INFLUENCE OF SOCIAL-CULTURAL AND ECONOMIC FACTORS ON ACCESS TO SAFELY MANAGED SANITATION FACILITIES IN PASTORAL COMMUNITIES IN SAKU SUB-COUNTY, KENYA

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DECLARATION

I declare that this thesis is my original work and has not been submitted for the award of any degree in any other institution.

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DEDICATION

I dedicate this work to my dear wife, Madina Chichia, and my children, Sabdio Chichia and Deraso Chichia.

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OPERATIONAL DEFINITION OF TERMS

Community-Led Total Sanitation	This is an integrated sanitation promotion approach to achieving and sustaining an Open Defecation Free (ODF) status. CLTS entails the facilitation of the community's own observation, appraisal and analysis of their sanitation. Profile, their practices of defecation and the consequences, leading to collective action become ODF.
Demographic factors	characteristics of a population or group of people that are used to describe, analyse and understand their composition. The factors include various aspects such as age, gender, education level, income, occupation and household size.
Excreta	It is waste or by product that is removed or expelled from the body and consists of urine and faeces
Economic factors	Are aspects that influence and shape the overall economic conditions and performance of a country, region or organization. The factors include various elements such as unemployment, income levels and financial wellbeing.
Faeces	Waste material that is eliminated from the body through the anus and is primarily composed of undigested food, water and bacterial that reside in

	the digestive system.
Improved sanitation	Having access to sanitation facilities which are capable of cutting contact between people and human excreta.
Open defecation	disposal of human excreta in open places like fields, bushes, forests, or water bodies.
Sanitation facilities	rooms where people on either short or long call relieve themselves, commonly known as toilets or latrines.
Safely managed sanitation	Refers to the provision of adequate and hygienic sanitation facilities that ensure that faeces are safely treated and disposed of in a manner that protect the public health and environment.
Social factors	Factors that affect people's lifestyle and may change their behaviour

ABBREVIATIONS AND ACRONYMS

CLTS	Community-Led Total Sanitation
DHS	Demographic Health Survey
FGDs	Focus Group Discussions
KIIs	Key Informant Interviews
MDGs	Millennium Development Goals
OD	Open Defecation
ODF	When no faeces are openly exposed to the air
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
NACOSTI	National Commission for Science, Technology and Innovation.
UN	United Nations
UNICEF	United Nations International Children Emergency Fund
VIP	Ventilated improved pit latrine
WHO	World health organization

ABSTRACT

The Sustainable Development Goals (SDGs) aim for universal access to safely managed sanitation by 2030 and also emphasizes eradication of open defecation as a way to promote pathogen-free environment. Despite efforts to improve sanitation standards, significant challenges still persist, particularly in developing regions inhabited by pastoral communities and could be linked to unique components in the society. This study investigated the influence of social cultural, economic and demographic factors on access to safely managed sanitation in pastoral communities of Saku Sub-County, Kenya, where sanitation access is notably low. A cross-sectional descriptive design was employed. The researcher employed semi-structured questionnaires to gather data from 100 household heads and sample size determined using Yamane's adjusted formula. Stratified technique of sampling was used to classify the area based on its Wards and simple-random sampling based on population size considered in selecting household heads. Data analysis was conducted using SPSS version 26 for descriptive and inferential statistics. Results indicated a correlation between households with school-aged children and a lower likelihood of constructing safe toilets. These households often prioritized educational expenses, such as school fees and food, over sanitation improvements. Gender roles were significant predictors of safe toilets adoption at the households ($\beta=0.138$, $p=0.01$). The nature of work for women such as having to look for water and for men like herding in lonely places where there were no toilets attracted open defecation cases. Latrine utilization was minimal at night due to safety concerns among females as indicated by 72% of the respondents. The cultural beliefs held in the region had a negative influence on toilet adoption ($\beta=-0.130$, $p=0.040$) while level of awareness on sanitation-related matters among the residents positively influenced adoption of safe toilets, thus increased access to safe sanitation ($\beta=0.127$, $p=0.011$). Construction of toilets near some households was undermined by the fear that the toilet pits would kill or injure livestock, which seemed to be given the highest priority. Traditions that revolved around restriction of latrine sharing between grown-ups and children attracted cases of open defecation even with access to toilets which suggested a need for toilets separation. Economic status of residents significantly affected adoption of safe toilets at the households ($p<0.05$). The study recommends context-appropriate, culturally sensitive, and gender-inclusive sanitation interventions supported by education, community engagement, and policy measures—while calling for further research on socio-cultural influences and multi-stakeholder policy approaches to improve sustainable sanitation in pastoral communities.

CHAPTER ONE: INTRODUCTION

1.1 Background Information of Safely Managed Sanitation and Related Factors

The Sustainable Development Goals (SDGs) agenda 6.2 envisions universal access to safely managed sanitation with zero cases of open defecation by 2030 (UN, 2015) as a strategy towards improved public health, social wellbeing and economy. Although states and Non-Governmental Organizations have shown efforts towards improvement of sanitation standards, the reality for millions of people is one of polluted environments and use of toilets which fail to separate human contact from excreta with a noticeable gap between developing and developed countries.

