021

MR. NGWAWE OCHIENG CHRISPINE
MASENO UNIVERSITY
PRIVATE BAG - 40105
MASENO

Dear Sir,

RE: PERMISSION TO CONDUCT RESEARCH IN MT. ELGON SUB COUNTY

Following your application for authority to carry out research on **"Effectiveness of Peer Education Intervention in Increasing Uptake of Colorectal Cancer Screening amongst Residents Aged 45-59 Years in Mt. Elgon Sub County of Bungoma County",** I am pleased to inform you that you have been authorized to carry out research for a period ending September, 2022.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the County Director of Health. The soft copy of the same should be submitted through the online Research Information system.

Thank you.

COUNTY DIRECTOR OF HEALTH
BUNGOMA COUNTY
P. O. Box 18-50200
BUNGOMA

DR. JOHNSTON AKATU
COUNTY DIRECTOR OF HEALTH
BUNGOMA

APPENDIX XVII: DIRECTOR OF EDUCATION APPROVAL LETTER

REPUBLIC OF KENYA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

State Department of Basic Education and Early childhood — Bungoma County

When Replying please quote
e-mail: bungomacde@gmail.com

RefNo: BCE/DE/19/VOL.111/200

County Director of Education
P.O. Box 1620-50200
BUNGOMA

Date: 1 November 2021

TO WHOM IT MAY CONCERN

RE: AUTHORITY TO CARRY OUT RESEARCH - CHRISPINE OCHIENG NGWAWE

The bearer of this letter Mr. Chrispine Ochieng Ngwawe of Maseno University /has been authorized to carry out research on "Effectiveness of Peer Education Intervention in Increasing uptake of Colorectal Cancer Screening amongst residents aged 45 — 59 years in Mt. Elgon Sub County, Bungoma County, Kenya" for a period ending 7th September 2022.Kindly accord him the necessary assistance

COUNTY DIRECTOR OF EDUCATION
BUNGOMA
P.O. Box 1620,
BUNGOMA - 50200

CALEB OMONDIFOR COUNTY DIRECTOR OF EDUCATIONBUNGOMA COUNTY

SGS

APPENDIX XVIII- TRAINING SESSIONS ATTENDANCE SHEET –

RESEARCH TITLE- "EFFECTIVENESS OF PEER EDUCATION INTERVENTION IN INCREASING AWARENESS AND UPTAKE OF COLORECTAL CANCER SCREENING AMONGST RESIDENTS YEARS IN MT. ELGON SUB COUNTY, BUNGOMA COUNTY, KENYA

TRAINING VENUE:

NAME	**ID NUMBER**	**DATE**	**DATE**	**DATE**	**DATE**	**DATE**	**DATE**	**DATE**	**DATE**	**DATE**	**DATE**
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											

GENERAL COMMENTS:

SESSION TIME: From To

PEER EDUCATOR'S NAME:……DATE:……SIGNATURE: ……

PRINCIPAL INVESTIGATOR/ASSISTANT'S NAME ……DATE: SIGNATURE: ……