

**FACTORS AFFECTING TRACHOMA CONTROL AND PREVENTION AMONG
PASTORALIST IN KIRISIA SUB-COUNTY, SAMBURU COUNTY, KENYA**

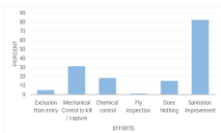
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**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF PUBLIC HEALTH (EPIDEMIOLOGY AND
POPULATION HEALTH)**

SCHOOL OF PUBLIC HEALTH AND COMMUNITY DEVELOPMENT

MASENO UNIVERSITY

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DECLARATION

“I hereby declare to the best of my knowledge that this thesis is my original work and has not been presented for a master degree in any other University.”

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I acknowledge the interviewers and the respondents who collected and provided data respectively reported in this work.

I wish to extend my genuine thanks to all my colleagues and friends who supported me in any way in the course of this study.

DEDICATION

I dedicate this work to my lovely parent Miss Margaret Wangui who always stood with me and supported me throughout this journey. My loving wife Lucy Wangari, and my loving children who always encouraged me and gave me enough time to do this work.

ABSTRACT

Trachoma is still a public health and socioeconomic problem, majorly in sub-Saharan Africa. Trachoma control and prevention efforts have over the past few decades realized significant progress. However, numerous challenges remain to be circumvented in order to achieve effective control and prevention of this disease in endemic communities. Though this disease is preventable and treatable, its prevalence in Samburu County as well as Kirisia Sub-county remains high above the WHO recommended threshold of 10% and 1% in children between 1-9 years and individuals above 15 years, respectively. Moreover, there is a gap in knowledge on the factors contributing to the sustained high trachoma prevalence in the area. This cross-sectional study focused on the assessment of socioeconomic, cultural and health system factors affecting trachoma control and prevention among pastoralist in Kirisia, Samburu County. A multistage sampling technique on 446 respondents comprising of household heads aged 18 years and above was explored. Quantitative and qualitative techniques were used to collect data which was analyzed using SPSS windows version 28.0 at $P \leq 0.05$ level of significance. Findings from this study revealed that majority of the respondents (63%) were female, 43.8% had not completed any level of formal education, 51% were low-income earners and 33.4% were unemployed. The median average age and SD of the informants was 38.9 ± 13.5 . Individual level factors that increased the risk of trachoma transmission included the level of income ($P > 0.05$), level of knowledge on trachoma transmission, prevention and control ($P > 0.05$), level of education ($P > 0.05$), occupation ($P > 0.05$), distance to water sources ($P > 0.05$). Healthcare facilities were reported to be significantly far from households ($P < 0.05$). Additionally, behaviors predisposing the informants to trachoma such as open defecation (33.9%), lack of hand and face washing facilities (41%), poor treatment seeking behavior (5.8%), self-medication (5.2%), and use of herbs (1.2%) while health facility factors included distance from the households ($P > 0.01$). Inadequate ophthalmologists (85.5%) and inadequate equipment (3.6%), low coverage and visitation by community health volunteers to households (23.3%) were among the factors influencing trachoma spread reported by the informants. Association analyses revealed a relationship between level of education and the following trachoma risk factors, namely; level of income, religion, level of knowledge on trachoma transmission, prevention, and control, face washing behavior, latrine ownership, and water treatment behavior ($P < 0.05$). This study also reports a significant association between religion and cultural factors ($P < 0.05$), face washing behavior and distance to water sources during the dry season ($P < 0.05$), knowledge on trachoma and water treatment behavior ($P < 0.05$), occupation and waste disposal ($P < 0.05$), knowledge on trachoma and water treatment behavior ($P < 0.05$), and distance to healthcare facility and time taken to seek treatment when sick ($P < 0.05$). These study findings could be used to inform, plan and initiate socio-culturally sensitive sustainable interventions to combat the identified high-risk factors and undesirable practices in favor of safe, effective and sustainable trachoma control methods among the pastoralist in Samburu County, Kenya.

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LIST OF ABBREVIATIONS AND ACRONYMS

AMREF	-	African Medical and Research Foundation
ASAL	-	Arid and Semi-Arid Land
CBM	-	Christian Blinden Mission
CDC	-	Centre for Disease Control
CHV	-	Community Health Volunteer
CLTS	-	Community Led Total Sanitation
CORPs	-	Community Own Resource Persons
KAP	-	Knowledge Attitude and Practice
KNBS	-	Kenya National Bureau of Statistics
KPHC	-	Kenya Population and Housing Census
MOH	-	Ministry of Health
NTD	-	Neglected Tropical Disease
OSU	-	Ophthalmic Service Unit
SAFE	-	Surgery, Antibiotics, Facial Cleanliness & Environmental Improvement
SDG	-	Sustainable Development Goals
SPSS	-	Statistical Software for Social Sciences
SSI	-	Sight Savers International
TF	-	Trachomatous Inflammation – Follicular
TT	-	Trachomatous Trichiasis
UIG	-	Ultimate Intervention Goal
WASH	-	Water, Sanitation and Hygiene
WHO	-	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Acceptability of healthcare services	This is the appropriateness of the social, cultural and religious interaction that accompanies use of health care services
Accessibility of healthcare services	Proximity of the healthcare facility to the patient's home
Active Trachoma	The conjunctival inflammation and usually is seen in children especially pre-school children characterized by white lumps in the under surface of the upper eyelid
Affordability of healthcare services	Ability of families to pay for the costs of treatment
Availability of healthcare services	The capacity of a healthcare facility to be staffed by skilled healthcare workers, equipped with adequate drugs, medical supplies and equipment
Blinding Trachoma	Due to repeated infection, the inside of the eyelid becomes so severely scarred, turns inwards and causes the eyelashes to rub against the eyeball (trachomatous trichiasis) resulting in constant pain and light intolerance.
Cultural factors	Factors or elements that have their roots in the culture of a particular society.
Social factors	Factors referring to the range of elements that have their roots in the society.
Socio-cultural factors	These are customs, lifestyles and values that characterize a society or a group of people.
Socio-demographic factors	These are personal characteristics that may influence the health of an individual such as the age, occupation, religion, ethnicity, residence and level of education.
Socio-economic factors	These are characteristics involving the interaction between the social and economic habits of a group of people like the level of income and how it affects their health seeking behaviour.
Ultimate Intervention Goal	The final targets that must be achieved to eliminate trachoma i.e. reduce the number of people with trichiasis to fewer than 1 case per 1,000 people and reduce to less than 5% active trachoma in children between the ages of 1 and 9 years in any district.

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CHAPTER ONE

INTRODUCTION

1.1 Background Information

Trachoma is a neglected tropical bacterial disease caused by *Chlamydia trachomatis* through eye-to-eye transmission of infection (Emerson *et al.* 2000; Mariotti *et al.* 2003; Taye *et al.* 2007). Trachoma is the second leading cause of blindness worldwide (second to cataract) and the leading cause of preventable blindness (Kumaresan, 2007). It is characterized by inflammation of the transparent mucous membrane that lines the eyelids known as the conjunctiva. The disease is transmitted by direct contact through hands, fomites and flies. Flies of particular importance is a house fly known as *Musca sorbens* which is known for its characteristic eye-seeking behaviour and therefore playing a major role in trachoma transmission. In Trachoma endemic areas muscid flies are often seen clustering around the faces and noses of children feeding on mucus and eye discharges. The disease causes misery, dependency, loss to quality life and barrier to development (Adafrie *et al.*, 2021).

Over the last few decades, a lot has been achieved in the control and prevention of trachoma Worldwide. New assessment techniques, effective evidence-based control strategy with new methods, drugs and an aggressive global partnership for the control of the disease have evolved. The Surgery, Antibiotics, Facial Cleanliness & Environmental Improvement (SAFE) strategy remains an effective public health intervention that has been successfully used to manage and eliminate trachoma in some of the poorest Countries of the World, leading to the reduction of disease and blindness cases. Despite these achievements, numerous challenges remain for achieving effective control and prevention of trachoma in endemic communities. These notable constraints range from socio-economic factors, cultural factors, health system factors and environmental factors that affect effective trachoma control and prevention. Notably, for any intervention strategy to achieve the set goals of eliminating trachoma in spite of other constraints, community support and participation is essential. In order to achieve this, the healthcare provider needs to have a better understanding of the community perspectives of the disease (Ajewole *et al.* 2001). A more sustainable and probably effective control strategy for the trachoma control program is improvement in personal and environmental hygiene. However, it is

more difficult to attain, as it takes time for the effect to be visible and requires attitudinal and often sociocultural changes.

Globally, about 8 million people are irreversibly visually impaired and approximately 84 million cases of active trachoma currently exist Worldwide who are in need of treatment if blindness is to be prevented. Over 110 million people live in confirmed endemic regions and about 232 million people live in suspected areas worldwide.

WHO ranks Africa as the Continent that is most affected with trachoma. WHO estimates 77% of the total population living in trachoma endemic areas Worldwide reside in Africa while 18% are in the Eastern Mediterranean region. Owing to the fact that the burden of trachoma as a leading cause of preventable blindness, the WHO launched an international convection known as Global Elimination of Trachoma by 2020 (GET 2020) in 1997 of which Kenya is a signatory. GET 2020 sole aim was to eliminate blinding trachoma among endemic Countries by the year 2020. In addition to the above convection WHO has also recommended adoption of SAFE strategy {S-surgery to correct blinding trachoma, A-antibiotic administration to treat and prevent active trachoma infection, F-promotion of facial cleanness and E-environmental improvement} for trachoma control and prevention (Mariotti *et al*, 2008).

In Kenya, trachoma is the second leading cause of blindness after cataract which accounts for 19% of the blind population and the disease is mainly found in the arid areas of Rift Valley and Eastern regions among the marginalized nomadic communities with poor hygiene and water scarcity. Kenya has completed mapping of all suspected trachoma endemic Counties to determine segments with trachoma prevalence rates that warrants intervention. Among Kenya's 47 Counties, 12 have been confirmed to be trachoma endemic. According to Ministry of Health (MoH), the Trachomatous Inflammation (TF) prevalence was above 30% in three Counties, namely; Narok, Turkana and Samburu, 10-30% in three Counties of Kajiado, West Pokot and Marsabit and 5-10% in six Counties of Baringo, Laikipia, Meru North, Kitui, Embu and Isiolo whereas previously suspected Garissa was found to be below the threshold. In Counties with TF prevalence above 10%, trachoma is considered to be an issue of public health concern and in need of full SAFE intervention (MOH, 2009). According to the WHO, trachoma is a public health problem in Country where active cases of the disease prevalence is above 10% for

children 1- 9 years and 1% of blinding form for adults 15 years and above (WHO, 2009). Samburu County therefore, qualifies as trachoma endemic County having a prevalence of active trachoma among children 1-9 years of 35% and 6% for blinding trachoma among people above 15 years compared to 10% and 1% respectively, the WHO recommended minimum threshold (Karimurio *et al.*, 2006).

Samburu County generally has an undulating topography and lies in the arid and semi-arid ecological zone characterized by dry, hot and dusty conditions. The rainfall is erratic, unreliable and inadequate with annual range of 300 mm to 800 mm and therefore it frequently experiences drought conditions. Livestock rearing is the main economic activity but drought and cattle rustling have reduced the animal herd thus making the pastoralists (Pokot, Samburu and Turkana) poorer. Due to these hardships, the pastoralist communities have been forced to migrate within and to other Counties outside Samburu in search of water and pastures. Due to cattle rustling and insecurity, most health facilities and schools are within urban and settled areas. The road network is very poor in the County and impassable during rainy seasons. There are no public services vehicles to most parts of the County and people therefore mainly walk, use donkeys and ride motor bikes to urban market. Social cultural practices remain barriers to adoption of desired health behaviors. Traditional healers are widely consulted and self-medication using traditional herbs is widely practiced while modern medicine (where available) is also used. Care is sought very late at health facility, partly due to inaccessibility of health facilities and partly due to ignorance and belief in superstition. Women bear the blunt on myriad social and economic responsibility which is a norm, for instance, construct the temporary huts (manyattas), and cover long distances to fetch water, carry out all domestic work, and care for young stock and children. Men and boys look after animals and provide security against rustlers from within and in neighboring Counties. Decisions making remain the domain of men and women have less access to property.

Due to the high prevalence of active trachoma among children 1-9 years of 35% and blinding trachoma of 6% among people above 15 years despite the ongoing trachoma control and prevention interventions in Samburu County couples with low socio-economic characteristic, poor health seeking behaviors and infrastructure, deep rooted cultural practices and beliefs which

are all contributing risk factors to trachoma transmission with no study conducted to assess these determinants particularly in this area, Samburu was identified for the study.

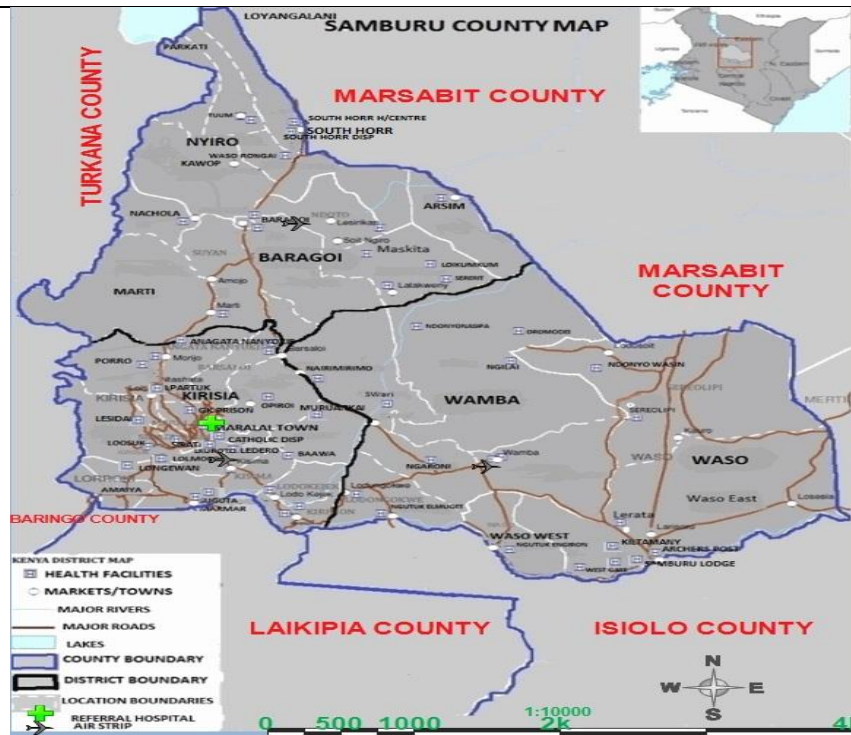


Figure 1.1: A map of Samburu County showing administrative boundaries

Trachoma is a focal disease that is brought about by poor sanitation, inadequate water accessibility, dry and dust conditions especially in ASAL areas and complicated by high poverty levels (Gebrie *et al.*, 2019). Trachoma has been virtually eliminated from developed Countries through improvements of water supply, hygiene sanitation, poverty reduction and increased literacy levels (Beneke A, 2012). The situation in Samburu is the reverse of what is happening in the developed world with all contributing risk factors that include inadequate access to water, poor hygiene and sanitation, ASAL climatic conditions, high illiteracy level and prolonged droughts prevalent in the County.

Although majority of the population in Samburu County are perceived to be of low socio-economic status, ingrained in cultural values and practices with poor medication seeking behavior (MOH, 2015), the information on the effect of socio-economic, cultural and healthcare system factors on effective trachoma control and prevention among the pastoralists in Samburu County is limited. Here we sought to establish the impact of socio-economic, cultural and

healthcare systems factors on effective trachoma control and prevention in Samburu County. This contributed towards a deeper understanding on how these factors influence trachoma transmission.

1.2 Statement of the problem

Samburu is one of the trachoma endemic Counties in Kenya with an active trachoma prevalence of 35% among children 1-9 years and 6% for blinding trachoma among people above 15 years. This is higher than the WHO recommended minimum threshold of less than 10% and 1% respectively for control at a district level. According to WHO, the ultimate intervention goal of trachoma at a community level is less than 5% for active trachoma and one TT case per every 1,000 people aged above 15 years for the blinding trachoma. Despite the great intervention efforts employed by the County Ministry of Health and Eyecare partners using the full SAFE strategy, trachoma remains a disease of public health and socio-economic importance in Samburu County. This situation has possibly been exuberated by the existing bottle-necks factors and barriers to effective trachoma control and prevention which are yet to be fully addressed. These factors include; resistance and slow uptake to positive behaviour change, social and economic factors, existing health system gaps in addressing trachoma, possible cultural factors influencing trachoma transmission among the pastoralists. The proportion of people practicing facial hygiene and hand washing practices in Kirisia Sub-county is low with only 20% of the population washing hands with soap after visiting the toilet. Additionally, the proportion of people with access to safe water is 31% and access to basic sanitation stands at 19% which is very low in the Sub-county compared to National rates of 59% and 32% respectively. The low proportion of people accessing safe water and basic sanitation is a hindrance to successful interventions and hygiene promotion for trachoma control among the pastoralist. This also fosters the conducive breeding sites and increase population for the ever presence of flies that in turn play a key role in the transmission of trachoma further frustrating the trachoma control and prevention efforts. It is important to establish the effect of socio-economic, cultural and healthcare systems factors on trachoma control and prevention among the pastoralist in Samburu County.

1.3 Objectives of the Study

1.3.1 Main Objective

To assess the factors affecting trachoma control and prevention among pastoralist in Kirisia Sub-county, Samburu County, Kenya.

1.3.2 Specific Objectives

- i. To assess the socio-economic factors affecting effective trachoma control and prevention among the pastoralist in Kirisia Sub-county, Samburu County, Kenya.
- ii. To evaluate the cultural factors influencing trachoma transmission among the pastoralists in Kirisia Sub-county, Samburu County, Kenya.
- iii. To investigate the health system factors affecting effective control and prevention of trachoma in Kirisia Sub-county, Samburu County, Kenya.

1.4 Research Questions

- i. What are the socio-economic factors affect effective trachoma control and prevention among the pastoralist in Kirisia, Samburu County?
- ii. What are the cultural factors influencing trachoma transmission among the pastoralists in Kirisia, Samburu County?
- iii. What are the health system factors affecting effective control and prevention of trachoma in Kirisia, Samburu County?

1.5 Justification of the Study

Visual impairment has a profound impact on the quality of life of individuals and their communities in Samburu County. It greatly constrains the area potential for poverty alleviation, social and economic development leading to high poverty levels and poor living standards of the community members due to reduced social and economic opportunity cost of blindness. These costs include loss of productivity, income and social status of both the individual directly affected, the family and community who are indirectly affected. People who are blind are dependent on family members to attend to their basic needs including economic reliance. Blindness has got multiple effects to the affected individual running down through socio-cultural, economic reduced productivity. Trachoma disease is managed using a WHO recommended strategy called SAFE; (Surgery for people at immediate risk of blindness, Antibiotic therapy to treat individual active cases and reduce the community reservoir of

infection, Facial cleanliness and improved hygiene to reduce trachoma transmission, Environmental improvements resulting in conducive human habitation through infrastructural and behaviour change improvement).

Various trachoma interventions have been implemented towards control and prevention of trachoma by the Samburu County Ministry of Health and other eye care partners in the County including Kirisia Sub-county. However, a lot of emphasis has been directed toward the curative perspective. It is important to promote behaviour change of the pastoral community living in Samburu through changing the prevailing attitude, practices and improving knowledge on the connection between various socio-economic factors, cultural factors, health system determinants and effective control and prevention of trachoma. This preventive approach will not only create positive behaviour change in trachoma control and prevention but also synergize the curative and concerted WASH intervention efforts.

In view of the above, hence this study on; assessment of factors affecting trachoma control and prevention among pastoralist in Kirisia Sub-county, Samburu County, Kenya. The study will culminate to identification of unaddressed trachoma effective control and prevention limiting social economic, cultural and health system factors in Samburu County. The findings will then serve to increase pool of knowledge, information advancement and advocate for socio-culturally sensitive interventions to abandon the identified high-risk practices in favor of safe practices of the pastoralist in Samburu County. The study will be useful to researchers, policy makers and programme managers in designing and implementing policies and programs to address the challenge of high trachoma prevalence among the pastoralist. The findings may also help the National, County Governments and development partners in prioritization and allocation of resources both material, personnel and funds to sustainably address and manage the diseases and other underlying social, economic, cultural and health system factors that are affecting trachoma control and prevention. Additionally, the study will explore more insight on the control of trachoma for policy influence, advocacy and evidence-based decision making by the County Government and relevant stakeholders.