A 2023 report by WHO/UNICEF revealed that 3.5 billion people globally lacked safely managed sanitation by 2020, with 419 million still practicing open defecation (Rakotomanana et al., 2020). While Europe boasted a 72% rate of safely managed sanitation, less developed regions, including Sub-Saharan Africa (where Kenya is situated), reported a mere 20% coverage (WHO/UNICEF, 2023). The prevalence of unsafe sanitation and open defecation contributes significantly to diarrheal diseases, a leading cause of mortality in children under five within low and middle-income countries (WHO, 2022). According to Mulenga et al. (2017), societal social, cultural, demographic and economic factors could explain the disparities in access to safely managed sanitation which differ with communities. If communities lack the resources to build better sanitation facilities, access to securely managed sanitation may not be feasible (Maharaj & Maharaj, 2021). It has been noted that one major obstacle preventing nations from adequately addressing sanitation challenges is a lack of resources. According to a study by Agbadi et al. (2019) that explored the obstacles to better sanitation in Ghana, people from middle-class households were more likely to use

improved toilets than people from lower-class households. Failure to own an improved toilet at the household could increase chances of interacting with nuisances such as flies capable of transmitting deadly diseases such as cholera and dysentery. Poor households may lack financial resources to cater for the costs associated with toilet construction such as material and labour costs. While analysing poverty levels alongside open defecation rates in 47 counties in Kenya, Njuguna and Muruka (2017) established that the mean rate of open defecation across all counties was 23.5% with the highest rate being 88.4%. The study found out that poverty was among the significant predictors of the variation in sanitation access between the counties at 68.4% with unacceptable high open defecation rates for the poorest. Faeces left in the open could be unsightly and cause environmental contamination. Given that the level of income and poverty index could differ with country or community; it will be necessary to examine the influence of income level on access to safely managed sanitation in the study area.

Community awareness and education level on sanitation matters could improve sanitation standards and eliminate open defecation. A study by Paul et al. (2022) in the United States revealed that 25% of the population engaged in open defecation. The research linked higher levels of education among household heads and increased access to sanitation information with a significant reduction in open defecation practices. A similar study in Ethiopia, by Temesgen et al. (2021) found out that household heads having formal education had 3.10 odds of avoiding open defecation (CI 95% [1.34-7.13]) compared to those who lacked.

However, although increased knowledge and awareness regarding sanitation could be essential, the outcomes for approaches of awareness creation such as public and community health campaigns and Community-led total sanitation have exhibited mixed outcomes in

ensuring adoption of toilets and eradication of open defecation (McMichael, 2018). In Ghana, a study by Alhassan and Anyarayor (2018) established that while effective communication on the essence of safe sanitation resulted in widespread sanitation awareness, community beliefs accounted for households' inability to sustain latrine utilization where people avoided even the available toilets. Avoidance of the available toilets could encourage people to defecate openly exposing them to infectious pathogens.

A set of beliefs relating to sanitation uptake have been associated with adoption of sanitation practices which however could differ from region to region. In Indonesia, a study by Dwipayanti et al. (2019) that assessed the cultural determinants of sanitation sustainability and uptake found out that establishment of latrines in households was considered polluting and was believed to cause illnesses and attracted curses from gods. Lack of latrines in the households could attract the practice of open defecation hence diseases related to poor excreta disposal. Similar sanitation-related beliefs were also noted by Bhatt et al. (2019) in Nepal where residents preferred open defecation to latrine utilization because having a latrine at home was deemed to attract diseases and smell. In Kenya, a study by Wasonga et al. (2016) that examined the determinants of sanitation practices established that toilet sharing among males and females or in-laws was prohibited and that the use of latrines at night exposed members to evil spirits. Establishment of many toilets per household because of toilet non-sharing beliefs could be expensive especially for the poor households. Beliefs could however differ with communities. It will therefore be necessary to find out the existence of sanitation-related beliefs in the study area.

While the topic of gender and sanitation has received attention in research, sanitation insecurity among women and children has yet to be defined (Caruso et al., 2017; Eliud et al.,

2022). Males, females and children have different sanitation needs related to safety, privacy and convenience and therefore require sanitation facilities which address their needs. The role of gender in household sanitation provision where households adopt toilets that are non-friendly to some members like women and children has attracted indisputable debates in the literature. In India, a study by Caruso et al. (2017) that analyzed gendered sanitation experiences established that women preferred defecating and throwing children faeces in the open to save time for household chores such as house maintenance and washing because the toilets were situated far from households.

Location of toilets far from households could attract insecurity concerns and make women fear using the toilets. Another similar study by Khanna and Das (2016) in India that explored gender and sanitation safety found out that although women had higher demand for safe latrines, they continued to defecate in bushes and water bodies because the available toilets were unsafe for use due to lack of privacy and location far from households. The study established that gender-based power dynamics where men had the overall mandate on sanitation-decision making influenced establishment of women-unfriendly toilets. Unless women are also involved as decision-makers in household sanitation matters, toilets adopted at the households could fail to address their sanitation needs.

Another issue that could arise is access to safely managed sanitation facilities is inability of children to use some of these facilities such as pit latrines. Infrastructure and care for pit latrines deter children from using such facilities and promote a preference for the use of other methods of waste disposal. Similarly, Ellis et al. (2020) observed that barriers to safe disposal of child faeces were lack of latrines, time associated with safe disposal practices, beliefs that infant faeces were not harmful, and not knowing where children had defecated.

Children may be discouraged from using the latrine if the slab is not designed with them in mind and is too big for them.

Access to safely managed sanitation facilities is key to healthy and safe environment. Although the United Nations (2015) has set a target of achieving safe sanitation and end open defecation for all by 2030, developing countries seem off track the goals and achievement of the target may require consideration of new strategies for progress (WHO/UNICEF, 2023). Studies for instance by Dwipayanti et al. (2019), Njuguna and Muruka (2017), Agbadi et al. (2019) and Mulenga et al. (2017) revealed that social cultural, demographic and economic factors could have an influence on adoption of safely managed sanitation. However, the studies were conducted in contexts with different social, geographical and economic orientations. With the increasing rates of open defecation cases and access to unsafe sanitation facilities in pastoral communities (Njuguna & Muruka, 2017; Busienei et al., 2019), there is need to examine the influence of social, demographic and economic factors on access to safely managed sanitation to inform strategies for progression in sanitation ladder in such areas.

In Marsabit County, which includes Saku and Laisamis Sub-Counties, the National Drought Management Authority (NDMA) highlights the detrimental interactions between drought, water scarcity, food insecurity, and sanitation. A high likelihood of undernutrition and diseases associated with poor sanitation, for example, is shown by the March 2023 NDMA bulletin, which states that the nutrition status in Laisamis Sub-County has increased to "extreme critical" levels at 32.6 percent (NDMA, 2023a). The basic causes of this statistic—poor sanitation, scarce water sources, and precarious livelihoods—apply to Saku and other pastoral sub-counties just as much even though they are from Laisamis.

Moreover, while some water sites in the county demonstrated sufficient recharge, others quickly declined and even dried up, lowering households' reliable access to water, according to the September 2023 Marsabit drought advisory (NDMA, 2023b). Similarly, the national drought updates for August and September 2023 showed that Marsabit alternated between the recovery and normal drought periods, with pastoral households often prioritizing animal water needs and cooking over sanitation and hygiene (NDMA, 2023c).

In such situations, open defecation turns into a coping mechanism, increasing the risk of diarrheal diseases in communities. Additional data from the July 2023 SMART Survey showed that just 30.2% of caregivers in Marsabit used proper handwashing during the four critical periods (County Government of Marsabit et al., 2023). This research highlights how sociocultural behaviors, in addition to economic and demographic factors, influence sanitation results and demonstrates that hygiene disparities continue despite efforts to increase knowledge.

1.2 Statement of the Problem

The widespread use of crude toilets continues to impede progress, and the accessibility of latrines has not eliminated open defecation in many places, including Kenya (WHO/UNICEF, 2023). The consequent spread of intestinal worms, cholera, dysentery, typhoid, and polio, especially in children, emphasizes how urgent it is to solve sanitation shortages (WHO, 2022).

Inadequate sanitation infrastructure has been demonstrated to substantially limit health and development outcomes in arid and semi-arid lands (ASALs), which have a persistent shortage of water and sanitation resources (Full & Danga, 2013; Kurui et al., 2019). The nomadic way of life and intimate contact with animal feces in pastoralist tribes make

sanitation procedures even more difficult and influence how people view the management of human waste (Maliti, 2021). As a result of many households' failure to implement appropriate sanitation practices, open defecation and the improper disposal of human waste are still common.

Without addressing the behavioral, socio-cultural, demographic, and economic factors that influence sanitation practices, the persistence of unsafe and underutilized facilities threatens to render Sustainable Development Goal (SDG) 6.2—universal access to adequate and equitable sanitation—an unattainable vision in such communities. Yet, there is limited empirical evidence on how these factors shape access to safely managed sanitation among pastoral populations. This study, therefore, seeks to fill this knowledge gap by investigating the determinants of sanitation practices in pastoral communities, with a focus on Marsabit County, Kenya.

1.3 Objectives

This section presents the general and specific objectives for the study.

1.3.1 General objective

To establish the influence of socio-cultural, demographic and economic factors on access to safely managed sanitation facilities in pastoral communities in Saku Sub-County, Kenya.

1.3.2 Specific objectives

i. To assess the influence of demographic factors on access to safely managed sanitation facilities in pastoral communities in Saku Sub-County, Kenya.
ii. To establish the influence of economic factors on access to safely managed sanitation facilities in pastoral communities in Saku Sub-County, Kenya.

iii. To examine the influence of socio-cultural factors on access to safely managed sanitation facilities in pastoral communities in Saku Sub-County, Kenya.

1.4 Research Questions

i. What is the influence of demographic factors on access to safely managed sanitation facilities in pastoral communities in Saku Sub-County, Kenya?

ii. How do economic factors influence access to safely managed sanitation facilities in pastoral communities in Saku Sub-County, Kenya?

iii. How do socio-cultural factors influence access to safely managed sanitation facilities in pastoral communities in Saku Sub-County, Kenya?

1.5 Justification

The Sustainable Development Goals (SDGs) prioritize improved sanitation services for enhanced well-being, cost-efficiency, and human dignity (UN, 2015). The lack of adequate sanitation, particularly prevalent in impoverished and unplanned urban areas, poses a significant global development challenge. Given that these regions house a substantial portion of the world's population, the issue is particularly pressing. Kenya's rapid urbanization has exacerbated this problem, with its most detrimental impacts falling on vulnerable residents. The findings of this study will offer valuable insights to the national Government of Kenya on how to improve sanitation standards in low-income pastoral areas. The findings of this study can guide the Ministry of Health and Marsabit County Government in formulating effective and sustainable sanitation strategies. These strategies should prioritize environmental protection, reducing income inequality, and empowering rural communities. The study may also inform approaches of ensuring that pastoral communities move up the sanitation ladder and improve the livelihood in communities. The

study is beneficial to the community if the county government takes action to ensure household's access safely managed sanitation facilities. The findings of the study may elicit general critique and discussion among academicians on how best pastoral communities might access safely managed sanitation facilities. Moreover, the findings generated in this study will provide useful insights for future researchers.

1.6 Limitations

The study was carried out in three rural administrative divisions of Saku Sub-County, targeting individuals with permanent residency in the area. As noted by Theofanidis and Fountouki (2018), limitations can influence data collection, results, and the generalizability of a study. The researcher encountered financial challenges where money to cater for the expenses of the data collection exercise was limited. There was therefore a need to source funds from alternative sources and have a strict budget to ensure achievement of objectives. Some people who were sampled for the study could not read and understand questions written in English. An interpreter who understands local languages for the area was involved in such cases. Honesty of respondents was key for the study. However, it was beyond the ability of the researcher to influence honesty of the participants.

1.7 Delimitations

The study was delimited to the rural areas of Saku Sub-County, Marsabit County, Kenya. Institutions, urban and peri-urban areas were therefore not targeted. The data collection instrument was a questionnaire and the study only targeted household heads.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This section provides a comprehensive review of empirical data from previous studies. The review is anchored on the study objectives. This section identifies gaps in existing research, thereby justifying the need for the proposed study. Additionally, it outlines the conceptual framework underpinning the research.