1.6 Scope and Limitations of the study

The study focused on the assessment of factors affecting trachoma control and prevention in Kirisia, Samburu County, because it is one of the mapped Counties in Kenya with a high prevalence of trachoma. Communities living in the study area have low socioeconomic status, deeply rooted in cultural believes and have poor behavior in seeking health services which could be impacting negatively on the efforts to eradicate trachoma in the region. To realize the goal of this study, men and women aged between 18-80 years from different households across four locations within Kirisia Sub-county, Samburu County were targeted. The effect of socioeconomic, cultural and healthcare systems factors on trachoma control and prevention were explored.

This study was subject to a number of limitations; First, the selection bias, this can be a limitation when household head selected as a respondent is not reached resulting to population under coverage due to vastness or topography. This might give rise to findings that lack external validity and might threaten generalizability of the study outcome. Therefore, to avoid this, the study was a representative of the whole population, attempts were made to include hard-to-reach groups, such as people in institutions, on migration or the homestead. Secondly, non-response bias could affect the study especially when the characteristics of non-responders differ from responders and could result in bias of the measures of outcome. To mitigate this limitation, the study increased the sample size by 20%. Thirdly, recall bias can affect the reliability of the study if the respondent is unable to recall well the past exposure information or do not remember previous events or experiences accurately or omit details. To mitigate this, a high-quality questionnaire was devised and interviewers were well trained to allow the interviewees sufficient time for adequate recall of long-term memory. Medical records were also used to access information that interviewees were unable to recall. Lastly, the "observer effect" was avoided by the enumerators to minimize possible bias where people acted or said things that were not usual because of the presence of strangers. This was achieved by recruiting the locals as research assistants and minimization of status differences by the enumerators so that people can feel comfortable with the research team.

1.7 Conceptual framework

This study operationalized Aunger and Curtis (2013) (Figure 2) conceptual framework to understand the underlying determinants affecting trachoma control and prevention, advance health knowledge and feasible innovations in a strengthened health system in order to fuel adoption of these healthy practices and promote behaviour modification towards enhanced homegrown sustainable trachoma control and improved health outcomes.

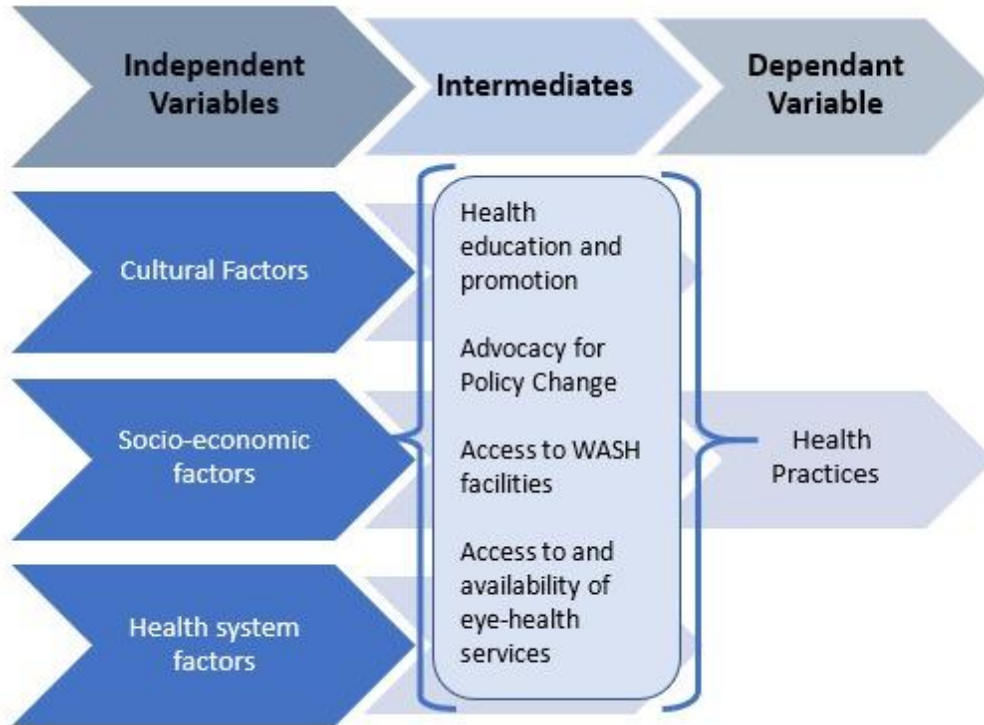


Figure1.2: Conceptual framework adapted from Aunger and Curtis (2013)

1.8 Theoretical framework

This study was primarily guided by a framework base of an existing Theory of Triadic Influence as well as Social Cognitive Theory of Behavioral Change Model detailing the principles, construct, concepts and tenants of the theory that is related and reflects the hypothesis and research questions of this study (Figure 3).

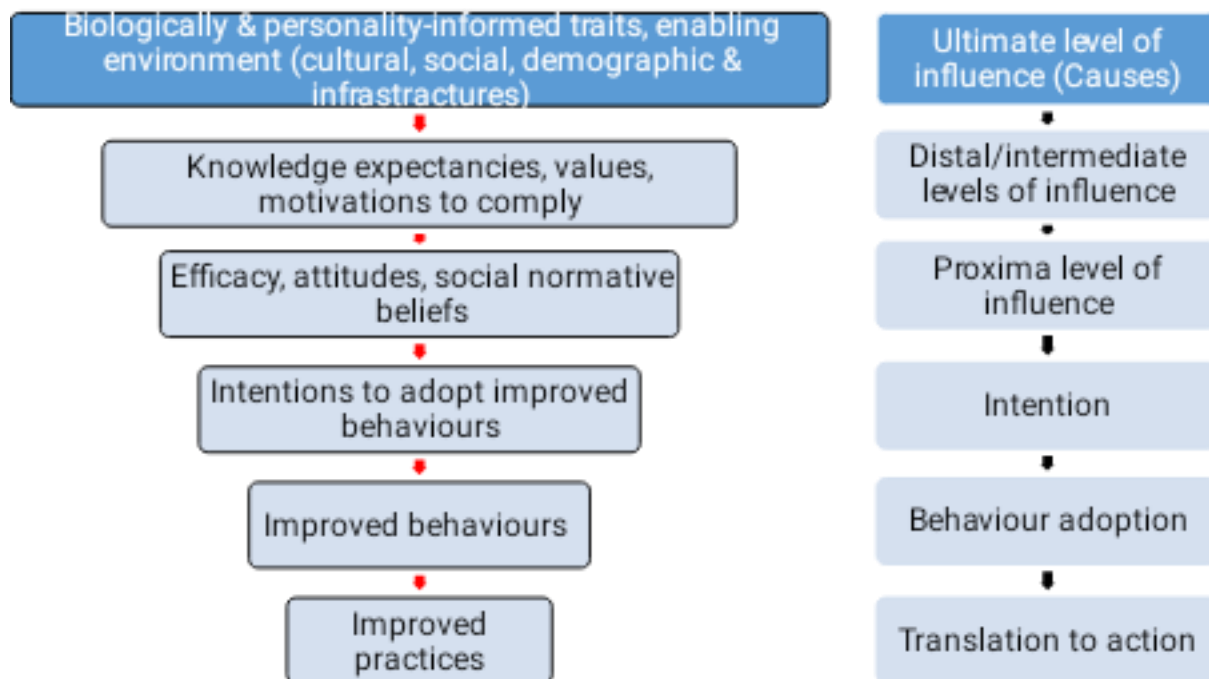


Figure 1.3: Theoretical framework adapted from Flay and Petraits (1994)

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of related literature and relevant studies regarding trachoma control and prevention. It commences by describing the various theoretical and scientific perspectives on trachoma control and prevention. Some of the factors considered as the leading determinants and predisposing risk factors to effective control and prevention of trachoma are discussed. These include; socio-economic factors, cultural attributes and healthcare system factors.

2.2 Socio-economic factors affecting effective trachoma control and prevention among the pastoralist in Kirisia Sub-county

The social-economic factors include the level of education, ethnicity, religion, level of income and marital status. Although great advances have been made in the clinical understanding of trachoma, the disease remains endemic in many parts of the world. Social and economic factors continue to play an important role in trachoma transmission and progression (Ripotolim *et al.*, 2021). However, available literature contains relatively few studies which rigorously assess the importance of social factors. A critical review of the trachoma literature implicates individual and community hygiene as important risk factors for disease (Gebrie *et al.*, 2019). The level of education influences the knowledge on healthcare, disease preventive and control measures. For instance, literate individuals are likely to be more conscious on their general health state and that of their children leading to better eye healthcare seeking behavior (Vinke, C., & Lonergan, S., 2011).

According to the study by Alison Dittmer (2009), the community believed that latrines are meant for wealthy people and they should not try to imitate them by building one. Other socio-cultural issues identified were that when someone feeds, the person should defecate in their field, one may be possessed by demons after latrine usage, use of latrines leads to the loss of magical powers, defecating in latrines shortens life span, continuation of ancestor's way of life by using latrines and the community members were comfortable with the practice of open defecation (Dittmer A, 2009). The issues identified in the survey relate to the wider issue of poverty and

cost of building a latrine which is high in relation to household income in many rural communities

A community-based survey was conducted using the standardized WHO protocol to investigate risk factors for active trachoma and trichiasis in Amhara Regional State, Ethiopia. Its objective was to establish the prevalence of active trachoma (TF) in children aged 1-9 years; potentially blinding trachoma (TT) in adults >15 years and to document the magnitude of selected known trachoma risk factors. The study found out that active trachoma in children to be independently associated with ocular discharge, nasal discharge, proxy indicators of low socio-economic status in households (thatch roof and no electrification) and increasing altitude. Trichomatous trichiasis in adults was independently associated with increasing age, female gender, increasing prevalence of active trachoma in children in the household and increasing altitude (Ngondi *et al.*, 2008).

Studies have shown that marital status of people plays a significant role in determining the health status of the family members. Research indicates that in addition to change of individual knowledge, perceptions and other psychological factors that influence behavioral preferences, single parenthood has contributed to poor health status in most Countries (Elder *et al.*, 2014). Social scientists assume that married women are healthier and more self-sufficient than the single women are; this factor affects their health well-being in a positive manner, thus, contributes to better health status (Uddin & Hossain, 2006).

Findings from formative research conducted in Uganda (MoH, 2013) to support a Trachoma prevention communication campaign showed that ideation factors influenced individual behaviors associated with the use and non-use of water and sanitation. These antecedents to behaviour change included; knowledge of Trachoma transmission and preventions; beliefs and values about Trachoma infection, hygiene, latrine use, clean children, perceived risk for Trachoma, self-efficacy to wash hands and faces correctly and to keep households and community environments clean and subjective norms.

Though majority of the pastoralists in Samburu are perceived to be of low socio-economic status, low education levels, entrenched societal norms and staunch religious beliefs, no studies have been conducted in Samburu to identify the socio-economic factors that are associated with effective trachoma control and prevention (MOH 2014). As such, there is need to conduct more

research to identify the specific socio-economic factors that influence effective control and prevention of trachoma. The study provided a deeper understanding of the socio-economic factors of importance that should be addressed by the Ministry of Health and other strategic partners for effective trachoma control and prevention at all levels.

2.3 Cultural factors influencing trachoma transmission among the pastoralists in Kirisia Sub-county

Culture has been shown to be closely intertwined with behaviors and health outcomes. The cultural factors include the elements that have their roots in the culture of a particular society. These are customs, lifestyles, altitude, beliefs and values that characterize a society or a group of people. For the purpose of this study, the cultural facets that influence trachoma transmission and control and prevention included the pastoralist perspectives towards the role of the eye-seeking fly, facial cleanliness behaviors, handwashing practices, human waste control and prevention and latrine usage.

2.3.1 Fly cultural significance and role in trachoma transmission

There exists a strong cultural belief on fly importance, significance and semblance among the pastoralist. The resultant cultural consequence on fight against trachoma remain unexplored in Samburu County, despite their potential impact on disease control, particularly on the “F” and “E” aspects of trachoma control and prevention. Understanding the perceived role of fly in trachoma transmission among the residents is therefore key to the implementation of effective disease control, especially regarding the community beliefs about etiology. Traditionally eye-seeking flies are considered a major factor in the spread of trachoma and this indeed seems likely in many trachoma endemic regions. Studies in The Gambia using fly traps found that only 2 species of fly; *Musca sorbens* and *M. domestica*, were caught from the eyes of children. Significantly, although *M. sorbens* comprised < 10% of the total number of flies caught with attractant traps, it was responsible for > 90% of the fly-eye contacts. As would be expected, all fly species were more numerous in the wet season than the dry season. This confirmed flies potential role as vectors of trachoma (Bailey *et al.*, 2000).

In another study carried out to determine the effect of fly control on trachoma, it was found out that fly control decreased numbers of muscid flies by around 75% in the intervention villages

compared with controls. Trachoma prevalence was similar at baseline (wet season, prevalence in intervention village 8.8% vs. control 12.2%; dry season, 18.0% vs. 16.0%), but after 3 months of fly control there were 75% fewer new cases of trachoma in the intervention villages (wet season 3.7% vs. 13.7%; dry season 10.0% vs. 18.9%; rate ratio and relative risk of pooled data 0.25 [adjusted 95% CI 0.09-0.64], $p=0.003$). This study therefore underlines the importance of fly control in the control and prevention of Trachoma and the consequent knowledge, attitude and practice that are interlinked with fly control (Emerson *et al* 1999).

In Tanzania a further study was conducted in rural setting, flies appeared to be an important vector for trachoma but it is not clear that flies are equally important in areas with hyper-endemic trachoma, nor is it known if fly control adds value to the provision of mass antibiotic treatment for active trachoma as part of the SAFE strategy. Through an evaluation study, it was concluded that there was an added value in intensive spraying for the people who have received antibiotic treatment azithromycin immediately prior to the start of the study of trachoma house fly control. Mass treatment with azithromycin is needed for a number of years to control trachoma in Hyper-endemic communities in Tanzania. Scant empirical data from hyper endemic communities exist on the number of rounds of treatment needed to reach a goal of <5% prevalence in children. The prevalence of trachoma and infection with *Chlamydia trachomatis* was determined in communities after 3 –7 years of annual mass treatment in Tanzania. After 3 years of mass treatment, the prevalence of trachoma decreased in a linear fashion with number of years of mass treatment, whereas decreased prevalence of *C. trachomatis* infection were related to the extent of the previous year's azithromycin coverage (West *et al*, 2005).

In Samburu, it's perceived that house fly signifies wealth and many livestock which is the tenet of good and comfortable life and as a result, the fly is highly regarded among the pastoralist community (MOH, 2013). However, these cultural factors have not been studied in details to show how they influence trachoma transmission in Samburu County. As such, it's an area not well understood which merits research to identify the specific cultural factors related to fly and that affect trachoma transmission hence provide evidence for raising awareness and changing current practices to reduce trachoma transmissions.

2.3.2 Facial cleanliness behaviors

Poor hygienic conditions favor the transmission of *C. trachomatis* through contact with infectious secretions, exposure to the ocular and nasal secretions of pre-school children clearly a potential source of infection. Several investigations have been carried out on the impact of unclean faces in children and the value of face washing on trachoma. Successfully implementing of facial cleanliness requires community support and behavioral changes (Emerson *et al*, 2006).

According to a study by Rubinstein R. & Lane S. (2012), health behaviors such as the maintenance of facial hygiene are heavily influenced by sociocultural factors and understanding which is therefore key to the implementation of effective trachoma disease control especially regarding community beliefs about etiology. As there is a paucity of research examining the foundations of community health behaviors and attitudes towards eye disease, this study addresses an important gap in the literature. Improving facial cleanliness may decrease the likelihood of trachoma transmission. However, ascertaining the frequency of face washing among children is difficult and prone to reporting bias, since in most cultures, mothers are aware that face washing is a desirable activity, regardless of their actual practices. Thus, studies that rely on self-report of face washing may have significant misclassification (Rabiu *et al*, 2011).

In a Tanzanian longitudinal study, children observed in the home to have clean faces were less likely to have trachoma or severe trachoma compared with children with unclean faces. The two time points six years apart found that children with unclean faces who had clean faces at follow up were less likely to have severe trachoma at follow up (odds ratio = 0.21) compared with children who had unclean faces at both time points (Taylor *et al*, 1989). Flies seeking moisture and protein, which may be physical vectors of infection, are liable to be less attracted to clean faces than to faces with ocular and nasal secretions (Emerson *et al*, 2006).

Similarly, a study conducted to assess the baseline prevalence and distribution of trachoma and dirty faces in the Upper Eastern Kenya region, a “hard-to-reach” region with poor health and low economic indicator concluded that a dirty face is the most important risk factor for active trachoma because it is believed to be the final common pathway by which environmental risk factors influence the risk of the disease (Taylor HR, 2008).

In a study carried out in six Counties of Kenya, blinding trachoma was found to be a public problem in all surveyed Counties. Active trachoma was a County-wide public health problem in four Counties of Samburu, Narok, West Pokot and Kajiado and only in some of the sub-location of the other two Counties of Baringo and Meru. A dirty face is the most important risk factor for active trachoma because it is believed to be the final common pathway by which environmental risk factors influence the risk of the disease. The results of this study indicated that Counties with high prevalence of TF, majority of children were found to have dirty faces. Additionally, the Odds of a child with a dirty face were higher than for a child with a clean face (Karimurio *et al*, 2013).

2.3.3 Handwashing practices

Personal hygiene including hand washing with soap before cleaning eyes and face is taken to interrupt the trachoma transmission. This measure not only reduce the attractiveness to eye-seeking flies, but also reduces the spread of the trachoma disease from an infected person to a healthy person. Handwashing is generally considered the single most important procedure for preventing bacterial infections. Handwashing has been particularly well researched in low-income Countries, where washing hands with water alone has been found to reduce infectious diseases by about 30% and by about 45% when soap is used (Curtis *et al*, 2011).

A study was conducted to find out the role of handwashing in preventing these diseases in developing World settings in Pakistan. In a series of randomized, controlled studies of intensive handwashing promotion, researchers found about 50% fewer diarrheal and respiratory infections among young children in low-income households that received weekly handwashing promotion compared with households that did not receive these interventions. This study helped demonstrate that handwashing can prevent spread of two of the leading killers of young children in the developing world. However, although handwashing seems outwardly simple, the habit of washing hands consistently and at the critical times can be difficult to form (WHO, 2008). As a result, CDC began to investigate models of promoting handwashing behaviour change and confirmed that the approach is more efficient through schools in developing Countries. This because hygiene habits generally evolve through childhood and large numbers of children are concentrated in schools, this strategy included studying schools as a site for handwashing promotion (WHO, 2008).

2.3.4 Human waste management and latrine usage

Proper sanitation for disposal of human waste is needed to reduce fly population and transmission. Households should access to a toilet, proper make use of it to reduce open human defecation. It is important for communities to engage and commit to proper waste control that avoids human and animal faeces, food wastes and moisture that attract eye-seeking flies that in turn facilitate trachoma transmission. Among the pastoralists, due to socio-cultural perceptions, latrines are usually unacceptable and the communities commonly use bushes for human waste disposal. Poor perceptions on disease susceptibility and linkage to poor sanitation, flies on children's faces, latrine ownership and usage and separation of human and animal dwellings also have played a role in the transmission of trachoma (Njomo *et al*, 2016).

Environmental sanitation is particularly poor in villages where inadequate or non-existent latrines and lack of dedicated areas for the disposal of rubbish pollute the local environment. While lack of sanitation facilities may be attributable to many factors including physical, economic, socio-cultural factors and poverty, community members are responsible for most of the factors that affect their environment and health (Emerson *et al*, 2004). A study was designed to identify the socio-cultural beliefs in West African Countries that make some communities resistant to changing their sanitation practices. The study identified socio-cultural barriers to abandoning open defecation. Shame or embarrassment of being seen approaching a toilet was identified as a barrier among some communities in Burkina Faso and Mali. People are ashamed or embarrassed to be seen walking in the direction of a latrine or toilet, even by close relatives such as their spouses or children, as other people will know they are going to relieve themselves. It was found out that most people avoided walking directly towards toilets, and some prefer not to have any at home as they feel that defecating in the bush offers more privacy. The community believed excreta should be removed from the house due to bad smell. Living with human excreta is unacceptable, with most difficulties related to the elimination of smell (Alison Dittmer, 2009).