2.2 Influence of Demographic Factors on Access to Safely Managed Sanitation Facilities

Specific characteristics of people could influence their practices with regard to sanitation. In Bangladesh, a study by Akter et al. (2022) analyzed equity in safely managed sanitation and highlighted age and education as key demographic factors. Data from the 2017-2018 Bangladesh Demographic and Health Survey were examined to assess inequalities and determinants of safe sanitation management. The Slope Index of Inequality and multilevel regression models were used to examine disparities in SMS access. Nationally, SMS penetration was 44%, with slightly higher rates in urban compared to rural areas. The study found that older, more educated, and wealthier households had greater access to SMS services.

In a study conducted by Donacho et al. (2022) in Jimma, Ethiopia, the focus was on evaluating households' access to safely managed sanitation services and identifying associated factors. The cross-sectional study, involving 356 randomly selected households, utilized structured questionnaires and observation checklists to assess facility conditions. The findings revealed that a substantial percentage of households (87%) relied on unsafe sanitation services. The study identified various demographic factors, such as the presence

of a school-attending family member, family size, occupational engagement of household heads and wives, monthly income, and toilet age, as influential in determining access to safely managed sanitation. However, considering potential dissimilarities in demographics between the study area in Jimma, Ethiopia, and the proposed research area in Saku sub-County, Marsabit County, Kenya, the need for an empirical study to validate and explore specific demographic factors affecting sanitation access in the latter becomes imperative. This aligns with the primary objectives of the current study.

Girmay et al. (2022) conducted a comprehensive study involving 3,213 households to examine the influence of demographic factors on access to basic water, sanitation, and hygiene services using the Joint Monitoring Program (JMP) ladder framework. The study revealed significant disparities in service access based on educational attainment, residence, occupation, income, and gender. Notably, the study's insights, though valuable, emphasize the contextual nature of these demographic influences, indicating the need for tailored research to understand specific dynamics in diverse geographic locations.

Besides, households living in urban areas were 21.7 times more likely to use basic drinking-water services than in rural parts. The study further revealed that households headed by merchants were 2.1 times more likely to utilize basic sanitation services compared to those led by farmers. Additionally, households with higher per capita monthly income were 2.9 times more likely to employ basic sanitation services than the poorest households. In terms of hygiene, households with female heads were 1.5 times more likely to use the JMP ladder for basic hygiene practices than those with male heads. Besides, respondents who live in urban areas had 2.8 times higher use of basic hygiene services than those in rural areas. This implies that demographic factors like educational levels, area of residence, occupation,

income and gender are determinants to access SMS. While Girmay et al. (2022) and Donacho et al. (2022) identified various demographic factors influencing access to safely managed sanitation (SMS) in their Ethiopian studies, the potential impact of these factors might vary across different geographical contexts.

Alemu et al. (2023) investigated water and sanitation access challenges in low and middle-income countries, specifically Ethiopia. Using household data from the Ethiopian Demographic and Health Survey (EDHS) and JMP ladders, they conducted a time-trend analysis. The study revealed a substantial increase in basic drinking water services from 18% in 2000 to 57% in 2019, accompanied by a 61% decline in surface water use. Demographic factors, including wealth and household head age, significantly influenced access to water and sanitation services. The regional disparities in the impact of demographic factors on Safely Managed Sanitation (SMS) facilities highlight the need for context-specific research.

Examining household access to drinking water in Nigeria through the lens of the 2013 Demographic and Health Surveys, Abubakar (2019) conducted a comprehensive exploration into the determinants of water sources. Utilizing descriptive and inferential statistics, the study highlighted a striking finding: approximately 88% of households relying on surface water were predominantly situated in rural areas. Moreover, the research shed light on the multifaceted influences shaping household drinking water sources, encompassing factors such as place of residence, geopolitical zone, education, wealth index, ethnicity, access to electricity, and gender. Logistic regression analysis revealed that several factors, including place of residence, time spent collecting water, and number of rooms, significantly predicted

access to improved or unimproved water sources. However, the study found that toilet type and household size were not significant predictors in this context.

A study by Angoua et al. (2018) investigated water and sanitation access challenges within impoverished peri-urban settlements of Yopougon, Abidjan's largest municipality. Through a cross-sectional study, the researchers assessed factors influencing access to the essential services among 556 randomly selected households. The study revealed significant disparities, with 25% lacking clean water and 57% lacking improved sanitation. Socioeconomic status and settlement characteristics emerged as key determinants of access. In contrast to traditional demographic factors often linked to sanitation access, this study found that socioeconomic status and settlement characteristics were key determinants of water and sanitation access in peri-urban areas. Notably, households headed by women had better access to clean water, emphasizing women's role in water management.

The reviewed literature consistently demonstrates that demographic and socioeconomic factors—including age, education, income, occupation, gender, household size, and place of residence—significantly shape access to water, sanitation, and hygiene services across diverse contexts in Asia and Africa (Akter et al., 2022; Donacho et al., 2022; Girmay et al., 2022; Alemu et al., 2023; Abubakar, 2019; Angoua et al., 2018). While most studies affirm that wealthier, urban, and more educated households have greater access to safely managed sanitation, variations emerge across regions, with some highlighting unique determinants such as settlement characteristics or female household leadership. These disparities emphasize the contextual nature of demographic influences on sanitation access and point to gaps in empirical evidence from pastoral communities. This underlines the necessity of the current study, which seeks to critically examine the influence of socio-cultural, demographic,

and economic factors on access to safely managed sanitation facilities within the unique pastoral setting of Saku Sub-County, Marsabit County, Kenya.

2.3 Influence of Economic Factors on Access to Safely Managed Sanitation Facilities

Existing studies point out to the need to have affordable sanitation services in communities as most especially in Developing counties are poor. A study by Alfonso et al. (2022) in Quezon City, Metro Manila, was conducted to examine the interplay between socioeconomic status and water access disparities in urban settings. Through interviews with 146 households categorized by income quintiles, the researchers uncovered significant correlations between economic factors, water source accessibility, consumption patterns, and related challenges across different socioeconomic groups. The access rate to piped water decreased from 100% for the rich to 66% for the poor. More than 30% of the poor had to purchase water from water vendors due to their lack of access to piped water because of their socio-economic status, including land ownership. Per capita water consumption levels differed significantly across the income quintiles, from 93.4 liters-per-capita-per-day (LPCD) for the poor to 259.4 LPCD for the rich. This coincided with the high Gini coefficients in household income (G = 0.56) and the expenditure for water (G = 0.41). Per capita water consumption was linearly correlated with the logarithm of household income. Among the poor households, 10% consumed less than 50 LPCD, and 44.8% spent more than 4% of their income on water, with the maximum expenditure of 13.3%. The poor quintile's expenditure on water varied significantly, depending on their sources such as water vendors, piped water, or well water. Disparities in water access are evident, with 45% of impoverished households exposed to contaminated water compared to 13% of affluent households.

This socioeconomic gradient in water access strongly suggests a similar correlation for sanitation services. While economic factors significantly influence access to sanitation, government and non-governmental interventions can help to reduce these disparities. To develop effective policies, researchers must thoroughly examine the complex relationship between economic conditions and sanitation outcomes. Exploring the dynamics of socio-economic factors in relation to water source and sanitation practices in Malaysia, Kong et al. (2020) conducted a comprehensive analysis of 7978 living quarters, shedding light on the prevalence of non-improved water sources, suboptimal toilet facilities, and improper waste disposal across diverse urban and rural contexts. The study's findings underscore the impact of education, income levels, and house types on water and sanitation practices, adding valuable insights to the broader understanding of how economic considerations may shape access to safe water and sanitation facilities. Of the 7,978 living quarters (LQs) surveyed, 58.3% were located in urban areas.

Concerning basic amenities, 2.4% lacked improved water sources, 0.5% had inadequate toilet facilities, and 27.4% improperly disposed of domestic waste. Open burning was prevalent in 26.1% of households. Long houses (10.5%), squatters (8.5%), and shared houses (4.0%) faced particular challenges in accessing water sources. Squatters (11.9%) and shared houses (4.8%) had higher rates of inadequate toilet facilities. Improper waste disposal was most common in village houses (64.2%), followed by long houses (54.4%), single houses (45.8%), and squatters (35.6%). Higher education and income levels correlated with reduced improper waste disposal practices.

The type of dwelling significantly impacted water and sanitation outcomes, even when other factors were considered. Lower-income households were more likely to lack proper toilets

and waste disposal. Additionally, lower education levels and rural locations were associated with improper waste disposal. These findings strengthen the link between socioeconomic status and sanitation access. However, it's crucial to recognize the potential differences in housing structures between Malaysia and the study area, which might limit the applicability of these findings.

In an endeavour to discern critical determinants influencing access to safe drinking water and improved sanitation in Punjab, Adil *et al*. (2021) delved into the analysis of Multiple Indicator Cluster Survey Household data spanning 2017 to 2018. Through a meticulous logistic regression model, the study identified household media exposure, education levels of the household head, household wealth status, and ethnic background as pivotal factors shaping access to safe drinking water. Additionally, the research highlighted the significance of social norms and place of residence in determining household access to improved sanitation.

Notably, the study underscored the profound impact of social norms, emphasizing the complex interplay of socio-economic factors in shaping access to sanitation and safe drinking water facilities. While acknowledging the substantial influence of economic factors on sanitation access, this study emphasizes the need for a more nuanced understanding. Future research should incorporate a wider range of indicators to comprehensively explore the complex relationship between economic conditions and access to sanitation and safe drinking water facilities.

Mshida et al. (2020) conducted a cross-sectional study in Babati Town, Tanzania, to evaluate sanitation and hygiene practices. While most households had some form of sanitation, a significant portion lacked safely managed sanitation services. Pit latrines and flush toilets

were common, indicating reliance on on-site sanitation. The study revealed a high prevalence of poor hygiene practices among residents. Hand washing facilities were scarce, and women were more likely to wash their hands than men. These findings underscore the need for improved sanitation and hygiene promotion in the region.

Despite reported adherence to hand washing at critical times, observed practices often fell short. Households with piped water were more likely to wash hands compared to those without. A combination of socioeconomic, cultural, and economic factors influenced sanitation and hygiene behaviours. While previous research linked economic status to sanitation access, this study aims to provide concrete evidence to support or refute this connection.

Mahama's 2013 study examined factors influencing access to improved water and sanitation in five low-income Accra neighborhoods with diverse populations. A survey of 1,500 households was conducted, and the data was analyzed using chi-square and logistic regression. The study found a strong correlation between household income and access to improved drinking water, highlighting the significant role of economic factors in determining water and sanitation access in these communities. While recognizing the significant influence of wealth on access to improved facilities, the study highlighted the need for ongoing research to fully understand the complex factors affecting access to safely managed sanitation. To achieve this, the study categorized households as having either improved or unimproved water and sanitation services.

Statistical analyses, including chi-square tests and binary logistic regression, were employed to examine the relationship between socioeconomic factors and access to these essential services. The survey data revealed that a very low percentage (4.4%) of respondents had

access to improved drinking water according to the study's definition. Additionally, only 34.7% had access to improved toilet facilities based on the same criteria. However, using broader WHO definitions, these figures increased to 40.7% for improved drinking water and 84% for improved toilet facilities.