A study conducted in Gambia, aimed at assessing the role of eye-seeking flies as vectors of trachoma and provision of simple pit latrines without additional health education. The study found out that removal of human faeces from the environment, through the provision of basic sanitation, is likely to greatly reduce fly density, eye contact and hence trachoma transmission (Emerson *et al*, 2004).

In many African cultures, construction of pit latrines is seen as a man's job while the task of cleaning them is a woman's role. A study conducted in rural Northern Kenya, revealed that a women-headed households face difficulties with latrine construction and repair, because it is not acceptable for a woman to dig a pit latrine or to repair a latrine. With regard to latrine use, the findings revealed that some latrines were located outside the homestead and children's faeces were noticed in the compound. It was reported that parents normally train their young children to defecate in a specially designated place within the compound where after defecation, mothers dispose of the faeces either by taking it to the latrine (with a hoe) or by digging and burying it on the ground. In the local community culture, it's generally believed that contact with human faeces is defiling thus should be avoided at all costs. The study found out that the local community believes that if a latrine is located within the compound, it cannot be shared with the in-laws as the act is seen as tantamount to undressing or being naked in front of one's in-laws. Such notions of nakedness relate to privacy which is a very important and well recognized requirement for latrine acceptance and use (Astier Almedom, 2009).

A formative research study conducted in Turkana and Marsabit Counties found out that the barriers to implementation behaviour change interventions for the "F" and "E" include physical infrastructural barriers such as lack of water and limited means of transport in most communities, difficulties in building and use latrines and this is not seen as valuable use of time and other resources for migratory nomadic communities. The study further concluded that cultural barriers included; lack of distinction between hygiene and health; nasal discharge is seen as normal and keeping animals close to compounds for security reasons (Gilbert *et al*, 2013).

In the past, focusing on the supply and installation of sanitation hardware only to communities by the County government and other well-wishers has proved inadequate, thus other sanitation approaches such as CLTS that focus on triggering, changing attitudes and behaviour through community mobilization to stop open defecation has been encouraged and community members need to be sensitized to build and use latrines. Social solidarity of the sensitized target group to promote behaviour change in the entire community as the environmental health of the local area will only improve if all members of the community improve their sanitation practices (Mariotti *et al*, 2008).

An impact study in Kenya representing a range of socio-economic and cultural diversity, the study showed that the communities had different excreta disposal practices influenced by traditional beliefs while limited financial resources was the major constraint to access to sanitation facilities, lack of awareness about sanitation and hygiene, how to construct and maintain pit latrines do hinder sanitation coverage. The study findings further showed that there was a positive relationship between education levels, health and hygiene awareness on the demand for sanitation facilities (Boro Gathuo, 2004).

Observation with the Samburu people of Kenya has shown that both gender is very exclusive about their toilet habits and practices. They therefore don't visit a toilet, as it could make their intentions apparent to any bystander. Generally, Samburu community in general, more so the children are often frightened of dark dugouts because of the likelihood that they could host potentially deadly snakes capable of causing death. Consequently, latrines facilities supported and constructed by well-meaning actors are often left intact or used as refuse pits which could also be dangerous to children. A case study intervention to eliminate trachoma from the Samburu community was conducted on improved face-washing and acceptable human fecal habits (Morris D. and Francombe J., 2006). The construction and utilization of latrines requires the participation of communities. However, among the pastoralist community, they often perceive that they cannot conceive sleeping in thatched-roof huts and on the other hand build latrines with cement and reinforcing steel just to defecate. Thus, they give less importance to the latrines than to other facilities and do not want to invest in latrines (Kindo Souleymane, 2009).

Many community-based trachoma interventions focused on face-washing with other hygiene measures and changed the excreta disposal habits of community, since the practice reduces the population of the eye-seeking flies that carry the disease. WHO recommends the use latrines for human excreta disposal, however, for pastoralist communities, this poses various disadvantages because latrine facilities are not portable to ensure the community keeps moving around from place to place. Additionally, it would be expensive since several latrines facilities would be required to accommodate the pastoralist lifestyle and still it's hard to construct in semi-arid areas where mechanical digging apparatus are readily unavailable. Understanding the underlying cultural factors that focuses on attitudes and behaviors of local populations that increased risk of Trachoma is important in identifying and providing deeper insights into antecedents to behavior

change. Cultural factors remain unexplored among the pastoralist in Samburu, despite their potential impact on disease control and prevention and control, particularly through the “F” and “E” aspects. By examining these, the study aims to illuminate the population's unreported health beliefs, hygiene behaviors and disease perceptions. This understanding will help to optimize future public health interventions in trachoma control and prevention in Samburu County.

2.4 Health system factors affecting effective control and prevention of trachoma in Kirisia Sub-county

Integration of trachoma control interventions into the mainstream health systems makes the programs sustainable, improves on coverage, leverage and reduces costs. Planning and integration into regular health systems is essential in scaling up the interventions to achieve complete eradication of the trachoma disease, provide quality health care services, ease of access, improved health outcomes, wide population coverage, user satisfaction and efficiency. The question of human resources for eye health is central to the success of VISION 2020 (The Right to Sight) and of any health Programme. The VISION 2020 is a global initiative aims to eliminate avoidable blindness by the year 2020. The ultimate goal of the initiative is to integrate a sustainable, comprehensive, high quality, equitable eyecare system into strengthened national health-care systems. The three core approaches of VISION 2020 to the prevention of blindness and visual impairment are; the disease control, human resource development and infrastructure and technology. The development of sustainable, affordable and equitable comprehensive eye care systems as an integral part of the national health care systems based on the principles and practices of primary health care is key to achievement of this goal. The initiative specified what human resource was needed and recently, World Health Organization guide on human resources for health made recommendations on the cadre and number of personnel needed to meet all the objectives requirement in global health. However, in the real sense no national eye health policies articulated so far has an explicit guidance on human resources (WHO, 1999).

Initially, it was acknowledged that it was important to develop new cadres of professionals who would work in the communities to address the rising ebb of avoidable blindness. Although, eye health service delivery at all levels still relies majorly on high level specialized eye health medical doctors, the degree of this dependence on medical specialists varies across regions. It is progressively becoming clear that there are inadequate ophthalmologists to be trained and on

boarded to serve all forms of ocular morbidity. If this approach is to be depended on, then the objectives will be unaccomplished. Midlevel technical personnel, trained ophthalmic nurses, ophthalmic assistants, vision technicians, instrument technicians as well as ‘task shifted’ professionals who can provide various eye health services, are critical if the needs and envisioned requirements for eye health human workforce is to be realized. At the household level, the community health volunteers within the established community units becomes critical and an effective bridge between the community and modern evidence-based health services therefore directly responds to the health needs of community within their immediate environment. In a situation where the community health promoters are to be assigned roles on community level eye health to conduct basic eye screening, case identification and counselling, then CHVs should be capacity build on basic skills, simple instrument and technology to execute as well as communication and collaboration skills to connect and utilize links with other sectors as necessary.

Health care in Kenya just like in Africa has been challenged mainly by weak health systems, especially due to minimal commitment to the development of the six building blocks of a health system. The plan includes Human Resource control and prevention as one of the strategic objectives that will realize equitable, rational development and distribution of eye care workers in line with vision 2020 and Vision 2030 of reducing health irregularities and inequity. The crucial role of human resource in driving a health system is well stipulated, with relevant skills transfer system. The shortage of health workers in the Country is as a result of multiple factors such as difficult working conditions or a lack of training and recruitment systems. But the situation is made far worse by the inequity in the distribution and mobility of health workers. Health workers, like most people, tend to prefer living and working in areas where there are higher standards of living, safety and a good infrastructure (MOH, 2010).

The availability of appropriate healthcare infrastructure, skilled competent workforce and equipment has played a fundamental role in trachoma prevalence and backlog reduction in controlling and managing the trachoma disease in various nations. However, healthcare facilities that lack the basic ophthalmic equipment, drugs, supplies and an effective referral system, lead to the delay in eye health care quality and timely service provision hence contributes to poor trachoma disease control and prevention.

Despite the efforts made on trachoma prevention and control through continuous awareness creation, health education, capacity building, antibiotic administration and surgical interventions, the active and blinding trachoma is still high and very limited reliable studies have been conducted that show the relationship between health system factors and effective trachoma control and prevention. Thus, the findings of this study can be used to inform policy makers to develop and embrace health system strengthening for effective trachoma prevention, control and prevention strategies to reduce the prevalence rates in achieving the UIG in Samburu County.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Introduction

This chapter presents the procedures and methods used in assessing the socio-economic, cultural and health system factors affecting trachoma control and prevention among pastoralist in Kirisia Sub-county in Samburu County, Kenya. Study setting, research design, study population, sample size determination and sampling procedures, data collection methods, measurement of variables, data analysis and ethical considerations are detailed here.

3.2 Study Design

This was a cross-sectional study that employed both quantitative and qualitative methods of data collection to assess the factors affecting trachoma control and prevention using surgery, antibiotics, facial cleanliness and environmental improvement (SAFE) approach among the pastoralists in Kirisia Sub-county in Samburu County, Kenya.

3.3 Study Population

The study engaged household head or the available eldest member aged above 18 years in every selected household. The respondents were drawn from Sirata, Loosuk, Porro and Maralal locations of Kirisia Sub-county, Samburu County who are mostly pastoralists. The target population in the 4 locations was 39,719 with a total of 5,449 households. For qualitative data, 6 key stakeholders from the Ministry of Health, Water, Education and Social services and the community opinion local leaders were involved.

3.4 Study Area

The study was conducted in Kirisia Sub-county, Samburu County, Kenya. The locations where the study was carried out are Sirata (791 HH), Loosuk (1,298 HH), Maralal (2,088 HH) and Porro (1,272 HH) locations.

Samburu County covers an area of 21,127 km² and has a projected population of 310,327 (KNBS 2019), giving it a population density of 15 people per square kilometer. Samburu County is among the three Counties with the lowest Human Development Indices in Kenya (0.293) compared to the National average of 0.519. The Human Poverty Index for the County is 59.6%, compared to the National average of 47.2% which makes it one of the lowest in the Country.

The County life expectancy is 49 years (2011), while 75% of the population has no access to proper health care; about 46.2% of the children under five are underweight and only 13.3% of the population have access to piped water. Illiteracy level in the County is high at 81% especially among the adults.

According to Kenya National population census 2019, Kirisia Sub-county has an estimated population of 86,610 and its classified as arid and semi-arid zone with hot and dry climate, rainfall is unreliable and erratic. Livestock rearing is the main occupation and source of income though cattle rustling and drought have reduced the livestock numbers subjecting the population to poverty.

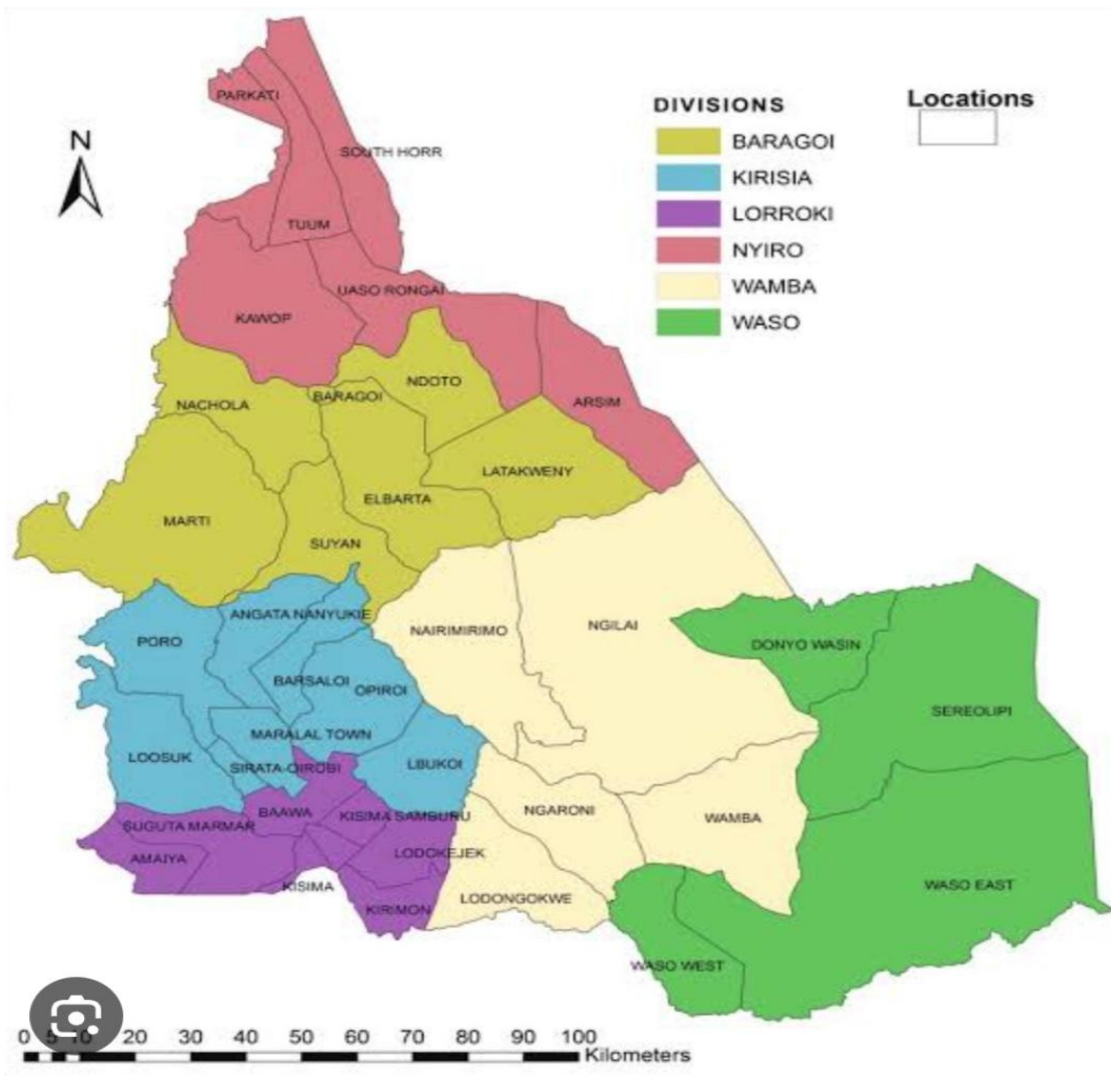


Figure 3.1: A map of Samburu County showing Kirisia Sub-county, the study area

3.5 Sampling

The study was designed to collect information from households within the study area. Purposive sampling was used to identify Samburu County as the study area owing to its trachoma endemicity and the high trachoma disease burden. Simple random sampling was used to select Kirisia Sub-county. Four locations were also selected using simple random sampling. The locations were stratified into sub-location from where the households were obtained. At the sub-location level cluster sampling was used for dividing the area into small non-overlapping areas and then randomly selecting a number of these smaller areas (Kothari, 2007). Simple random sampling of the clustered groups was used to select elements within each selected group to ensure everyone have an equal opportunity to participate in the study. Systematic sampling was used to select respondents at the households that participated in door-to-door interview exercise. Every 3rd household was selected and the household head or an adult HH member aged above 18 years in each HH sampled was interviewed. The first household was randomly selected.

Purposive sampling was used to identify key informants and participants for focused group discussions. The key informants and participants of the FGDs comprised healthcare workers and community local leaders selected based their knowledge and role in advocating for the acceptance of positive health behavioral change in the community.

3.5.1 Sample size determination

To determine the sample size of this study, the total population and community members to be interviewed were represented by number of households and HH head or an adult HH member aged above 18 years, respectively.

Total number of Households = 5,449

$$n = (z^2pq)/d^2$$

To calculate the sample frame for the study, the population of the study area, adults aged 18 years and above, the number of households were identified.

To calculate the sample size for populations < 10, 000, the calculation was based on Fisher's *et al* (1999) formula (Fisher's *et al* 1999).

$$n = \frac{Z^2 \times P \times Q}{d^2}$$

Given:

Total HH (N) = 5,449

P = Proportion of adults ~50%

Z = Standard normal deviate at required confidence level = 1.96

Q = Desired level of accuracy = 0.5

d = Level of significance = 0.05

n = Desired sample size

Therefore:

$$n = \frac{1.96 \times 1.96 \times 0.5 \times 0.5}{0.05 \times 0.05}$$

$$n = \frac{0.9604}{0.0025}$$

$$n = 385$$

$$n = 385$$

Since the total population of the locations is <10,000, then the finite alternative formula is used to get the final sample size:

n = Desired sample size (population >10,000)

nf = Desired sample size (population <10,000)

N = Total households

$$nf = \frac{n}{(1 + (n/N))}$$

$$nf = \frac{385}{1 + (385/5,449)}$$

$$nf = 385 / (1 + 0.07066)$$

$$nf = 385 / 1.07066 \quad nf = 359.5913 \quad nf = \mathbf{360}$$

Anticipating a non-response and drop out percentage of 20%.

Then; Final sample size = Effective sample size / (1 - non response rate anticipated).

Hence; Final sample size = 360 / (1 - 0.2) = 450 units is the minimum required in this situation.

$$\mathbf{Nf = 450}$$

3.6 Data collection

The data collection process was undertaken on a participatory approach that involved the community members, local leaders, relevant County government line Ministries in the Subcounty. The overall leadership and supervision of the data collection and processing were carried out by researcher and County supervisor supported by the ten enumerators (researcher assistants) who were locally hired from the Sub-county. The researcher was responsible for overseeing the whole research exercise and all necessary logistics. The research team underwent through a short orientation training which entailed understanding of the study, reviewing and refining all data collection tools and materials.

3.6.1 Quantitative data collection methods

Quantitative data was collected using a household questionnaire. Structured, closed ended household questionnaires were administered to the 450 household heads as respondents by trained research assistants. The targeted 450 households were distributed as follows; Maralal – 170HHs, Sirata - 92HHs, Loosuk – 110HHs and Porro – 78HHs. The distribution of the respondents per sub location was informed by proportionate computation based on the total number of HHs in every sub location. Quantitative data was collected electronically using ODK Collect App. The data questionnaire was designed and uploaded into android phones installed with the ODK Collect application. Each enumerator possessed an android smart phone for data collection. Data was transmitted in real time to the server after completion of each questionnaire. A conditional skip pattern was introduced into the ODK collect questionnaire to restrict display of questions that were not relevant to the subsequent questions. The enumerators for the study were recruited within the locality in their respective Wards based on set qualification selection criteria that included O-level education and prior research experience using electronic software.

3.6.2 Qualitative data collection methods

To clarify issues pertaining to attitude and behavioral characteristics, qualitative data collection methods were used which included administration of interviews to six key informant interviews, four focus group discussions and direct observation. An observation checklist, FGD and KII guides were organized according to themes based on the variables under study. The questionnaires were organized under sections also based on variables.

3.6.2.1 Key Informant Interviews

Interviews were conducted with 8KIIs based on an interview guide that was structured to facilitate interviews with four key stakeholders from the Ministry of Health, Ministry of Education and 4 opinion local leaders from the community. These are the people endowed with information on community characteristics and norms.

3.6.2.2 Focus Group Discussions (FGDs)

These were conducted in each of the 4 locations namely; Maralal, Sirata, Loosuk and Porro sites with selected trachoma high-risk groups including; care-takers and mothers with children under the age of 9 years and women groups.

3.6.2.3 Participatory observation

An observation checklist was organized for visits during household survey to observe and record infrastructural physical facilities.