Nyambe et al. (2020) employed multivariate stepwise logistic regression to examine factors associated with improved and unimproved sanitation facility use among 205 peri-urban Lusaka residents. Data included socio-demographics, household sanitation characteristics, and diarrhea prevalence. WASH facilities were assessed using WHO-UNICEF criteria. The study highlighted the simultaneous use of toilets and chambers as an alternative sanitation strategy. A particular focus was on understanding the relationship between these sanitation options and factors such as income, education, and household composition. The study revealed that regular income, private toilet ownership, access to improved drinking water, and handwashing facilities positively correlated with owning an improved toilet.

Interestingly, both improved toilets and chambers were associated with increased diarrhea prevalence. Chamber usage was more common among women and those using unimproved toilets. Externally managed toilets were more likely to be used as chambers. Additionally, households with more toilet users experienced higher diarrhea rates. These findings suggest a complex relationship between economic factors, sanitation practices, and health outcomes. While owning a toilet and higher income are associated with improved sanitation, other factors such as toilet type, ownership, and usage patterns influence disease prevalence. However, this inference need to be supported by an empirical study like the one being proposed herein.

Looking at the critical elements that shape households' access to clean drinking water, Kithinji (2015) explored factors influencing water sourcing behaviour in Imenti South. Employing a descriptive survey design, the study randomly selected one sub-location from each of the three purposively chosen wards, surveying a total of 90 households. Through the use of questionnaires and descriptive statistical analysis, the research unveiled the impact of demographic, economic, and social characteristics on water sourcing behaviour and clean drinking water accessibility. While the study did not establish the statistical significance of economic influences, it exclusively focused on water access rather than encompassing broader sanitation considerations. In light of this, the current study seeks to determine the potential significance of economic factors in shaping access to safely managed sanitation facilities.

Kong et al. (2020) found a positive correlation between higher education levels and income and improved sanitation practices in Malaysia, aligning with Mahama's (2013) findings in Ghana. However, these studies primarily focused on urban settings and do not provide specific insights into the economic conditions and water/sanitation practices of pastoral communities in Kenya, such as those in Saku Sub-County.

Mshida et al. (2020) investigated sanitation and hygiene practices in Babati Town, Tanzania, examining the influence of socio-demographic and economic factors. Their findings indicated a positive correlation between higher income levels and access to improved sanitation facilities, reinforcing the importance of economic status in determining sanitation outcomes. This aligns with similar research conducted in Malaysia and Ghana. However, while Mshida et al. (2020) provided valuable insights into urban sanitation challenges, the

study's focus on a town setting limits its applicability to rural and pastoral communities, such as those in Saku Sub-County, Kenya, where the current research is centered.

These studies affirm that economic status—reflected in income levels, occupation, land ownership, housing type, and household wealth—plays a decisive role in shaping access to safe water, sanitation, and hygiene services, with poorer households disproportionately relying on unsafe sources and facilities (Alfonso et al., 2022; Kong et al., 2020; Adil et al., 2021; Mahama, 2013; Nyambe et al., 2020; Mshida et al., 2020). Wealthier and better-educated households are more likely to access improved toilets, piped water, and safer waste disposal practices, while low-income groups often depend on vendors, unimproved facilities, or alternative unsafe strategies, which exacerbate health risks. Moreover, factors such as housing structures, settlement type, and social norms interact with economic conditions to further widen sanitation disparities, underscoring the multidimensional nature of the problem. However, most of these studies have been conducted in urban or peri-urban contexts, leaving limited evidence on how economic constraints uniquely affect sanitation access in rural pastoral settings. This highlights the research gap that the present study addresses by examining the influence of socio-economic factors on access to safely managed sanitation facilities in pastoral communities of Saku Sub-County, Marsabit County, Kenya.

2.4 Influence of Socio-Cultural Factors on access to Safely Managed Sanitation Facilities

Routray et al. (2015) conducted a qualitative exploratory study on the socio-cultural and behavioral factors limiting latrine adoption in rural coastal Odisha. The study utilized focus group discussions (FGDs), observations of latrines, and interviews with latrine owners.

FGDs involved frontline NGO sanitation program staff and community members, categorized by caste, gender, latrine type, and age group. Data were analyzed using a thematic framework approach. The study revealed that habits, socializing, sanitation rituals, and daily routines, which varied by caste, gender, marital status, age, and lifestyle, impeded latrine adoption. The researchers concluded that merely providing infrastructure does not guarantee its use due to significant culturally ingrained behavioural barriers. Although this study was conducted in India, its results might not be applicable to Saku sub-County, Marsabit County, Kenya, due to cultural differences. However, empirical data is needed to support this, which the current study aims to establish.

Jewitt et al. (2018) conducted village-based qualitative research in Guwahati, India, to examine how specific geographical settings impact sanitation sustainability and user-based priorities. They focused on sustainability issues related to pit emptying, poor construction, and seasonal flooding. The study used shit flow diagrams to depict seasonal variations in estimates of safely managed sanitation. The findings revealed that poor latrine construction and maintenance, along with seasonal flooding, frequently caused shifts between "improved," "unimproved," or "shared" systems and led to significant changes in safely managed sanitation estimates.

Additionally, sanitation "stacking" (the simultaneous use of various sanitation systems) occurred due to a preference for open defecation and high demand for existing latrines, especially during seasonal flooding. The study argued for the necessity of monitoring seasonal variations in the use, quality, and continuity of access to sanitation facilities and capturing data on sanitation "stacking" to achieve "sanitation for all." Although the study largely points to whether changes as factors impeding access to safely managed sanitation

facilities, it also indicates that preferences play a major role. Since preference might be engrained in cultural values of the people, it can be argued that cultural practices and believes might affect access to safely managed facilities. However, this assertion needs to be augmented by empirical data which the current study seeks to gather.