Table 3.1: Data collection tools distribution

Tool	Location				Respondents
	Sirata	Loosuk	Maralal	Porro	
HH Questionnaires	92	110	170	78	HH Heads or eldest member aged above 18 years
KII guides	1	2	4	1	Local leaders (Chiefs/Ass Chiefs) and MoH, MoW county staff
FGD guides	1	1	1	1	Mothers of children under 9years & women group

3.7 Data processing and analysis

3.7.1 Quantitative Data

Duly filled questionnaires were electronically transmitted in real time to the server after completion of each questionnaire. Quantitative data from the household questionnaires was cleaned and then exported to Ms excel workbooks and SPSS for analysis. The data was entered according to the variables categorized in the sections of the questionnaire according to desired variables both independent and proximate and each answer was given a value on whose basis the frequencies were run. The questions ‘others, specify’ were coded, entered and analyzed as per frequency of similar answers.

Descriptive statistics aided by SPSS software for windows version 28.0 were used to analyze data at $P \leq 0.05$ level of significance and a set of selected fields were disaggregated by age

and/or gender of the respondent and reported in form of proportions and mean and presented in tables and graphs.

Inferential statistics were used to establish correlation and associations. Depending on the distribution of data collected according to the Z-score. T-test was used to compare the mean of two groups when there is need to show that there is possibility of difference in response (significance difference) of respondent per a given demographic split such as gender. P -value ≤ 0.05 was interpreted as statistically significant. Pearson's correlation and Chi-square tests were used to determine the difference in proportions (association and correlation between two variables).

3.7.2 Qualitative Data

Transcription of recordings in MS Word were undertaken for the qualitative data from KIIs and observation which was later open coded to identify concepts or key ideas or themes that were hidden within the textual data. Data was transcribed verbatim and later transferred to nVivo release 1.7 to form nodes and themes. Coding and thematic analysis of the qualitative were done by the help of qualitative data analysis software (nVivo). Nodes obtained were used to crawl the data and emerging themes grouped and ranked and used to explain the quantitative findings. The outputs generated was used in report writing and presented in form of narratives and tables. The data collected was also triangulated with the quantitative data to build coherent justification for the evidence emerging from the interviews with various respondents.

Table 3.2: Data analysis plan

Objective	Variables	Type of data	Type of Analysis
Objective 1: To assess the socio-economic factors affecting effective trachoma control and prevention among the pastoral communities	<ul style="list-style-type: none"> • Mean knowledge • Mean attitude 	Binary Continuous Ordinal Nominal	Descriptive: Averages, frequencies, Proportion, graphs, tables Inferential: Chi square tests, Pearson correlation
Objective 2: To evaluate the cultural factors influencing trachoma transmission among the pastoralists	<ul style="list-style-type: none"> • Proportion of respondent with a latrine in the household • Proportion of the households identifying use of toilet as a cultural barrier. • Mean attitude of respondents towards eye-seeking fly control 	Binary Continuous Ordinal Ordinal	Descriptive: Averages, Frequencies, Proportion, graphs, tables Inferential: Chi square, Pearson correlation
	<ul style="list-style-type: none"> • Cultural aspects 	Qualitative	Content and Thematic analysis
Objective 3: To investigate the health system factors affecting effective control and prevention of trachoma	<ul style="list-style-type: none"> • Frequency of individuals who seek treatment • Proportion of determinants affecting where to seek treatment • Health facility infrastructure • Community infrastructure 	Ordinal Nominal	Descriptive: Averages, Frequencies, Proportion, graphs, tables Inferential: Chi square, Pearson correlation

3.7.3 Data storage and ownership

Quantitative data was collected and transmitted electronically. Qualitative filled guides were assembled to a central place upon transcription verbatim by a data entry clerks. Upon analysis, the study data was imported, profiled, protected and stored in high-speed access, affordable data

cloud-based computing storage as per The Data Protection Bill 2018, Law of Kenya. The principal researcher was directly entitled to be the custodian of information and have data access rights. Maseno University remain the custodian of all research data and primary study materials. Researchers or institutions wishing to maintain a copy of the research data and primary materials for further use obtained a written authorization from the University. During dissemination, the key stakeholders including the County government and study participants accessed the study findings.

3.8 Validity and Reliability

The research tool was pretested in the neighboring Ngari location, Kirisia Sub-county in Samburu due to its comparable characteristics and subjects with the study population to fine-tune and assess the tools suitability, practicability and applicability for the main data collection. As recommended in other scientific studies, a default sample size of 30 respondents was employed in the pretest (at least 10 observations per variable). The results from the pretest showed n significant change in the tools.

The use of handheld devices for data collection eliminated the need for manual data entry; thereby reducing data entry errors. At field level, the research assistants facilitated daily data reviews with the supervisor and the researcher for the filled questionnaires to ensure completeness, consistency and validity, upon which the research assistants concerned were involved in ensuring identified discrepancies are corrected. Additionally, close supervision was maintained at all times between research team. Considerable care was taken to achieve the desired response rate and obtain complete and good quality data. At entry level, completed questionnaires were first examined for possible inconsistencies before submission. Validity and rigor was enhanced during the interpretative analysis through a series of feedback sessions with research team.

3.9 Ethical considerations

Ethical approval was sought from Maseno University School of Graduate Studies (SGS) before the commencement of the study. A research permit was also obtained from National Commission of Science Technology and Innovations (NACOSTI). Maseno University ethics and review committee provided the ethical clearance for the study. For in-county authorization, permission

to carry out the study was sought from the County Ministry of Health and Provincial Administration in the study area. Informed consent was sought from the study participants after explaining to them in detail what the study consisted, their rights, and they were given a chance to make a decision to participate or not freely. Further, participants' confidentiality and anonymity were assured.

3.10 Study limitations and risks

Non-response is a particular limitation that could have affected the study especially when the characteristics of non-responders differ from responders and could result in bias of the measures of outcome. To mitigate this limitation, the study increased the sample size by 20 % to avoid non-response or drop-out bias. The "observer effect" is a bias where people act or say things that are not usual because of the presence of strangers. This was avoided and achieved by recruiting the locals as research assistants and minimization of status differences by the enumerators so that people can feel comfortable with the research team. Given the prevailing COVID-19 context, training was conducted in a venue with adequate space to observe the social physical distancing and hand washing facility or sanitizer for hand hygiene purposes. The study team conducted the interviews outdoors and in strict observance to existing infection prevention guidelines. To ensure the quality of data was not compromised by time constrain, sufficient data quality checks both at field level and at the analysis level was put in place by the study team. To mitigate on socio-cultural and language sensitivities touching on study components, the study team enlisted local enumerators who are well versed with local context and able to administer the tool in a language that is clear to the respondents.

CHAPTER FOUR

RESULTS

4.1 Socio-economic and demographic factors affecting effective trachoma control and prevention among the pastoralist in Kirisia Sub-county

A total of 446 respondents from 450 households were successfully interviewed in this study after giving informed consents. Each location sample characteristics are shown in Table 4.1. Majority (63%) of the study participants were female and, 37% were males. The overall mean age and standard deviation of the participants from the four locations was 38.89 ± 13.52 . Participants age ranged between 18-80 years.

Most of the respondents (37.7%) had not attained any level of formal education (illiterate). Out of these, 43.8% were female (Table 4.2). Only 33.6%, 16.6%, 6.7% and 3.8% of the participants had attained Primary, Secondary, Tertiary, and University education level, respectively. Out of 446, 343 (76.9%) were married with 65.5% being married to one wife or husband, and 11.4% in polygamous marriages. Furthermore, about 8.3% were widowed and 3.4% divorced.

The number of the unemployment was high in the study population, about 33.4% were unemployed. However, livestock keeping, and crop farming were the main occupational activities in the area of study at 25.6% and 13.5%, respectively. Additionally, 15% were employed, 4.3% were students while 6.7% were self-employed (traders). A greater percentage of individuals from the study area earned a living through sale of livestock (24.0%), casual work (17.9%), and sale of crop produce (17.0%). Further, the remaining individuals in the population earned income as follows; sale of livestock products (10.5%), paid employment (13.9%), small scale trade (8.3%), remittances (0.9%), pension (1.1%) and, others (6.3%). A positive relationship was depicted between level of education and level of income ($P > 0.05$) (Table 4.20). Majority (37.7%) of the population which comprises of individuals without formal education earned below Ksh. 10, 000.

Majority were Christians; Catholics (46.6%) and protestants (41.3%). Islamic and traditional religions were also noted in the study area at 1.6% and 7.0%, respectively. On the contrary, 3.6% of the participants were not affiliated to any religion. A negative correlation was found between education and religion ($P = 0.01$) (Table 4.20).

Individuals from the Samburu ethnic group were the majority of the interviewed population at 85.4%, followed by the Turkana (10.3%), Kikuyu (1.8%), Borana (1.6%), Rendile (0.2%) while the other communities comprised the remaining 6.3%. Table 4.1 below shows a summary of socio demographic and household characteristics in detail.

Table 4.1: Characteristics of the sample drawn from each location

	Maralal	Sirata	Loosuk	Porro	Overall
Gender	M (17.7%)	M (4.5%)	M (11.9%)	M (2.9%)	M (37%)
	F (20.2%)	F (16.1%)	F (12.6%)	F (14.1%)	F (63%)
Number of Household	170	92	110	78	450
Number of individuals	169	92	109	76	446

(SD = Standard deviation)

Table 4.2: Cross tabulation table showing Education and Gender

			Gender		Total
			Male	Female	
Education	None / never	Count	45	123	168
		% Within Gender	27.3%	43.8%	37.7%
	Pre-School	Count	0	7	7
		% Within Gender	0.0%	2.5%	1.6%
	Primary	Count	54	96	150
		% Within Gender	32.7%	34.2%	33.6%
	Secondary	Count	34	40	74
		% Within Gender	20.6%	14.2%	16.6%
	Tertiary	Count	17	13	30
		% Within Gender	10.3%	4.6%	6.7%
	University	Count	15	2	17
		% Within Gender	9.1%	0.7%	3.8%
Total		Count	165	281	446
		% Within Gender	100.0%	100.0%	100.0%

Table 4.3: Socio-economic Demographic and household Characteristics

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	165	37
Female	281	63
Education		
None/Never	168	37.7
Pre-school	7	1.6
Primary	150	33.6
Secondary	74	16.6
Tertiary	30	6.7
University	17	3.8
Marital status		
Never married	51	11.4
Monogamous	292	65.5
Polygamous	51	11.4
Widowed	37	8.3
Divorced/separated	15	3.4
Occupation		
Student	19	4.3
Employed	67	15.0
Unemployed	149	33.4
Trade	30	6.7
Livestock keeping	114	25.6
Crop farming	60	13.5
Others	7	1.6
Religion		
Catholic	208	46.6
Protestant	184	41.3
Muslim	7	1.6
Tradition	31	7.0
No religion	16	3.6
Ethnicity		
Samburu	381	85.4
Turkana	46	10.3
Borana	7	1.6
Rendile	1	0.2
Kikuyu	8	1.8
Others	3	0.7
Main source of income		
Sale of livestock	107	24.0
Sale of livestock products	47	10.5
Sale of crop produce	76	17.0
Small scale trade	37	8.3
Paid employment	62	13.9
Daily wage/casual	80	17.9
Remittances	4	0.9
Pension/social aid	5	1.1
Others	28	6.3

4.2 Cultural factors influencing trachoma transmission among the pastoralists in Kirisia Sub-county

Cultural risk factors linked to the trachoma control and prevention SAFE strategy were investigated within the study population. These includes; face and hand washing behaviors, access to clean water, human waste disposal and latrine ownership and knowledge on the trachoma infection and control.

4.2.1 Individual practices in the control of flies

Majority of the respondents 216 (48.4%) reported that the likelihood of being exposed to flies is high when outside the house within the compound. It was also found out in almost an equal number of respondents 214 (48.0%) that the study population equally get in contact with flies inside the house. The remaining proportion responded that being outside in the field herding animals (3.1%) and other sites (0.4%) predisposed the population to flies (Table 4.4).

Table 4.4: Distribution of sites where the population gets into contact with flies

Breeding site	Frequency	Percentage
In the house	214	48.0
Outside the house but within the compound	216	48.4
Out in the field herding animals	14	3.1
Other	2	0.4
Total	446	100

When the study population was interviewed on the breeding season and sites of flies to assess their knowledge on flies, majority 373 (83.6%) alluded that flies are more likely to breed during the wet season. About 63 (14.1%) reported that flies are always breeding and a smaller proportion 10 (2.2%) responded that they breed during the dry season (Figure 4.1).

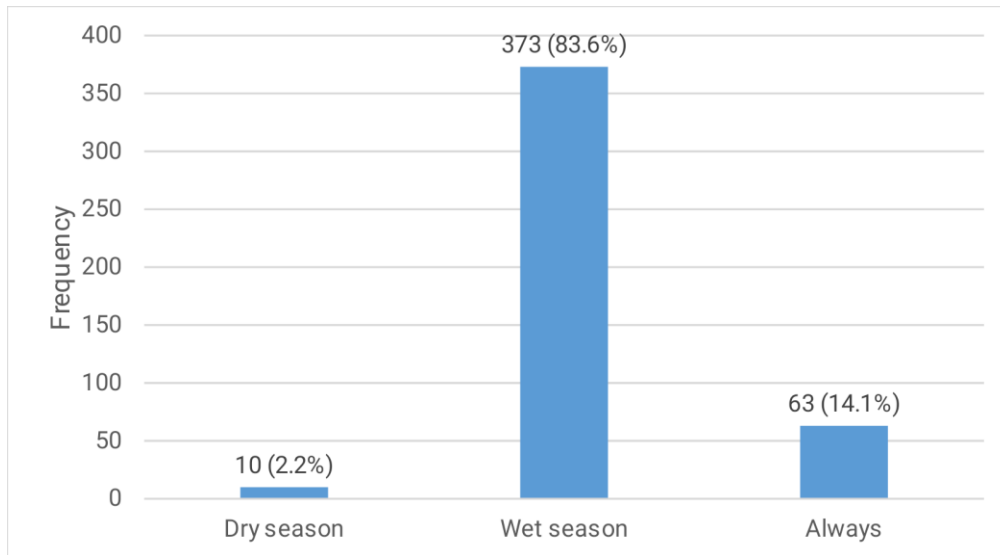


Figure 4.1: Distribution of seasons of the year when flies are rampant

Further, the breeding sites for the flies was explored by the research and the findings are as follows; majority 181 (40.6%) reported that cow bomas are the main breeding site for the flies while 133 (29.8%), 99 (22.2%) and 29 (6.5%) of the respondents alluded that walls, refuse, and latrine, respectively also serve as breeding sites for flies. The remaining group of individuals reported that other breeding sites for flies exists (Table 4.5). This study also highlights no relationship between level of education and where individuals get in contact with flies ($P > 0.05$) (Table 4.5).

Table 4.5: Distribution of flies breeding sites

Breeding site	Frequency	Percentage
Refuse	99	22.2
Walls	133	29.8
Latrine	29	6.5
Cow bomas	181	40.6
Others	4	0.9

The respondents were also successfully interviewed on the methods they employed to keep away the flies. More than half of the studied population 368 (58.8%) kept away flies through practicing cleanliness. The rest; 93 (14.8%) practiced spraying, 62 (9.9%) smoking, 48 (7.6%) destroyed breeding sites, and 15 (2.4%) used baits to keep flies away. The remaining 43 (6.8%) did nothing to control flies (Table 4.6). Additionally, there was no association between level of education and knowledge on how to keep flies away ($P > 0.05$) (Table 4.6).

Table 4.6: Methods of keeping away the flies

Method	Frequency	Percentage
Cleanliness	368	58.5
Spraying	93	14.8
Smoking	62	9.9
Destroy breeding site	48	7.6
Use of baits	15	2.4
Did nothing	43	6.8

4.2.2 Cultural beliefs related to house flies

Our findings show that 304 (68.2%) of the respondents associated house flies with cultural beliefs and the remaining 142 (31.8%) did not. Majority 150 (49.3%) of them linked house flies with abundant food while 83 (27.3%), and 68 (22.4%) associated it to wealth, and comfortable life respectively. Additionally, 3 (1.0%) associated house flies with other cultural beliefs not specified in the questionnaire (Table 4.7). Our analysis on association studies showed a strong relationship between religion and cultural beliefs ($P=0.001$) (Table 4.7).

Table 4.7: Cultural beliefs associated with house flies

	Frequency	Percentage
Sign of wealth	83	27.3
Abundant food	150	49.3
Comfortable life	68	22.4
Others	3	1.0

More than half of the respondents 354 (79.4%) reported that house flies are more attracted to children. Further, these findings from the respondents show that the elderly, women, and other categories of individuals are also attracted to house flies (Figure 4.2)

Who are most attracted to houseflies?

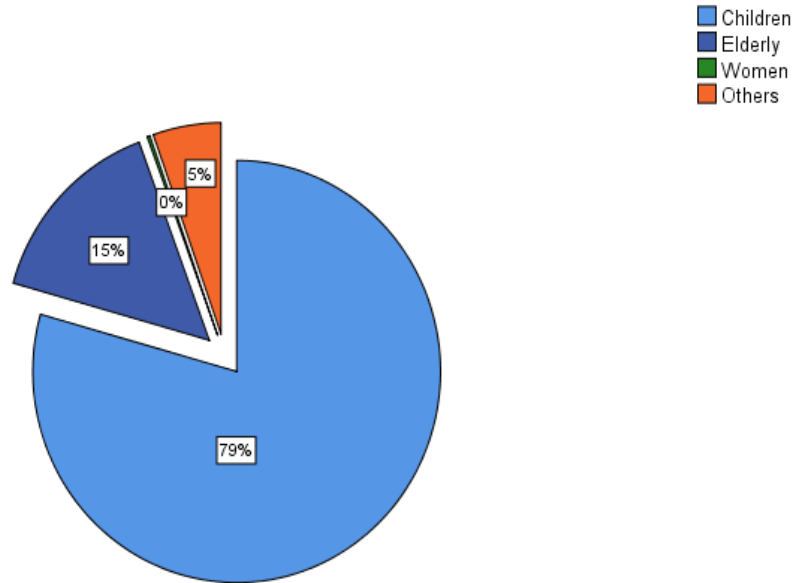


Figure 4.2: Proportion of individuals more attracted to flies

Various problems were attributed to house flies by the respondents. Majority 247 (98.4%) associated house flies with transmission of diseases to human. However, the remaining 2.2% linked house flies equally to the following problems; cause nuisance to humans, cause nuisance to animals, and transmission of diseases to farm animals. About 0.4% perceived no problem associated with house flies (Table 4.8).

Table 4.8: Frequency and proportions of problems associated with house flies

	Frequency	Percentage
Transmit diseases	247	98.4%
Nuisance to humans	1	0.4%
Nuisance to farm animals	1	0.4%
Transmit diseases to farm animals	1	0.4%
No problems	1	0.4%

4.2.3 Linkage between house flies and trachoma

Majority of the respondents 357 (80%) were aware of trachoma disease while only 89 (20%) did not know what it was (Figure 4.3).

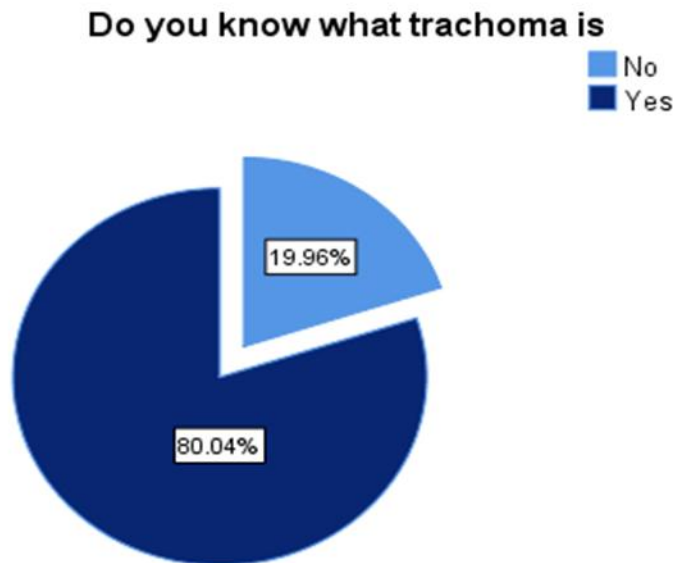


Figure 4.3: Proportions of individuals informed about trachoma

Poor hygiene was reported as the major 207 (58.0) cause of trachoma in the study area. House flies 127 (35.6%), bacteria 20 (5.6%), and smoke 2 (0.6%) were also noted as causes of trachoma (Table 4.9).

Table 4.9: Frequency of the causes of trachoma among the study population

	Frequency	Percentage
Bacteria	20	5.6
House fly	127	35.6
Poor hygiene	207	58.0
Smoke	2	0.6
Others	1	0.3

More than half of the study population 164 (54.1%) attributed trachoma spread to personal contaminated hands followed by shared fomites (towels and clothes) 124 (40.9%). The rest of the population reported smoke 13 (4.3%), curse and inheritance each 1 (0.3%) as other ways through which trachoma is spread (Table 4.10).

Table 4.10: Showing various ways through which trachoma is spread

	Frequency	Percentage
Personal contact hands	164	54.1%
Shared fomites (towels and clothes)	124	40.9%
Smoke	13	4.3%
Curse	1	0.3%
Inheritance	1	0.3%

Responses to how the study population-controlled trachoma revealed that most of them 194 (38.7%) practiced proper waste control and prevention to prevent the disease. Additionally, about 173 (34.5%) did it by controlling flies while 87 (17.4%) believed that improved access to water helps in controlling trachoma. Antibiotic treatment 9 (5.8%) and surgery 18 (3.6%) were also shown to be among the methods explored to control trachoma (Figure 4.4). When the respondents' knowledge on the relationship between flies and trachoma was assessed, it was noted that majority 272 (76.2%) perceived flies as the mechanical transmitters of diseases. About 69 (19.3%) reported that flies are reservoirs of bacteria causing diseases. However, 2 (0.6%) reported absence of relationship between the two variables while 14 (3.9%) had no idea (Table 4.11). Interestingly, a significant association was reported between the knowledge on trachoma and level of education ($P < 0.05$) (Table 4.26).

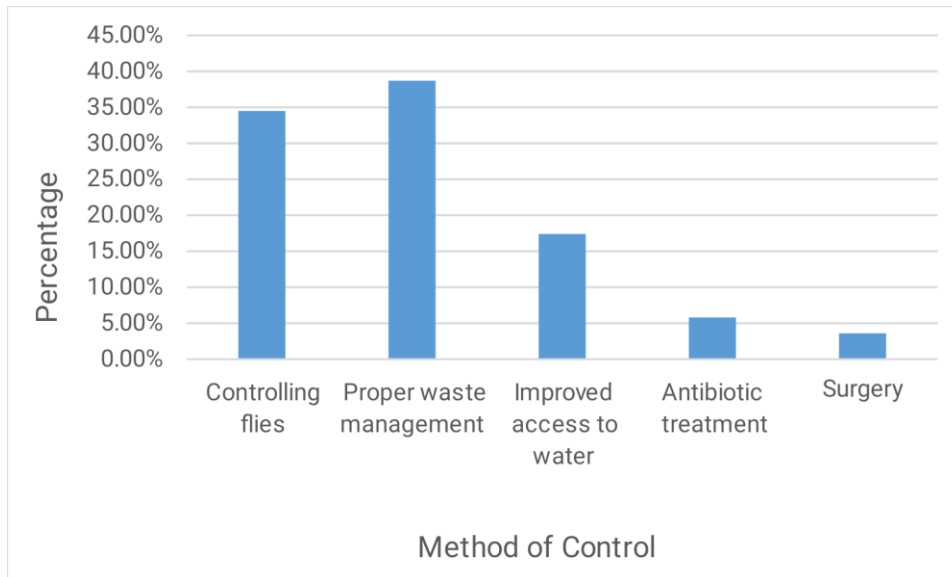


Figure 4.4: Frequency of methods used to control trachoma

Table 4.11: Relationship between flies' trachoma

	Frequency	Percentage
Mechanical transmitter of diseases	272	76.2
Harbour bacteria that cause diseases	69	19.3
No relationship	2	0.6
No idea	14	3.9

A greater number of participants 139 (44.1%) outlined that mechanical killing was the main effort practiced by the community to control flies. Other methods of control highlighted by the respondents included; chemical control 81 (25.7%), exclusion from entry 22 (7%), and fly inspection 6 (1.9%). Nonetheless, it was noted from 67 (21.3%) of the respondents that the community did nothing to control flies (Figure 4.5). Additionally, majority of the respondents 192 (43%) agreed that the efforts made by the community to control flies were effective while 106 (23.8%) were undecided. About 79 (17.7%) strongly agreed that the community is doing enough to combat flies. On the contrary 65 (14.6%) and 4 (0.9%) disagreed and strongly disagreed that the community efforts were not effective in controlling flies (Table 4.12).

Figure 4.5: Frequency of efforts by the community to control trachoma**Table 4.12: Perception on the community's efforts to control trachoma**

	Frequency	Percentage
Strongly agree	79	17.7
Agree	192	43.0
Undecided	106	23.8
Disagree	65	14.6
Strongly disagree	4	0.9

More than half of the respondents 321 (72%) had been sensitized about trachoma while 125 (28%) had not received any formal information about the disease (Table 4.13).

Table 4.13: Sources of information on trachoma to the respondents

	Frequency	Percentage
Health facilities	172	29.4
Chief's barazas	52	8.9
Schools	122	20.9
Seminars	81	13.8
Local media	158	27.0

Those who had received formal information about trachoma, majority 172 (29.4%) of them were informed at health facilities while 158 (27%) from the local media. Additionally, the rest were made aware of trachoma from different sources; 122 (20.9%) at school, 81 (13.8%) at seminars, and 52 (8.9%) at chief's barazas (Figure 4.6).

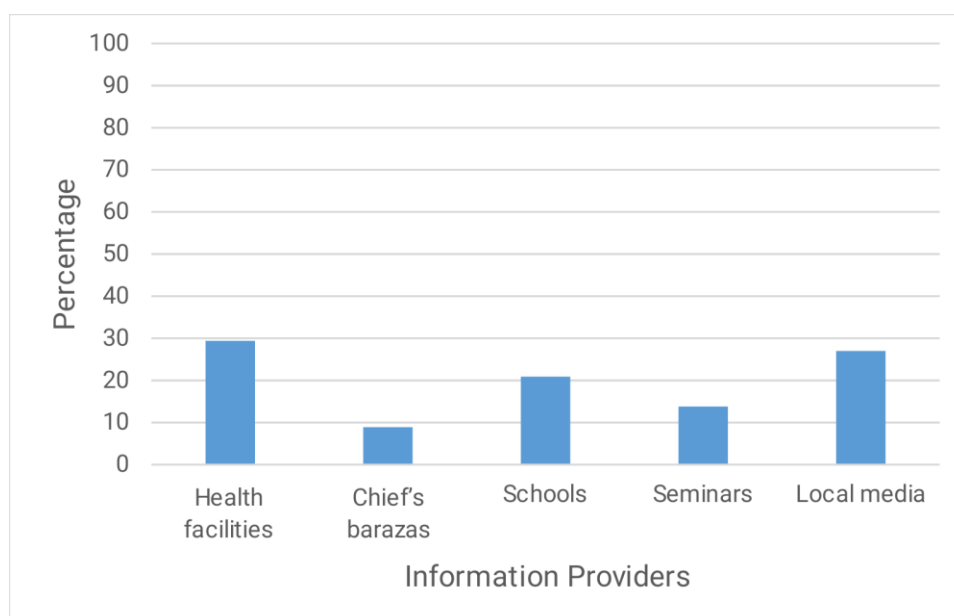


Figure 4.6: Distribution of information providers on trachoma

4.2.4 Face and hand washing behaviors

It was found out that 428 (96%) of the respondents washed their faces regularly with clean water. Only 4 (4%) of the individuals happened not to wash their faces daily. Majority of the respondents 219 (49.1%) reported to be washing their faces once daily. About 160 (35.9%), 25 (5.6%), and 24 (5.4%) individuals claimed to wash their faces twice, thrice and more than thrice, respectively per day (Figure 4.7).



Figure 4.7: Frequency of face washing behavior of the study population

Over 80% (367) of the study population washed their faces using clean water on a basin container. About 31 (7.0%) respondents used running water from a tap to wash their face while 30 (6.7%) used a cup/jug/sufuria (Figure 4.8)

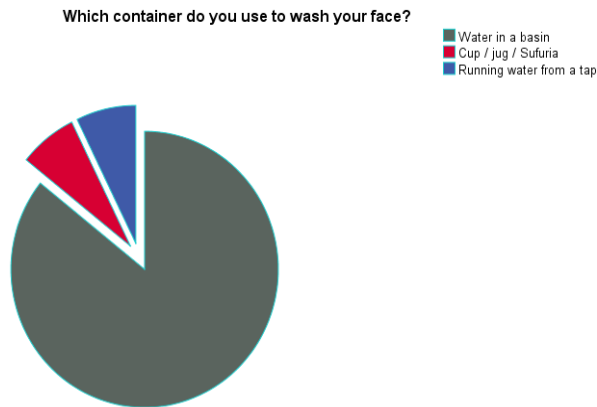


Figure 4.8: Proportion of face washing containers

A high proportion of the respondents 263 (59.0%) had a face and hand washing facility within their households. Of these population, 70 (26.6%) had the facility located outside the latrine, 17 (6.5%) outside the kitchen, 11 (4.2%) inside the house, 70 (26.6%) hanged on a tree, 84 (31.9%) at the gate and 11 (4.2%) at other sites (Figure 4.9).

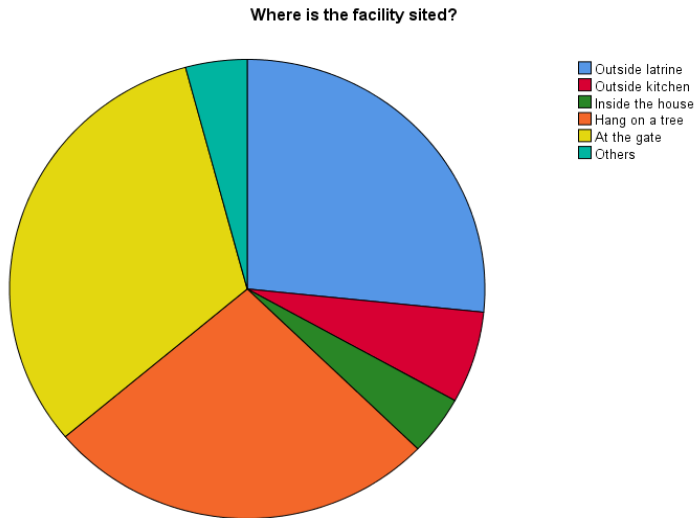


Figure 4.9: Proportions showing location of face and hand washing facilities

About 183 (41.0%) lacked a face and hand washing facility and they attributed this to a number or reasons, namely; lack of money (25.7%), ignorance (46.4%), maintenance challenges (14.2%), and lack of water (10.4%) (Figure 4.10).

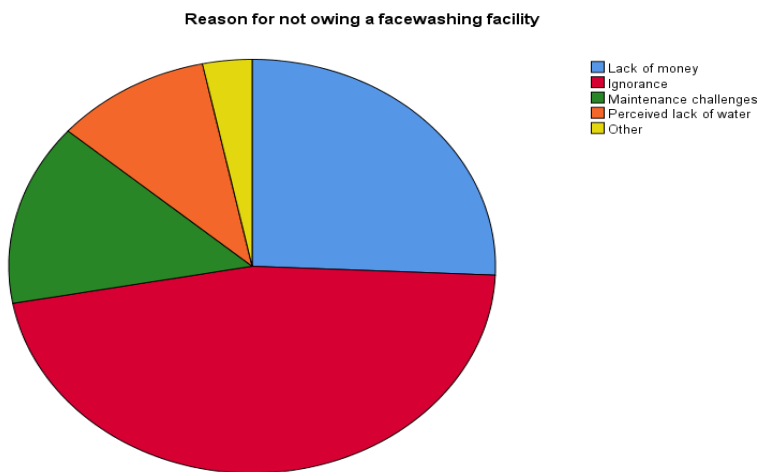


Figure 4.10: Proportions of reasons for not owning a face washing facility

4.2.5 Availability and distance covered to access water and sanitation

When the respondents were interviewed on the distance, they cover to fetch water during the dry and wet season. Most of them 290 (65%) travel between 1-3 KM to access water during the dry season. Table 4.14 below summarizes the distance covered to access water both in the dry and wet season. Additionally, 110 (24.7%) of the respondents take less than 1 KM and a small group

reported to get access to water after covering 3 KM. On the other hand, during the wet season, majority 346 (77.6%) of the study population travels less than 1 KM to get access to clean water. Further, 95 (21.3%) and 5 (1.1%) gets access to clean water after covering between 1-3 KM and > 3 KM distance, respectively. Table 4.14 summarizes this information. Association studies showed a significant relationship between face washing behavior and distance to the water sources during the dry season ($P<0.05$) (Table 4.14).

Table 4.14: Distance covered to fetch clean water during the dry season

Distance	Frequency	Percentage
< 1 KM	110	24.7
Between 1-3 KM	290	65.0
> 3KM	46	10.3

Table 4.15: Distance covered to access to clean water during the wet season

Distance travelled to fetch water (KM)	Frequency	Percentage
< 1 KM	346	77.6
Between 1-3 KM	96	21.3
> 3KM	5	1.1

When the question on the amount of water used by respondents per day for body cleanliness was posed, it was noted that most of them 217 (48.7%) used between 10-20 litres. The rest of the population, 169 (37.9%) and 60 (13.5%) used < 10 and > 20 Litres, respectively for body cleanliness daily. A summary of this information has been presented (Table 4.15).

Table 4.16: Amount of water used per individual for body cleanliness daily

Amount of used daily for body cleanliness (Litres)	Frequency	Percentage
< 10	217	48.7
Between 10- 20	169	37.9
> 20	60	13.5

This was further re-affirmed by the FGD participants.

❖ **FGD R1:** *“Our community of Nkopeliani have water challenge and this is why diseases like trachoma are common, our school which has over 300pupils have only two tanks that are not enough.....”*

❖ **FGD R2:** *” Angata rangau dam is dirty, hence its water not safe for drinking thus people gets drinking water far away.....”*

Our findings from this descriptive study show that more than half 267 (59.9%) of the study population treated water for drinking purposes, while 179 (40.1%) did not (Figure 4.11)

Do you treat your water in any way to make it safer to drink?

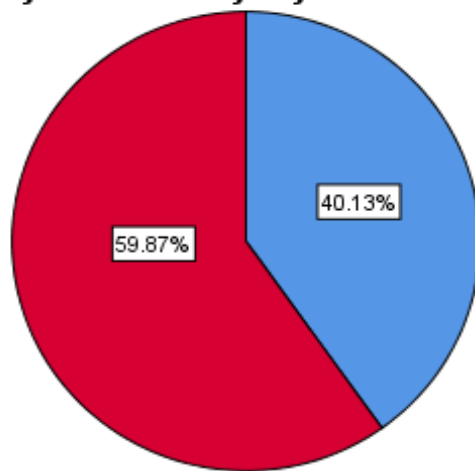


Figure 4.11: Frequency of water treatment in the study population

Data on water treatment methods is shown (Table 4.17). Majority of those practiced water treatment used chlorination (55.5%) and filtration (20.7%). Straining through the cloth and decantation (stand to settle) approaches were employed by 14 (6.2%) and 22 (9.7%) of the respondents, respectively. A small group 11 (4.8%) practiced solar disinfection method to make water safe for treatment. Also, we noted that knowledge on trachoma and level of education associated significantly with water treatment in the study area ($P<0.05$) (Table 4.26).

Table 4.17: Methods employed to treat water for consumption

Method of water treatment	Frequency	Percentage
Chlorination	126	55.5
Filtration	47	20.7
Decantation	22	9.7
Strain through a cloth	14	6.2

Inferential statistics further points out a correlation between the level of education and face washing behavior among the study population ($P < 0.05$) (Table 4.20).

4.2.6 Human waste management and latrine ownership

Data on latrine ownership shows that majority of the participants (59.9%) owned a latrine while slightly less than half (40.1%) did not (Figure 4.12).

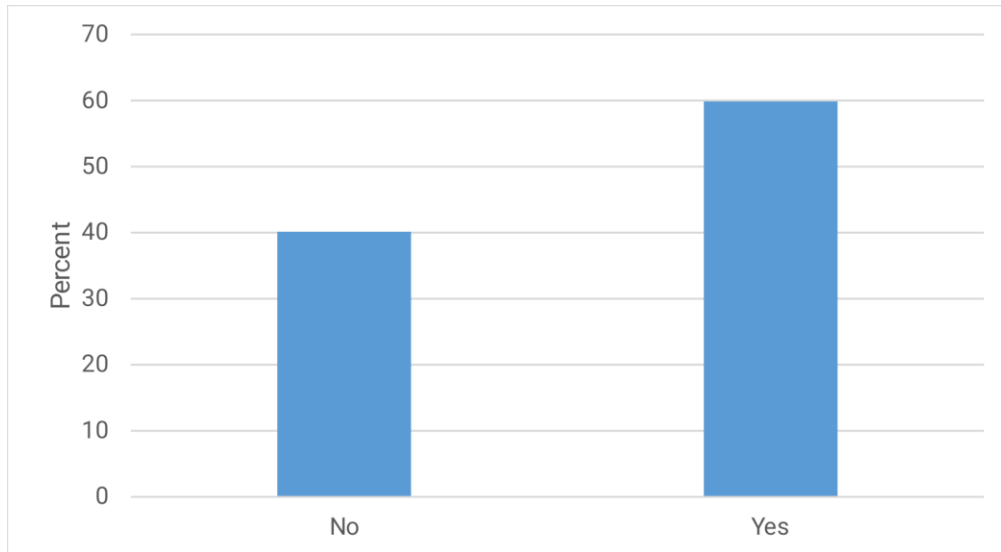


Figure 4.12: Frequency of latrine ownership in the study area

- ❖ **FGD R6:** “... pastoralism doesn’t affect usage of leaky tins but it affects usage of latrines because we are moving from one place to another....”
- ❖ **FGD R3:** “... us women have a role of constructing manyattas, hence can do the latrine construction labour but I lack money to buy the construction materials....”

Queries on who uses the latrine revealed that in majority of the household 266 (99.6%) all members use the latrine. A small proportion 1 (0.4%) of the respondents alluded that only parents use latrines (Table 4.18).

Table 4.18: Usage of latrine by household members

	Frequency	Percentage
Parents only	1	0.4
All household members	266	96.6

Interviews on the existence of cultural beliefs hindering latrine ownership and usage among the study population depicted that 34 (19.0%) of the respondents had reasons linked to cultural beliefs that impacted negatively on latrine ownership and usage. About 145 (81%) of the respondents did not believe in cultural hindrances to latrine ownership and usage (Figure 4.13). Table 4.18 shows a summary of the extent to which various cultural beliefs affected latrine ownership and usage. About 23 (40.4%) reported that latrines are not within the compound for they cannot be shared with in-laws. It was also found out that 5 (8%) of the respondents who did not own latrine linked this to; very private and visiting the latrine makes the intentions obvious by any observer and building a latrine is difficult and building it is not valuable use of time and resources. 3 (5.8%), 1 (1.8%) and 1 (1.8%) believed that contact with faeces is defiling, it is men’s responsibility to construct latrine and the dark pit holes are frightening, respectively are some of the cultural reasons why some households don’t own and use latrines.

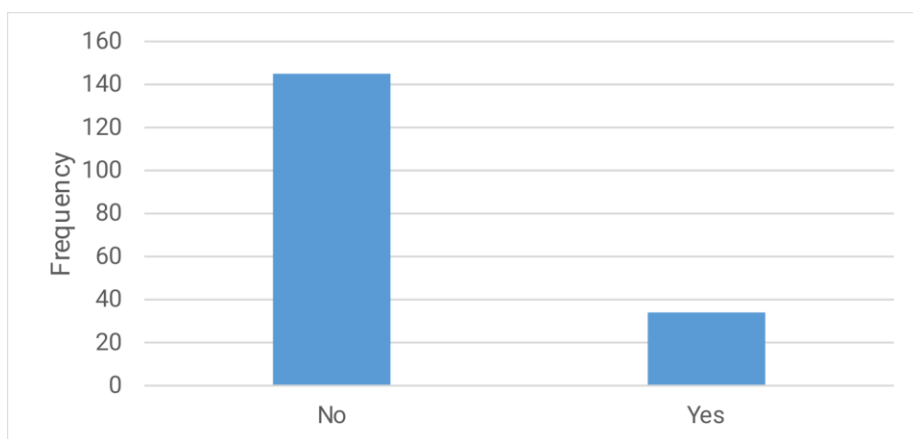


Figure 4.13: Distribution of cultural hindrance on ownership and usage of latrine

- ❖ **FGD R1:** “... should be provided with education and awareness of negative impacts of not having latrines for the community to know more on it.....”
- ❖ **FGD R3:** “... need latrines at every household since children dirtifies the compound with faeces and this encourages the flies around which mounts on foods and causes many disease.....”