Wasonga et al. (2016) conducted a qualitative study on the sociocultural determinants affecting the adoption of safe water, sanitation, and hygiene practices in Nyakach, Kisumu County, Kenya. The research employed qualitative methods and was carried out in Central Nyakach in Kisumu County, Kenya. Focus group discussions (FGD), key informant interviews (KII), and observation of homesteads were used to gather data. The data were then analysed thematically. The study established that water issues were gendered and its use was socially and culturally categorized. The study found that water storage practices were influenced by traditions, such as using a clay pot, while sanitation and hygiene practices were governed by rituals and taboos. It was observed that latrines were primarily constructed by men, and it was prohibited to share them with in-laws and older children.

Furthermore, the study by Wasonga et al. (2016) revealed the alarming practice of open defecation for children and the complete absence of handwashing with soap due to a harmful cultural belief about livestock rearing. These findings, derived from Wasonga et al. (2016), underscore the significant impact of sociocultural factors on sanitation practices. However, given the distinct climatic and cultural contexts of Saku Sub-County, Marsabit County, Kenya, it is imperative to acknowledge that these findings might not be directly applicable. Consequently, there is a compelling need to identify the specific sociocultural factors that influence access to safely managed sanitation facilities within this particular region. To achieve this, a comprehensive empirical study, such as the one proposed, is essential.

A study by Kasiva (2023) aimed to understand how social and cultural factors, along with the presence of latrines, influence sanitation practices in rural Nzaui Sub-County, Makueni County, Kenya. The study combined both qualitative and quantitative research methods. Data was collected through surveys of 100 randomly selected households and in-depth interviews with a focus group of nine participants. Statistical analysis was conducted using SPSS to identify patterns and relationships between variables. The findings were organized into themes and presented in narrative form. From the findings, 75% of residents adopted traditional pit latrines, some of which had no slabs, roofs, had tattered walls, flies and odour nuisances.

The study by Kasiva (2023) established that 30% of the households practiced open defecation. The study indicated that socio-cultural practices that had gendered roles like women fetching water and collecting firewood, and male roles like rearing livestock in deserted places with no toilets encouraged open defecation. The study revealed that existing traditions and beliefs regarding witchcraft associated with feces left in the open created a fear of open defecation. It also found that certain religions attributed the cause of diarrhea to demons, indicating a form of ignorance about sanitation realities. These findings, as highlighted by Kasiva (2023), underscore the importance of socio-cultural factors in accessing safely managed sanitation facilities. However, since traditions vary among communities, it is essential to empirically determine the specific socio-cultural factors that promote or hinder access to safely managed sanitation facilities in Saku sub-County, Marsabit County, Kenya. This is one of the primary goals of the current study.

Busienei et al. (2019) investigated the prevalence of open defecation (OD) in Lodwar, Kenya, using a combination of quantitative and qualitative research methods. The study

found that cultural factors were the primary reason for the persistence of OD in the area. Five key cultural factors contributing to this practice were identified through the research. Data was collected from a random sample of residents using surveys, focus groups, and interviews. These cultural aspects included sexual immorality, OD as a common habit, nomadic pastoralism, bride's dignity, and the mixing of feces. It is evident that socio-cultural practices significantly influence access to safely managed sanitation facilities. However, it remains unclear whether the socio-cultural factors identified by Busienei et al. (2019) can be generalized to Saku sub-County, Marsabit County, Kenya. Therefore, this study aims to empirically investigate whether the socio-cultural factors identified in previous research, particularly those related to open defecation, are prevalent in the study area. Additionally, the study seeks to uncover any other socio-cultural factors that either promote or hinder access to safely managed sanitation facilities within the community.

Dwipayanti et al. (2019) explored cultural determinants of sanitation uptake in rural Bali, Indonesia, highlighting how traditional beliefs influenced latrine adoption. Similarly, Routray et al. (2015) conducted a study in rural coastal Odisha, India, identifying socio-cultural barriers to latrine adoption. These studies emphasize the significance of cultural beliefs in shaping sanitation practices, which may resonate with pastoral communities in Kenya.

Jewitt et al. (2018) investigated the sustainability of sanitation practices in Guwahati, India, focusing on geographic factors and user preferences. Their findings highlighted the significant impact of poor infrastructure and seasonal flooding on sanitation, emphasizing the role of environmental conditions. While this study provides valuable insights into the

challenges of sanitation in urban settings, it does not delve into the unique cultural and social dynamics prevalent among pastoral communities, such as those found in Kenya.

The studies demonstrate that socio-cultural and behavioral factors significantly shape sanitation practices, often hindering the adoption and sustained use of safely managed sanitation facilities. Studies in India (Routray et al., 2015; Jewitt et al., 2018) reveal that entrenched habits, rituals, caste, gender roles, user preferences, and environmental conditions—such as seasonal flooding—undermine latrine adoption and sustainability, while emphasizing that infrastructure provision alone is insufficient.

Similar findings emerge from African contexts, including Kenya, where cultural beliefs, gendered roles, taboos, and traditions either discourage or condition the use of sanitation facilities. Wasonga et al. (2016) in Kisumu County found rituals and prohibitions against sharing latrines with in-laws as key barriers, while Kasiva (2023) in Makueni highlighted fears linked to witchcraft and religious misconceptions about disease. Busienei et al. (2019) further revealed that open defecation in Lodwar persists due to cultural drivers such as nomadic pastoralism, bride's dignity, and taboos about feces mixing. Across contexts, socio-cultural norms intersect with settlement types, gender dynamics, and traditional worldviews to shape sanitation behaviors, often in ways that defy purely economic or infrastructural explanations.

However, these studies also emphasize the contextual nature of such influences, with traditions varying widely across communities. Consequently, while existing research underscores the profound role of socio-cultural determinants, there remains a critical gap in understanding how these dynamics uniquely affect access to safely managed sanitation

facilities in pastoralist regions such as Saku Sub-County, Marsabit County, Kenya—an empirical gap the current study seeks to address.