Table 4.19: Cultural factors affecting latrine ownership and usage

Cultural factor	Frequency	Percentage
It is men’s work to construct	1	1.8%
Contact with human faeces is defiling	3	5.3%
Not within the compound for they cannot be shared with in-laws	23	40.4%

Very private & latrine visit makes intentions obvious to any observer	24	42.1%
Difficulties in building latrine, not valuable use of time & resource	5	8.8%
Frightened of dark pit holes	1	1.8%

The question on human waste disposal showed that majority of the respondents 151 (84.4%) dispose their wastes in the open in the bush while remaining used the neighbor’s latrine and cat system at a prevalence of 26 (14.5%) and 2 (1.1%) respectively (Figure 4.14).

FGD R5: “...we need money to dig the hole..... There are husbands cannot not dig. if us wives has powers nothing could be left undone....”

FGD R3: “... the morans don’t use latrines, girl child doesn’t use a latrine that a father is using, it’s against the culture to dig a hole near the home.....”

FGD R2: “.... everybody can use it except the in-laws....”

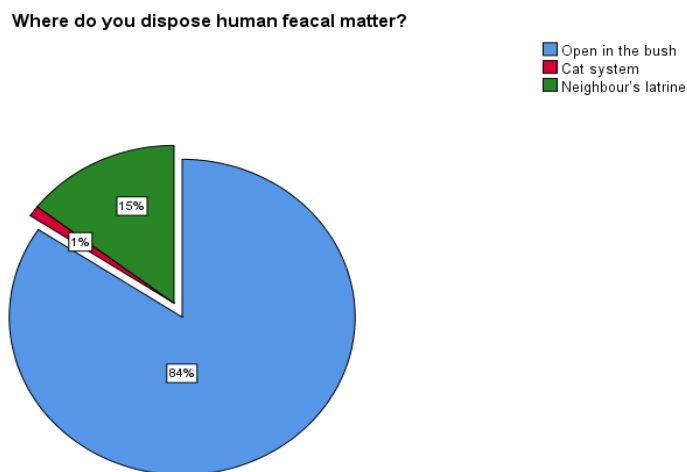


Figure 4.14: Disposal of human fecal matter

Further reasons for not owning a latrine were sought and it was found out that majority of the respondents 114 (63.7%) did not own a latrine because of lack of money. Additionally, 25 (14%) were nomads hence not owning a latrine. 16 (8.9), 13 (7.3%), 8 (4.5%) and 3 (1.7%) alluded this to ignorance, non- settlement, ongoing construction, and cultural factors, respectively (Figure

4.15). When the association was sought between level of education and latrine ownership, it was noted that a positive correlation exists between the two variables ($P=0.05$) (Table 4.20). Additionally, a significant association was noted between the level of income and latrine ownership in Kirisia ($P<0.05$), and also between occupation and waste disposal ($P<0.05$) (Table 4.27).

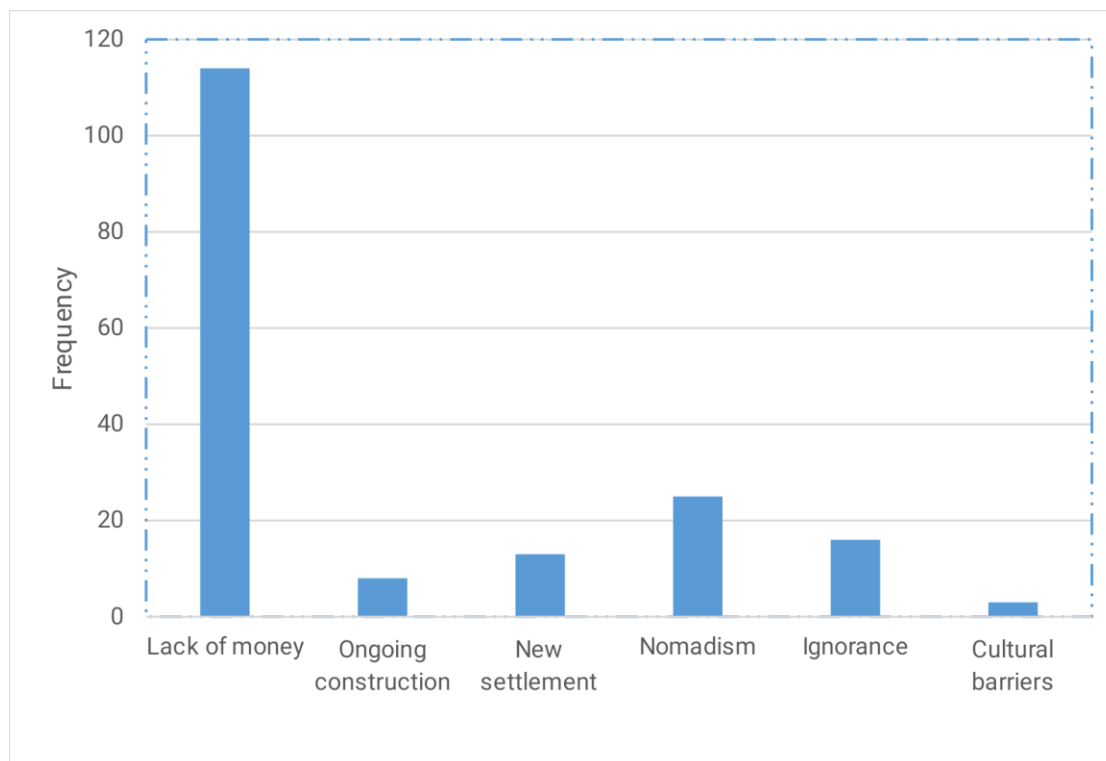


Figure 4.15: Frequency of reasons for not owning a latrine

Table 4.20: Correlation of different variables affecting Trachoma prevention and control

Variables	N	Pearson correlation coefficient	P value
Level of education vs Religion	446	-0.154	0.001**
Level of education vs Facial cleanliness	446	0.121	0.005**

Level of education vs Latrine ownership	446	0.442	0.000**
Distance from facility to informants households	446	0.314	0.000**

** Significant *P* value.

4.3 Health system factors affecting effective control and prevention of *trachoma* in Kirisia Sub-county

4.3.1 Eye care services delivery at healthcare facilities

Healthcare systems factors associated with trachoma control and prevention were successfully analyzed in this study. Our findings show that majority 420 (94%) of the respondents sought treatment frequently when faced with eye problems but 26 (6%) did not (Table 4.21). Of these that sought treatment, most of them 297 (70.7%) did this at local general health facilities while 79 (17.7%), 17 (4%), and 5 (1.2%) sought treatment from public eye clinics, private eye clinics, and traditional healers, respectively. Conversely, a small proportion 22 (5.2%) practiced self-medication (Figure 4.20).

Table 4.21: Frequency of seeking eye treatment care when sick

	Frequency	Percentage
Yes	420	94.2
No	26	5.8

Majority 366 (82.1%) of the respondents made informed decision on where to seek eye treatment. However, 69 (15.5%), 8 (1.8%), and 3 (0.7%) decision on where to seek treatment was determined by the household head, another person in the household, and a person outside the household, respectively (Figure 4.17).

Where do you normally seek eye care treatment?

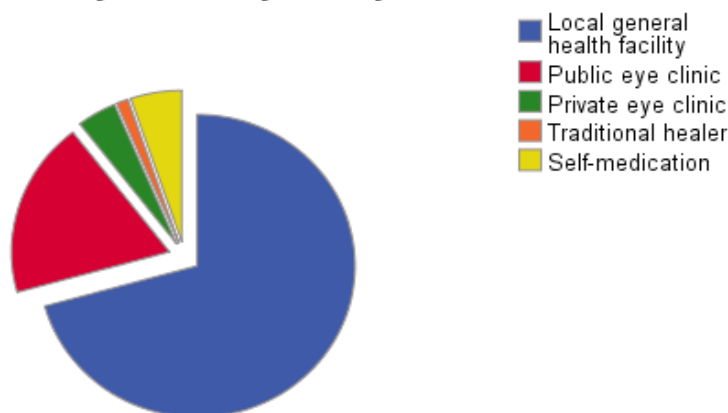


Figure 4.16: Eye care treatment facilities

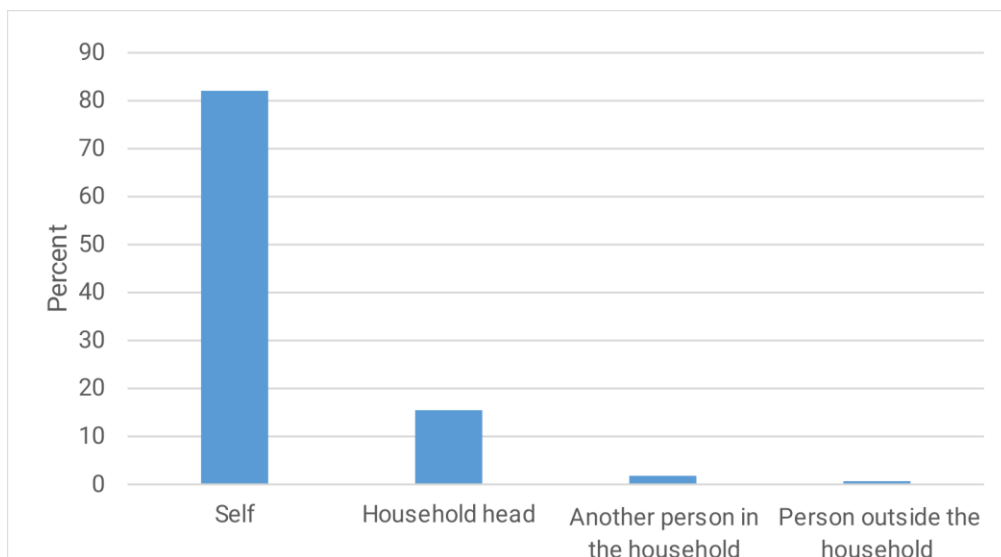


Figure 4.17: Proportions of determinants of where to seek eye healthcare

More than half 323 (74.7%) of the respondents covered a distance of 1-5 Km to get to the healthcare facilities while 75 (16.8%), 37 (8.3%), and 1 (0.2%) travelled a distance of < 1 Km, > 5-10 Km and > 10 Km, respectively (Table 4.22). A great number 233 (52.2%) of the individuals interviewed considered the healthcare facility to be far from their households (Figure 4.18). Correlation analysis revealed that healthcare facilities were significantly far from the informants' homes ($P > 0.01$) (Table 4.20), and this determined the time taken to seek treatment when faced with an eye problem ($P=0.03$) (Table 4.20). However, level of education and distance from the respondents' home to the health facility were found not to affect treatment seeking behavior in the community ($P > 0.05$) (Table 4.26-4.27).

Do you consider the eye care facility to be far from your home?

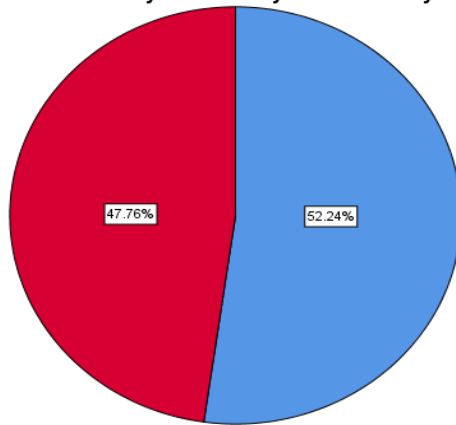


Figure 4.18 Eye care facility location from the respondents

Table 4.22: Distance from the respondents' households to the healthcare facilities

Distance	Frequency	Percentage (%)
< 1 Km	75	16.8
1-5 Km	333	74.7
>5 - 10Km	37	8.3
>10 Km	1	0.2

When faced with an eye problem, majority 402 (90.1%) of the interviewed population sought treatment in less than 1 week while 44 (9.9%) took between 1 week to 1 month (Figure 4.19).

When faced with eye illness, how long did it take you to visit the health facility?

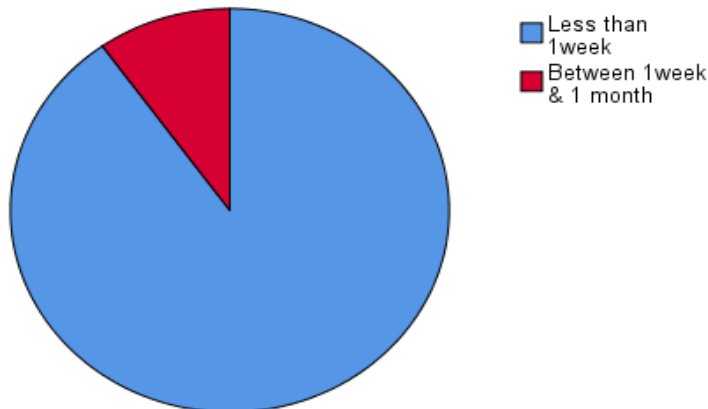


Figure 4.19 Time taken by the respondents to seek treatment when faced with eye illness

About 233 (52.2%) of the respondents were attended too by the general nurse, 113 (25.3%) were attended too by the ophthalmologist, 68 (15.2%) by the ophthalmic nurse, 31 (7%) by the

ophthalmic clinical officer, and 1 (0.2%) were treated by other healthcare providers (Figure 4.20).

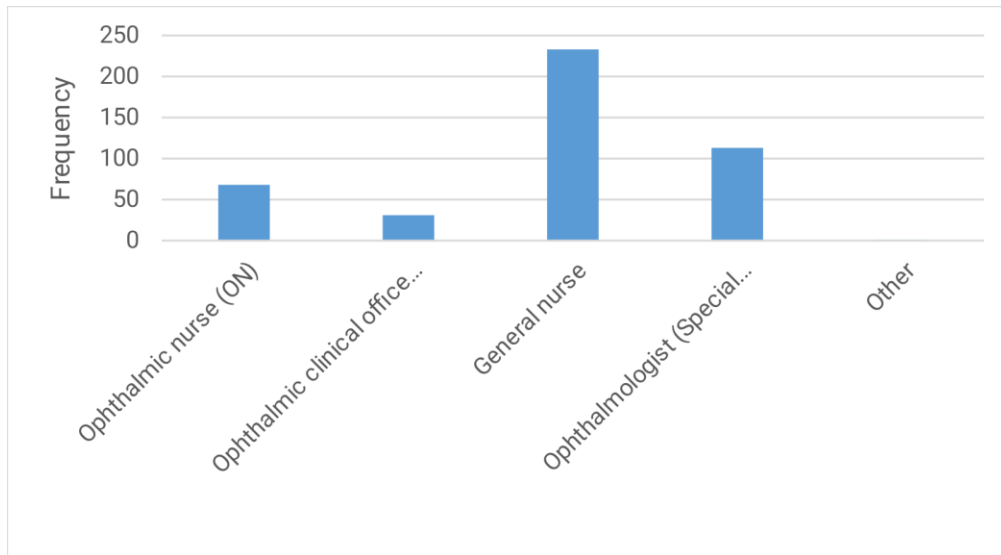


Figure 4.20: Distribution of health care providers who manage eye illnesses

More than half 279 (62.6%) of the participants who sought treatment at the healthcare facilities were not charged while 167 (37.4%) reported to have been charged (Table 4.23). For those who were charged, 75 (44.9%) reported the cost was fair, 53 (31.7%) rated the cost as expensive while 39 (23.4%) considered the cost cheap (Figure 4.23).

Table 4.23: Proportions of the study population charged and not charged for healthcare eye services

	Frequency	Percentage
Charged	167	37.4
Not charged	279	62.6

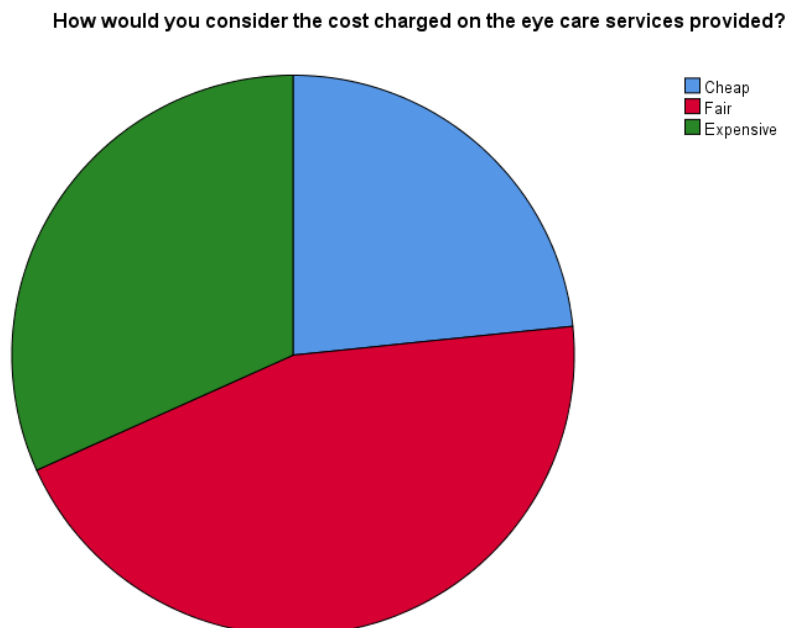


Figure 4.21 Frequency of healthcare services cost

About 104 (62.3%) paid by themselves, for 31 (18.6%) the bill was paid by someone else from their households, 17 (10.2%) borrowed money to settle the bill, 12 (7.2%) were assisted by humanitarian entities to pay the bill while for the remaining 3 (1.8%), their bill was waived by the health facilities (Figure 4.22).

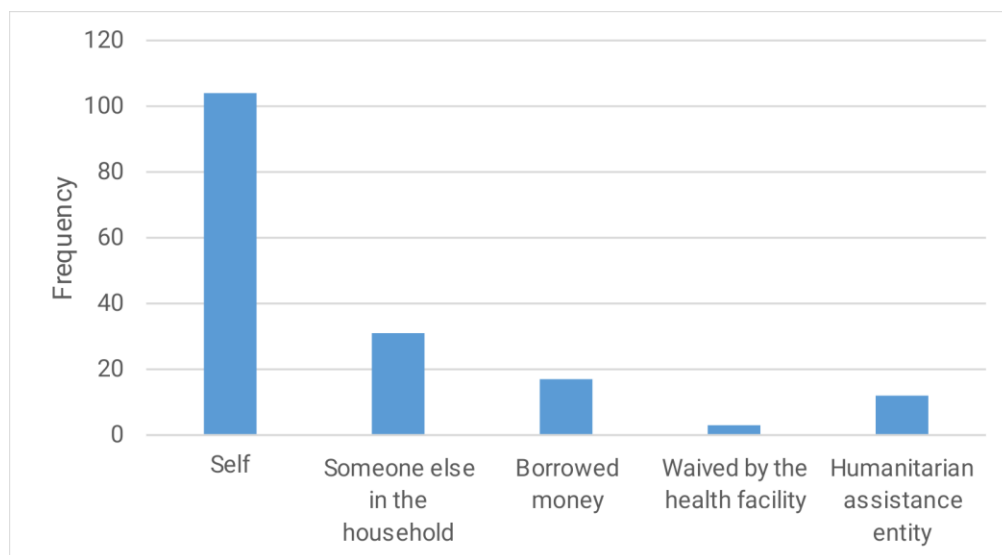


Figure 4.22: Frequency of payment for the eye care treatment services

Majority 391 (87.7%) of the respondents who sought treatment at the healthcare facilities received adequate eye care services while 55 (12.3%) did not.

Those who reported not to have received adequate healthcare attributed this to various reasons; 47 (85.5%) linked this to lack of eye care specialist, 3 (5.5%) associated this equally to lack of required drug/consumable and closure of the facility. The remaining respondents 2 (3.6%) was due to lack of special equipment/machine (Figure 4.23). Association between level of income and treatment seeking behavior revealed no relationship between the two $P > 0.05$ (Table 4.27).

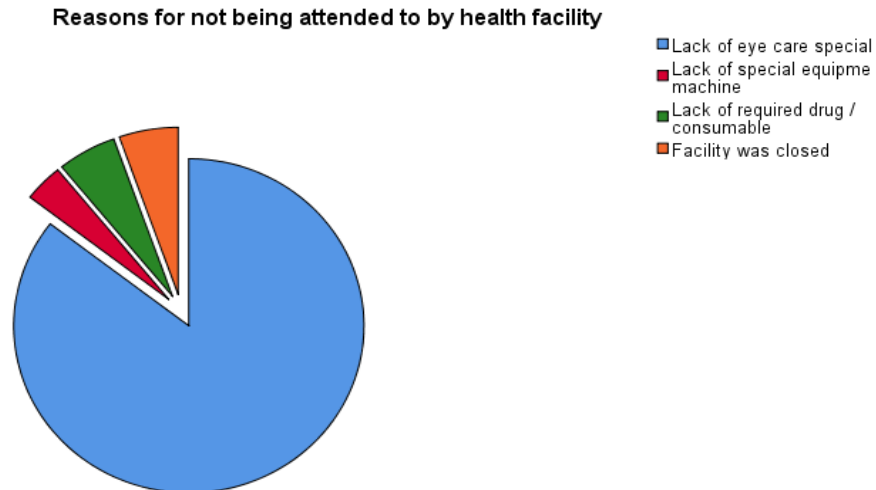


Figure 4.23: Frequency of reasons for not being attended to at the health facility

4.3.2 Roles of community health volunteers in trachoma control and prevention

Majority 342 (76.6%) of the respondents investigated reported the importance of community health volunteers (CHV) in trachoma control and prevention while 104 (23.3%) did not see any value of CHV in disease control and prevention.

Routine household visitation by CHV was reported by majority 281 (82.2%) of the participants interviewed. Moreover, it was shown by 61 (17.8%) of the respondents that CHV did not visit households routinely (Table 4.24).

Table 4.24: Home visits by CHVs

	Frequency	Percentage
Conducted	281	82.2
Not conducted	61	17.8

The frequency of visitation by CHV is summarized in Table 4.25 below. More than half 154 (54.8%) of the study population reported that CHV visited monthly, 91 (32.4%) noted they visited on weekly basis, 21 (7.5%) reported that the visits were quarterly while 15 (5.3%) indicated that the visits were bi-monthly. According to the opinion of the respondents, majority

reported that the visits to households by CHV were helpful in fighting trachoma, though some 27 (6.1%) indicated that it was not helpful in the control and prevention of the disease.

Table 4.25: Frequency CHVs of visits to households

	Frequency	Percentage
Weekly	91	32.4
Monthly	154	54.8
Bimonthly	15	5.3
Quarterly	21	7.5

Table 4.26: Chi-Square Association between level of education and other variables

	Level of Education		<i>P</i> value
	N	χ^2 (DF)	
Site of contact with flies	446	13.163 (1)	.598NS
Knowledge on how to keep away flies	446	7.503 (1)	.614NS
Knowledge on trachoma	446	41.433 (5)	.000**
Treatment seeking behavior	446	8.319 (5)	.140NS
Water treatment	446	43.672 (5)	.000**

** Significant *P* value, NS not statistically significant association, χ^2 - Chi-Square value, DF - Degrees of freedom

Table 4.27: Chi-Square Association between level variables affecting trachoma control and prevention

	N	χ^2 (DF)	<i>P</i> value
Latrine ownership vs level of income	446	49.888 (2)	.000**
Treatment seeking behavior vs level of income	446	0.947 (2)	.623NS
Religion vs Cultural beliefs	446	18.641 (4)	.001**
Face washing vs Distance to water sources during the dry season	446	32.026 (2)	.000**
Knowledge on trachoma vs water treatment	446	34.442 (1)	.000**
Occupation vs waste disposal	446	26.972 (12)	.008**
Distance to Health facility vs Time taken to seek treatment	446	8.319 (3)	.030**
Distance to Health facility and Treatment seeking behavior	446	5.187 (3)	.295NS

** Significant *P* value, NS not statistically significant association, χ^2 - Chi-Square value, DF- Degrees of freedom

CHAPTER FIVE

DISCUSSION

5.1 Introduction

Trachoma is still the leading cause of preventable blindness in most of the poor communities living in the tropics of Africa, including Kenya. The prevalence of this disease in children below 9 years and individuals more than 15 years in Samburu County remains above the WHO minimum target for elimination despite the SAFE strategy-based control and prevention practices being in place. This chapter discusses various factors affecting effective trachoma control and prevention in Kirisia, Samburu County using the Surgery for trichiasis, Antibiotics for active infection, Facial Cleanliness & Environmental Improvement (SAFE) approach. These factors range from sociodemographic characteristics of the study population to cultural and healthcare systems.

5.2 Socio-economic and demographic factors affecting effective trachoma control and prevention among the pastoralist in Kirisia Sub-county

Sociodemographic factors such as age, gender, level of education, and income have been previously positively associated with trachoma as earlier reported in Kenya by Ripotolim and colleagues (Ripotolim *et al.*, 2021). Findings from our study assessing the effect of sociodemographic factors affecting trachoma revealed that most respondents had not attained any level of formal education and this could be linked to the low-income levels in the study area because most of the informants were unemployed and earning a monthly income of less than Ksh. 10,000. Association studies revealed a significant positive relationship between education and level of income suggesting that poor households are more likely not to afford formal education consistent with findings from earlier studies in Ethiopia (Gebrie *et al.*, 2019, Vinke, C., & Lonergan, S., 2011). The level of education and income correlated positively with latrine ownership where illiterate and poor households which forms the majority of the study population were likely not to own a latrine. Females were the majority informants, and this factor could be contributing to high burden of trachoma in the study area. Karimurio and colleagues argues in their previous study that gender affects trachoma control. The women are more prone to the disease because they have more contact with the children than men (Karimurio *et al.*, 2006), and this could be the reason for high burden of trachoma in the study area. This observational study

suggests that communities in the study area should be empowered through capacity building in order to strengthen trachoma control measures in the region using the SAFE strategy.

5.3 Cultural factors influencing trachoma transmission among the pastoralists in Kirisia Sub-county

Cultural beliefs and behaviors among communities living in trachoma endemic areas impact negatively on the SAFE components of trachoma control and prevention. Previously, it has been reported that community's perception on flies, latrine ownership, facial cleanliness and separation of livestock bomas from households affects effective trachoma control and prevention (Njomo *et al.*, 2016). Our findings from the assessment of the community's knowledge on trachoma infection and control showed that majority of the informants had knowledge on flies breeding season, breeding sites, who are more attracted to them, problems they cause and their control. However, this knowledge was incomplete in some individuals in the community. This is suggestive of the need to do more sensitization among the community on flies as vectors of trachoma and control measures. Further, the community had some cultural perceptions that flies are a sign of abundant food, wealth, and comfortable life as reported earlier by a study done in Kenya among the Maasai community in Narok where cultural beliefs affecting effective trachoma control and prevention practices were highlighted in the community (Njomo *et al.*, 2016). These findings are suggestive that greater awareness has to be made in the community on flies, their contribution in transmission of trachoma, and control since earlier studies in Gambia have argued that sustained flies control decreases the morbidity of trachoma in a population (Emerson *et al.*, 1999; 2004).

The SAFE strategy targets at preventing vision loss and blindness, decreasing disease prevalence below 5% and attaining trachoma elimination (Ndisabiye *et al.*, 2020). Our findings from the key informant interviews and focused group discussions in Kirisia Sub-County, Samburu County depicts that informants were aware of trachoma although their knowledge on the disease, its causes, how it is spread, and control was scanty. Trachoma awareness, cause, and control using the SAFE strategy components remained below 50% in Kirisia Sub- County. This was in-line with findings from earlier studies (Vinke C & Lonergan S., 2011). Community efforts to combat trachoma also remains below average in this area. This can be attributed to the low household income and high illiteracy levels of the study population, since an association was reported

between level of education and knowledge on trachoma among the study population. This is suggestive that more efforts by the community, County and National MoH are needed to make trachoma control and prevention by SAFE strategy feasible in the region.

Several risk factors such as poverty, water scarcity, and poor hygiene affect trachoma control and prevention in endemic areas (Gebrie *et al.*, 2019). In this study accessibility to clean water, poverty, and lack of hand and face washing facilities remains a problem to slightly less than half of the population. Earlier studies have reported that increasing distance to water sources increases trachoma cases and vice versa (Baggaley *et al.*, 2006, Aragie *et al.*, 2022). Majority of the study population cover an average distance of 2 Km to fetch water. Clean water for facial cleanliness and environmental sanitation is key for the realization of the F and E components of the SAFE strategy which focuses on behavior change (Aragie *et al.*, 2022). This study revealed a correlation between distance covered to the water source during the dry season and face washing behavior ($P<0.05$). This was in agreement with what Gilman and colleagues reported earlier that availability of water correlates positively with hand and face washing behavior (Gilman *et al.*, 1993, 2019). Our findings from this study implies that non-governmental and governmental efforts should be made to improve water accessibility by the population especially during the dry season and creating awareness, this will improve the face and handwashing behavior and sanitation in households hence impacting positively on trachoma control. Earlier studies have shown that facial cleanliness reduces cases of active trachoma (Abebe *et al.*, 2021; Cairncross S, 1999, Schemann *et al.*, 2002). Moreover, WHO, 2019 trachoma report argues that improved access to water by a community proffer protection against trachoma in households (WHO, 2019). A strong correlation was noted between level of education and face washing behavior. Moreover, level of education and knowledge on trachoma were found to significantly impact water treatment behavior in the study area ($P<0.05$). This suggests that improving the literacy level in the study population will put trachoma elimination goal on the right track. Earlier studies have reported the significant contribution of the F and E sanitation-based education on bringing down trachoma cases in endemic countries (Stocks *et al.*, 2014).

Household sanitation improvement through use of latrines has been implicated in reducing the cases of active trachoma through control of flies (Haile *et al.*, 2013; Ndisabiye *et al.*, 2020, WHO, 2019). However, in Kirisia sub-County almost half of the population don't own a latrine,

and they mainly dispose human wastes in the open field and bush. The sustained high burden of trachoma in this area could be due to this factor which subsequently aggravate disease spread by providing breeding grounds for the flies (Emerson *et al.*, 2001; Gebrie *et al.*, 2019; WHO, 2019). Association studies reports the existence of a significant impact of level of education, income, cultural beliefs on latrine ownership in the study community ($P>0.05$). This finding is suggestive that waste disposing behavior in the study area especially, human excreta is not only influenced by high poverty, and illiteracy levels but also cultural beliefs associated with flies and latrine ownership. This is in agreement with study findings by Busienei and colleagues looking at latrine structure, design, and conditions, and the practice of open defecation in relation to trachoma in Lodwar Town, Turkana County, Kenya in 2019 (Busienei *et al.*, 2019).

Occupation is a risk factor for trachoma infection (Smith *et al.*, 2015). An earlier study has shown a significant link between occupation and other factors affecting trachoma control and prevention, namely; water availability, literacy level and latrine ownership (Smith *et al.*, 2015). Here we report a significant correlation between occupation and waste disposal behavior among the study population ($P<0.05$). Other studies should explore more on the impact of occupation on trachoma control and prevention. Our study findings suggest that efforts to fight against trachoma in Kirisia sub-County, Samburu County should be scaled up by concerned bodies putting in the required support to improve face washing behavior, eradicate poverty, and encourage latrine ownership.

5.4 Health system factors affecting effective control and prevention of trachoma in Kirisia Sub-county

Human resources for eye care are key for the realization of the global goal of eliminating preventable blindness by 2020. This can be made feasible through; integration of sustainable, comprehensive, high quality, equitable eye care systems into strengthened national health systems. This observational study focused on examining factors affecting trachoma control and prevention, including healthcare systems in Kirisia sub-County, Samburu County. We found out that health facilities were significantly far from the participant households, and distance to the healthcare facility affected time taken by individuals to seek treatment when faced with an eye illness ($P<0.05$). Some individuals in the community failed to seek healthcare services when faced with eye problems. A study conducted in Ethiopia by Churko and others inferred that

people living far away from health facilities get inadequate information, communication and education on trachoma (Churko *et al.*, 2021). On the contrary to other studies (Churko *et al.*, 2021), our study did not point out the effect of level of education, distance to healthcare facility and income on treatment seeking behavior.

Provision of adequate eye care calls for specialized treatment by an ophthalmologist. Our finding showed that there is shortage of ophthalmologists in Kirisia Sub-county, and this could be due to poor living standards, insecurity, and poor infrastructure in the region. Kenya ministry of health (MOH) have argued previously that shortage in the work force is contributed by poor living standards, poor infrastructure, and insecurity (MOH, 2010). However, part of those who sought treatment for eye problems still did this from traditional healers, local health facilities, and self-medication. Majority of the individuals in Kirisia sub-County who sought eye treatment were attended to by a general nurse. Several factors such as lack of drugs, lack of ophthalmic equipment's, inadequate work force, and delay in seeking treatment were identified as some of the causes of failure to resolve trachoma in some of the infected individuals. Moreover, the impact of these factors alongside the effect of healthcare attendant on trachoma control and prevention should be elucidated in the study area since inadequate healthcare support for lack of specialized eye care services has been shown before to affect trachoma control and prevention by earlier studies. Amin and others in a study evaluating the impact of human resource on trachoma control and prevention in Ethiopia argued that general healthcare workers perform few surgeries targeting trachoma control because of the few opportunities they have hence little practical skills which in turn impairs the quality of services offered (Amin *et al.*, 2017). Our findings are suggestive that efforts should be made to train eye care professionals and integrate them in the national healthcare systems to implement all the components of trachoma SAFE control strategy since earlier studies have highlighted that skilled eye care givers offer high quality care which subsequently impacts positively on trachoma control (Amin *et al.*, 2017). The trained healthcare workers may help to implement the other components of SAFE strategy namely; Surgery and mass administration of antibiotics in the community. Mass drug administration has been earlier implicated in decreasing trachoma cases in Gambia and Senegal (Harding-Esch *et al.*, 2019). Trained nurses were used to effectively implement this in trachoma endemic communities (Anderson JD & Bentley CC., 1986).

Human resource upskilling is central for achieving the global WHO vision goal. Earlier studies show that trained community health volunteers have impacted positively on trachoma control (Anderson JD & Bentley CC., 1986). According to Corley and colleagues, trained community health volunteers bridge the gap between the people at the grass root level and health systems. They create awareness among the community, encourage people to seek eye treatment. Further, trained community health volunteers screen for the active cases of trachoma, thus increasing the healthcare system screening power (Corley *et al.*, 2022), hence targeted treatment. Our assessment of the role of community health volunteers on the control of trachoma depicted that majority of the respondents agreed to this fact that community health volunteers have positive impact on trachoma control and prevention as highlighted earlier by Corley and colleagues (Corley *et al.*, 2022). However, the coverage of visits by community health volunteers was not 100% since about 6% of the respondents reported no visitation of their households by community health volunteers. Additionally, the frequency of visitation was on monthly basis as noted from majority of the respondents. These findings are suggestive that more efforts should be made by both the government and non-governmental agencies to train and deploy more community health workers who will conduct more frequent visits to the households. Though, the role of community health volunteers has to be investigated further in the study community, this will consequently improve the control and prevention of active trachoma cases in Kirisia sub-County.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter highlights the summary and the recommendations of this study assessing the sociodemographic, cultural and healthcare systems factors impacting trachoma control and prevention.

6.2 Conclusion

In conclusion trachoma remains a great public health concern in Kirisia sub-County despite WHO recommendation of implementing SAFE strategy in endemic areas. This study unveiled a number of socio-economic, cultural and healthcare system risk factors that predisposes the study population to trachoma affecting the SAFE strategy of control, namely;

- i. Low level of education, and income are the common socio-economic factors that affected trachoma control and prevention in the study population by influencing latrine ownership. Further, the knowledge of most of the respondents on trachoma was incomplete and this also influences their sanitation such as water treatment, and face washing thus affecting trachoma control.
- ii. Cultural factors such as open defecation as a result of not owning a latrine is still practiced by some of the respondents in the study area thereby providing a breeding ground for the *Musca sorbens* flies, which are the efficient vectors for trachoma transmission. Additionally, Majority of the community members walked for longer distances especially during the dry season to access water a very important component for personal and domestic hygiene that affects the E part of the SAFE strategy which affected face washing behavior in the community.
- iii. Delayed treatment seeking behavior by some of the respondents influenced by distance to the healthcare facility, lack of enough eye care health professionals, and use of herbals by some individuals are the common healthcare systems risk factors that affects trachoma control and prevention in the study area.

6.3 Recommendations

From the conclusions above we recommend that;

- i. Intensive health education and promotion activities targeting to create trachoma awareness in the study area in local language are urgently needed in order to increase the knowledge of the residents on the disease, this will help to control and prevent trachoma and probably scale down the disease burden below the WHO prevalence threshold of >10%.
- ii. Communities in the study area should be empowered through capacity building on the trachoma risk factors to facilitate prevention and control trachoma i.e governmental and non-governmental agencies should encourage use and assist in building latrines in order to stem down on open defecation thus controlling trachoma transmission among the population. Water and Sanitation (WASH) programs and the Trachoma Control Program should work closely to improve on access to water and sanitation in the study area. This may help the community to meet its personal and domestic hygiene needs. Also, cultural factors that are held dear by the pastoralists community in Samburu County impacting negatively on the latrine ownership and utilization, and treatment seeking behavior should be addressed to reduce trachoma transmission risk factors.
- iii. The County government of Samburu should collaborate with the National government to invest in building a strong, sustainable healthcare systems in the area of study, this will increase efficiency in the services offered at the facilities and will also reduce; the longer distances travelled by the residents to seek treatment, and eradicate self-medication and use of herbals.

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APPENDICES

Appendix 1: Household Questionnaire

HOUSEHOLD QUESTIONNAIRE

The purpose of this questionnaire is to obtain information from you about various **factors affecting control and prevention of trachoma among pastoralist in Kirisia Sub county, Samburu County, Kenya**. Information collected through these questionnaires will help to establish the various factors affecting effective managing of trachoma.

Household Code: **Interviewer's Code:**

Start time: **End time:**

Duration: **minutes**

Data collection Date:

GeoPoint:

County **Sub-County**

Location..... **Sub-location**..... **Village**

Respondent: Household head / spouse / adult dependent

SECTION 1: Household Socio-demographic characteristics

	Q1. Relation with the HH head 1. Spouse 2. Son 3. Daughter 4. Relative 5. Others	Q2. Age at last birthda y	Q3. Sex 1. 2.	Q4. Marital status 1. Never married 2. Mono gamous 3. Polyga mous 4. Divorc ed / separ ated 5. Windo wed 6. Other	Q5. Educationa l level 1. Non e/never 2. Pre- Primary 3. Prim ary 4. Seco ndary 5. Terti ary 6. DK 7. Othe rs	Q6. Occupation 1. Student 2. Employed 3. Unemploye d 4. Trader 5. Livestock keeping 6. Others	Q7. Religion 1. Ca tholic 2. Pr otestant 3. M uslim 4. Tr aditional 5. No religion 6. Ot hers
Respo ndent							
1							
2							

SECTION 2: Cultural factors

# Q.	QUESTION	CODING
Section 2.1a: Questions on individual practices in control of flies		
Q8.	Where do you mostly get into contact with flies?	1. In the house 2. Outside the house but within the compound 3. Out in the field herding animals 4. Other (specify)
Q9.	During which season are the flies rampant	1. Dry season 2. Wet season 3. Always
Q10.	Why? (for your answer in Q9) – Probe	
Q11.	Where do flies mainly breed? (probe)	1. Refuse 2. Walls 3. Latrine 4. Cow boma (stable) 5. Others
Q12.	How do you keep flies away from the house?	1. Ensure cleanliness 2. Spraying 3. Smoking

		<ul style="list-style-type: none"> 4. Destroying breeding sites 5. Use of baits 6. Nothing
Section 2.1b: Individual beliefs and knowledge on flies and trachoma control		
Q13.	Are there cultural beliefs related to flies?	<ul style="list-style-type: none"> 1. Yes 2. No
Q14.	If yes in Q13, which ones? Probe	<ul style="list-style-type: none"> 1. Sign of wealth 2. Abundant food 3. Others (Specify)-----
Q15.	Who are most attracted to flies?	<ul style="list-style-type: none"> 1. Children 2. Elderly 3. Women 4. Men 5. Others
Q16.	Which diseases are spread by flies (List 3)	<ul style="list-style-type: none"> 1. 2.
Section 2.1c: Linkage between house flies and trachoma		
Q17.	Do you know what trachoma is?	<ul style="list-style-type: none"> 1. Yes 2. No (Skip to Q22)
Q18.	If yes in Q17, what causes it?	<ul style="list-style-type: none"> 1. Bacteria 2. House fly 3. Poor hygiene 4. Curse 5. Inheritance 6. Poverty 7. Smoke 8. Others (specify)
Q19.	If yes in Q17, How is trachoma transmitted	<ul style="list-style-type: none"> 1. House fly 2. Smoke 3. Curse 4. Inheritance 5. Others (specify)
Q20.	If yes in Q17, what are the prevention and control measures? (List 3)	<ul style="list-style-type: none"> a. _____ b. _____ c. _____ d. _____
Q21.	If yes in Q17, what is the relationship of flies and trachoma? Probe.	
Q22.	What has the community been doing to reduce flies? Probe.	
Q23.	Do you agree the community's efforts are effective in control of flies?	<ul style="list-style-type: none"> 1. Strongly Agree 2. Agree 3. Undecided

		<ul style="list-style-type: none"> 4. Disagree 5. Strongly Disagree
Q24.	Have you ever been formally provided with information about trachoma?	<ul style="list-style-type: none"> 1. Yes 2. No (Skip to Q26)
Q25.	If yes for 24, Where?	<ul style="list-style-type: none"> 1. Community health volunteers 2. Health facilities 3. Chief's barazas 4. School going children 5. Seminar 6. Local media 7. Other (specify)
Q26.	What is your perception on the community's attitude towards fly control? (Probe)	
Section 2.2a: Questions on Facial cleanliness behaviors		
Q27.	Do you wash your face with clean water frequently?	<ul style="list-style-type: none"> 1. Yes 2. No (Skip to Q31)
Q28.	How often do you wash your face in a day?	<ul style="list-style-type: none"> 1. Once 2. Twice 3. Thrice 4. More than 3 times
Q29.	At what time do you first wash your face each day?	<ul style="list-style-type: none"> 1. Immediately I wake up 2. When I remember to 3. Other
Q30.	Which container do you use to wash your face?	<ul style="list-style-type: none"> 1. Water in a basin 2. Jerrican 3. Cup / jug / Sufuria 4. Running water from a tap 5. Leaky tin
Q31.	Do you have a face & hand washing facility (leaky tin) for your household use?	<ul style="list-style-type: none"> 1. Yes 2. No
Q32.	Where is the facility sited? (Observe)	<ul style="list-style-type: none"> 1. Outside latrine 2. Outside kitchen 3. Hang on a tree 4. Others (specify)
Q33.	If No in Q31 above, why?	<ul style="list-style-type: none"> 1. Lack of money 2. Ignorance 3. Cultural barriers (specify) 4. Other (specify) -----
Section 2.2b: Questions on water source, availability and cleanliness (for face & handwashing practice)		
Q34.	What is the main source of water used by	<ul style="list-style-type: none"> 1. River

	this household during dry season?	<ol style="list-style-type: none"> 2. Pond 3. Borehole 4. Shallow well 5. Rain 6. Tap 7. Dam 8. Other (specify) -----
Q35.	What is the main source of water used by this household during wet season?	<ol style="list-style-type: none"> 1. River 2. Pond 3. Borehole 4. Shallow well 5. Rain harvesting 6. Tap 7. Dam
Q36.	What is the distance between your house and the water point during dry season?	<ol style="list-style-type: none"> 1. < 1KM 2. Between 1 – 3Km 3. > 3 Km
Q37.	What is the distance between your house and the water point during wet season?	<ol style="list-style-type: none"> 1. < 1KM 2. Between 1 – 3Km 3. > 3 Km
Q38.	How much water do you use per person per day for body cleanliness? (Probe)	<ol style="list-style-type: none"> 1. < 10 Litres 2. 10-20 Litres 3. >20 Litres
Q39.	In your opinion do you think the water you use is always safe?	<ol style="list-style-type: none"> 1. Yes 2. No
Q40.	If No in Q39 above, how do you treat it?	<ol style="list-style-type: none"> 1. Boiling 2. Chlorination 3. Filtration 4. None
Section 2.3: Human waste control and prevention and latrine usage		
Q41.	Do you own a latrine?	<ol style="list-style-type: none"> 1. Yes 2. No (Skip to Q43)
Q42.	If yes for Q41, who uses it?	<ol style="list-style-type: none"> 1. All Household members 2. Parents 3. Children 4. Moran 5. Visitors 6. No body
Q43.	If No for Q41, is there cultural hindrance on usage?	<ol style="list-style-type: none"> 1. Yes 2. No (Skip to Q47)
Q44.	If Yes for Q43, which ones? (List)	
Q45.	If No for Q41, where do you dispose human fecal matter?	<ol style="list-style-type: none"> 1) Open in the bush 2) Cat system 3) Neighbor's latrine

		4) Other (specify) -----
Q46.	If No for Q41, why?	1. Lack of money 2. Ongoing construction 3. New settlement 4. Nomadism 5. Ignorance 6. Cultural barriers
Q47.	Are there cultural barriers to latrine ownership?	1. Yes 2. No (skip to Q49)
Q48.	If yes for Q 47, which one? (List)	1. _____ 2. _____
SECTION 3: Healthcare system factors		
Q49.	Do you normally seek eye care treatment when sick?	1. Yes 2. No (skip to Q51)
Q50.	If Yes, where do you normally seek eye care treatment?	1. Local general health facility 2. Public eye clinic 3. Private eye clinic 4. Traditional healer 5. Self-medication
Q51.	If No for Q49, what is the limiting factor?	1. Long distance to the health facility 2. Unavailability of eye care services 3. Limited knowledge 4. Presence of alternative medication 5. Lack of money to pay for care services 6. Lack of means of transport to facility 7. Client unsatisfied in previous visit
Q52.	How far is the nearest health facility where you usually seek eye health care?	1. <1Km 2. 1-5Km 3. >5Km
Q53.	Do you consider the eye care facility to be far from your home?	1. Yes 2. No
Q54.	When faced with eye illness, how long did it take to visit the health facility?	1. Less than 1week 2. Between 1week & 1 month 3. Between 1 month & 3 months 4. Over 3 months
Q55.	Who was the healthcare provider who managed your eye illness?	1. Ophthalmic nurse 2. Ophthalmic clinical officer 3. General nurse 4. Ophthalmologist 5. Other (Specify)
Q56.	Were you charged for the provided eye	1. Yes 2. No

	care services?	
Q57.	If yes, how would you consider the cost charged on the eye care services provided?	1. Very cheap 2. Fair 3. Expensive
Q58.	Who paid for the eye care treatment?	1. Self 2. Someone else in the household 3. Borrowed money 4. Waived by the health facility 5. Humanitarian assistance entity
Q59.	Was the visited health facility able to attend to the eye illness you were suffering from?	1. Yes 2. No
Q60.	If no, what was the issue?	1. Lack of eye care specialist 2. Lack of special equipment/ machine 3. Lack of required drug / consumable 4. Facility was closed
Q61.	Who normally makes the decisions about where to seek eye healthcare services your household?	1. Self 2. Household head 3. Another person in the household 4. Person outside the household
SECTION 4: Roles of Community Health Volunteers in trachoma control and prevention		
Q62.	Is your household served by a community Health Unit (CU)?	1. Yes 2. No
Q63.	If yes for Q62, do CHV routinely conduct home visits?	1. Yes 2. No
Q64.	If yes for Q63, what do CHVs do during the home visits?	1. Health education 2. Eye screening 3. Counselling 4. Case identification 5. Treatment 6. Referral advice 7. Case follow ups 8. Other (Specify)
Q65.	In your opinion, what else in addition can a CHV do? (Probe)	

Appendix 2: Key Informant Interviews guide

Introduction

Greetings! I am This questionnaire is administered as per of partial fulfilment of the requirements for the award of the degree of Master of Public Health. The purpose of this study is to obtain information from you about various **factors affecting control and prevention of trachoma among pastoralist in Kirisia Sub-County, Samburu County, Kenya**. Information collected through these questionnaires will help to establish the various factors affecting effective managing of trachoma.

With your permission, I will ask you some questions relating to this exercise.

The information you provide will be treated in strict confidence and will only be used for general reporting of this study. The interview will take about 30 minutes.

KII Guide Code: -----	Date: -----	Station: -----
Department: -----	Time started:-----	Time ended: -----
Profession: -----	Female/Male: -----	Contact: -----

1. What is the socio-cultural structure of this community in terms of demographic structure, education levels and occupation?
2. Has sanitation and hygiene been a problem to this community? How?
3. Can you explain some specific practices where you think this community has remained behind in terms of sanitation and hygiene?
4. Facial cleanliness is one of the key practices that have been identified to control eye seeking flies in trachoma transmission. Do you think that most people from this community practice this? If no, why? (**probe**)
5. Does this community view “face and hand washing facilities” as a good intervention?
Explain.
6. Which are the major constraints to latrine and leaky tins usage by the community?
7. What can be done to enhance adoption rate of this intervention?
8. Do you think that the number of pit latrines used by people in this area is adequate?

9. What are some of the general perception and practices in human fecal control and prevention in this community?
10. Has this community been practicing flies control? Explain
11. How can you describe the community's attitude towards flies?
12. Are there any beliefs associated to flies held by this community? If yes, list them.
13. Have the Government and other stakeholders promoted fly control within this community?
14. If yes, what are some of the things that has been done towards this end?
15. How can the community enhance her capability to control flies as a way of controlling trachoma?
16. How is the eye health seeking behaviors among the community in this area?
17. What are the key hindrance to effective eye health services uptake among the community in this area?
18. How well is the health systems equipped to address trachoma menace?
19. What are the key challenges faced in trachoma eye care services provision in this area?
20. By who and how does the trachoma cases identified at the community and referred for medical attention?
21. Who is involved in the entire process of trachoma control and prevention and how effective is the process?
22. Any other comments on the discussion?

Thank you for your participation.

Appendix 3: FGD Guide

Introduction

Greetings! I am This questionnaire guide is administered as per of partial fulfilment of the requirements for the award of the degree of Master of Public Health. The purpose of this study is to obtain information from you about various factors influencing effective prevention and control of trachoma among pastoralist in Samburu Central Sub-County. Information collected through this discussion will help to establish the various factors affecting effective prevention and control of trachoma.

With your permission, I will ask you some questions relating to this exercise. The information you provide will be treated in strict confidence and will only be used for general reporting of this study. The interview will take about 30-45 minutes.

1: General Information

Date of discussion: DD_____ /MM_____ /2020				Moderator:		
Venue :				Note-taker:		
Time start:				No. Participants at start:		
Time stop:				No. Participants at stop:		
Duration (in mins):						
Participant	Name (optional)	Sex (M/F)	Date of Birth (DD/MM/YYYY)	Highest Level of Education	Religion (Christian, Muslim, Other-Specify)	Villages represented by the Participants:
1						
2						
3						
4						
5						
6						
7						

1. What is the socio-cultural structure of this community in terms of demographic structure, education levels and occupation?
2. Has sanitation and hygiene been a problem to this community? How?
3. Can you explain some specific practices where you think this community has remained behind in terms of sanitation and hygiene?

4. Facial cleanliness is one of the key practices that have been identified to control eye seeking flies in trachoma transmission. Do you think that most people from this community practice this? If no, why? (probe)
 5. Does this community view “face and hand washing facilities” as a good intervention? Explain.
 6. Which are the major constraints to latrine, hand and facial facilities usage by the community? What can be done to enhance adoption rate of this intervention?
 7. Do you think that the number of pit latrines used by people in this area is adequate?
 8. What are some of the general perception and practices in human faecal management in this community? Has this community been practicing flies control? Explain
 9. How can you describe the community’s attitude towards flies? Are there any beliefs associated to flies held by this community? If yes, list them.
 10. What’s your opinion about trachoma prevention and control?
 11. How does pastoralism affect usage and replication of latrines and leaky tins?
 12. How does traditions and religion affect usage and replication of latrines and leaky tins?
 13. What are the economic factors affecting usage and replication of latrines and leaky tins in Kirisia Sub-county?
 14. What are cultural factors affecting usage and replication of latrines and leaky tins?
 15. Are there gender issues affecting usage of latrines and leaky tins?
- What needs to be done to promote usage and replication of latrines and leaky tins in Kirisia Sub-county?
- Any other comments on the discussion?

Thank you for your participation.

Appendix 4: Informed Consent Form

TITLE OF RESEARCH STUDY: Assessment of factors affecting trachoma control and prevention among pastoralist in Kirisia Sub-county, Samburu County, Kenya.

INVESTIGATOR: Solomon Mwaniki (MPH candidate)

INSTITUTION AFFILIATION: Maseno University

STUDY LOCATION: Samburu County, Kenya

PURPOSE OF RESEARCH STUDY: In Samburu County is one of the trachoma confirmed endemic County. It is characterized by high prevalence of active trachoma among children 1-9 years and blinding trachoma among people above 15 years. The main objective of the study is to assess the factors affecting control and prevention of trachoma using among pastoralist in Kirisia, Samburu County. The study will assess the socioeconomic factors, social factors and health system factors affecting trachoma control and prevention among the pastoral communities. We believe that you can help us by telling us what you know both about trachoma and about interventions in general.

DESCRIPTION OF THE STUDY: The study will explore in-depth the factors that are associated with control and prevention of trachoma among pastoralist in Kirisia, Samburu County. The study will not involve any experiment or procedure. If you choose to participate in the study or your parent / guardian gives assent for you to participate in the study if you are under 18 years, you will fill a questionnaire which will take approximately 30 minutes. The questions will focus on socioeconomic factors, cultural factors, healthcare system factors that are associated with control and prevention of trachoma. In case of any changes or should new information become available about the study you will be informed. Upon completion of the study the collected questionnaires will be destroyed. You may choose not to answer any questions or you may choose to withdraw at any time.

POTENTIAL BENEFITS (BENEFICENCE): The study will culminate to identification of unaddressed trachoma effective control and prevention limiting factors. The findings will then serve to increase pool of knowledge, information advancement and advocate for socio-culturally

sensitive interventions to abandon the identified high-risk practices in favor of safe practices. Additionally, the study will explore more insight on the control of trachoma for policy influence, advocacy and evidence-based decision making by the County Government and relevant stakeholders.

CONFIDENTIALITY & ANONYMITY: Confidentiality will be guaranteed and the identity of the study participant will not be revealed in any part of the report of this study. The questionnaires will have an identification number for use during the processing of data and not to identify you. The files will be destroyed after the analyses.

VOLUNTARY PARTICIPATION: Your participation in this research is entirely voluntary. It is your choice whether to participate or not. If you choose not to participate all the status you hold in the community will continue and nothing will change. The choice that you make will have no bearing on your job or any work-related evaluations or reports. You may change your mind later and stop participating even if you agreed earlier. The study participant will be given a copy of the consent form to sign and keep.

POTENTIAL DISCOMFORTS, INCONVENIENCE, INJURIES, and HARM OR RISKS: There is no known harm/risk by participating in the study.

ALTERNATIVE PROCEDURES OR TREATMENTS: The study will purely be observational. It will not involve any procedures or treatment.

REIMBURSEMENT: No incentives will be given to the study participants.

DISSEMINATION OF FINDINGS: Nothing that you tell us today will be shared with anybody outside the research team, and nothing will be attributed to you by name. The knowledge that we get from this research will be shared with you and your community before it is made widely available to the public. There will also be small meetings in the community and these will be announced for each participant to receive the study findings. Following the meetings, we will publish the results so that other interested people may learn from the research.

STUDY PARTICIPANT:

RESPONDENT CODESIGNATURE / THUMBPRINT

DATE

Day/month/year

CONTACT: For any questions or concerns about this study contact person is:

Name: Solomon Mwaniki

Cell: +254723 591 463

Email: Solomon.mwaniki@gmail.com

For any questions pertaining to the research ethics and any related inquiries, contact person is:
The Secretary, Maseno University Ethics Review Committee, Private Bag, Maseno; Telephone numbers: 057-51622, 0722203411, 0721543976, and 0733230878;

Email address: muerc-secretariate@maseno.ac.ke; muerc-secretariate@gmail.com.

Appendix 5: School of Graduate Studies Approval Letter



**MASENO UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

Office of the Dean

Our Ref: EL/ESM/00667/2014

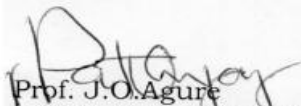
Private Bag, MASENO, KENYA
Tel:(057)351 22/351008/351011
FAX: 254-057-351153/351221
Email: sgs@maseno.ac.ke

Date: 7th May, 2019

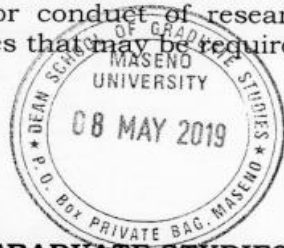
TO WHOM IT MAY CONCERN

**RE: PROPOSAL APPROVAL FOR SOLOMON MWANIKI —
EL/ESM/00667/2014**

The above named is registered in the Master of Public Health in (Epidemiology and Population Health), Maseno University. This is to confirm that his research proposal titled “Assessment of Factors Affecting Trachoma Management among Pastoralist in Kirisia Division, Samburu County, Kenya” has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.


Prof. J.O. Agure

DEAN, SCHOOL OF GRADUATE STUDIES



Maseno University

ISO 9001:2008 Certified



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Appendix 7: MUERC 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

FROM: Secretary - MUERC

DATE: 13th August, 2019

TO: Solomon Mwaniki
EL/ESM/00667/2014
Department of Public Health
School of Public Health and Community Development
Maseno University
P. O. Box, Private Bag, Maseno, Kenya

REF: MSU/DRPI/MUERC/00725/19

RE: Assessment of Factors Affecting Trachoma Management among Pastoralists in Kirisia Division, Samburu County. Proposal Reference Number MSU/DRPI/MUERC/00725/19

This is to inform you that the Maseno University Ethics Review Committee (MUERC) determined that the ethics issues were adequately addressed in the initial proposal. Consequently, the study is granted approval for implementation effective this 13th day of August, 2019 for a period of one (1) year. This is subject to getting approvals from NACOSTI and other relevant authorities.

Please note that authorization to conduct this study will automatically expire on 12th August, 2020. If you plan to continue with the study beyond this date, please submit an application for continuation approval to the MUERC Secretariat by 15th July, 2020.

Approval for continuation of the study will be subject to successful submission of an annual progress report that is to reach the MUERC Secretariat by 15th July, 2020.

Please note that any unanticipated problems resulting from the conduct of this study must be reported to MUERC. You are required to submit any proposed changes to this study to MUERC for review and approval prior to initiation. Please advise MUERC when the study is completed or discontinued.

Thank you.

Dr. Bernard Guyah
Ag. Secretary,
Maseno University Ethics Review Committee



Cc: Chairman,
Maseno University Ethics Review Committee.

MASENO UNIVERSITY IS ISO 9001:2008 CERTIFIED




Appendix 6: NACOST_public_permits_research_56381

REPUBLIC OF KENYA

Ref No: 563815

RESEARCH LICENSE




This is to Certify that Mr.. Solomon Mwaniki of Maseno University, has been licensed to conduct research in Samburu on the topic: Assessment of factors affecting trachoma management among pastoralist in Kirisia Division, Samburu County, Kenya. for the period ending : 27/August/2020.

License No: NACOSTI/P/19/963

Applicant Identification Number: 563815

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code



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