2.5 Study Gaps

Despite the wealth of research on sanitation access, there is a noticeable gap in empirical studies specifically targeting pastoral communities in Kenya, such as those in Saku sub-county, Marsabit County. While studies in other regions provide valuable insights, cultural, economic, and social contexts vary significantly, necessitating localized research.

Additionally, existing literature often emphasizes either water or sanitation access individually, rather than addressing both comprehensively. Integrating both aspects is essential for understanding the holistic challenges faced by communities. Moreover, although some studies recognize the influence of socio-economic factors, there is limited exploration of the intersectionality of these factors and their combined impact on sanitation access. Future research should delve deeper into these complex interactions.

By synthesizing findings from various studies, it becomes evident that while there is substantial research on sanitation access globally, there is a need for more targeted and context-specific investigations to address the unique challenges faced by pastoral communities in Kenya.

2.6 Theoretical Framework

To comprehensively understand the complexities surrounding access to safely managed sanitation facilities in pastoral communities, a theoretical framework that effectively analyzes socio-economic and cultural factors is essential. The paper adopted the Social-Ecological Model (SEM) as the theoretical framework to understand the complexities surrounding access to safely managed sanitation facilities in pastoral communities.

Bronfenbrenner's Social-Ecological Model (SEM) (1979) posits that multiple interconnected factors, ranging from individual attributes to broader societal and environmental contexts, shape human behavior. The SEM outlines several nested levels. The individual level emphasizes personal characteristics, beliefs, and behaviors, with factors such as education, income, and cultural beliefs significantly influencing sanitation practices.

The interpersonal level highlights the impact of social networks, family dynamics, and community norms on behavior. Cultural practices and social norms regarding sanitation, such as beliefs about latrine use and disposal of waste, are shaped by interpersonal interactions within pastoral communities. Community Level: Communities provide the social context within which individuals interact and form shared norms and values. Access to sanitation facilities may be influenced by community infrastructure, collective decision-making processes, and the availability of resources. Organizational Level: This level encompasses institutions and organizations that provide resources and services to communities. NGOs, government agencies, and local authorities play a crucial role in implementing sanitation programs and policies, which can impact access to facilities in pastoral areas. Policy and Societal Level: The broader socio-economic and political context, including government policies, cultural ideologies, and economic disparities, shapes access to resources and opportunities. Policies related to water and sanitation infrastructure allocation and funding can significantly impact pastoral communities' access to facilities.

The Social-Ecological Model provides a comprehensive framework for understanding the multifaceted influences on access to safely managed sanitation facilities in pastoral communities. By examining individual characteristics such as education, income, and cultural beliefs, the study can determine how these factors influence sanitation behaviors and

decision-making. Understanding the role of social networks, community norms, and collective behaviors is essential for designing culturally appropriate sanitation interventions. Exploring community dynamics will enable the identification of social barriers and facilitators to sanitation access.

In general, the Social-Ecological Model offers a comprehensive framework that recognizes the interconnectedness of individual, social, and environmental factors in shaping sanitation access. By applying this theoretical lens, the study can reveal the complexities of sanitation provision in pastoral communities and identify strategies for promoting sustainable access to safely managed facilities.

Individual factors such as age, education, occupation, and gender significantly shape attitudes and behaviors towards sanitation practices. Economic factors, including income levels, wealth status, and access to resources, also influence the ability to invest in and maintain sanitation facilities. Additionally, socio-cultural factors such as traditions, beliefs, social norms, and gender roles impact sanitation behaviors and practices within communities. Moving beyond the individual level, the SEM considers the interpersonal and community levels, where social networks, community norms, and collective behaviors influence sanitation practices. This includes factors such as community cohesion, social support, and cultural practices related to sanitation.

Furthermore, the SEM extends to the institutional and policy levels, where government policies, regulations, and support programs can either facilitate or hinder access to safely managed sanitation facilities. Institutional factors, including the availability of infrastructure, funding mechanisms, and the enforcement of sanitation standards, are crucial in shaping access to sanitation services. Additionally, the Social-Ecological Model (SEM)

acknowledges the interaction and influence of environmental factors, such as geographic location, climate conditions, and natural resources, which can affect the availability and sustainability of sanitation facilities.

Bronfenbrenner's Social-Ecological Model (SEM) has been effectively used by a number of researchers in studies pertaining to health and sanitation, providing important insights for the present study into access to properly managed sanitation in pastoral communities in Saku Sub-County, Kenya.

In order to investigate obstacles to the adoption and sustainability of sanitation in rural Ethiopia, Alemu et al. (2017) used the SEM in conjunction with the IBM-WASH framework. Their research showed that factors influencing sanitation use operated on multiple levels, including general practices and infrastructure, household barriers like labor and cost, personal preferences and demand, and larger societal or regulatory restrictions. This multi-level approach showed that sanitation issues must be seen within the various settings that affect access and behavior rather than being comprehended in a vacuum. This viewpoint is pertinent to the current study because it makes it possible to map sanitation variables across pastoral households, community norms, and structural factors that are specific to Marsabit County.

Similar to this, Ssemugabo et al. (2020) investigated the factors that promote and hinder the adoption of water, sanitation, and hygiene (WASH) in Kampala's slum environments using the socio-ecological model. Their results demonstrated that home dynamics, institutional promotion, community surroundings, and policy enforcement all influenced sanitation behaviors in addition to personal knowledge and financial standing. This highlights how crucial it is to incorporate sociocultural, economic, and demographic factors into

institutional and governance frameworks, which is highly relevant to the goals of the current study.

SEM was also used by Muthiru and Bukachi (2024) to investigate the variables affecting men's participation in nutrition practices. The study found that men's involvement in child health was influenced by a variety of factors, including institutional support, interpersonal family dynamics, community norms, and individual attitudes. This gives a good illustration of how SEM captures the interplay between sociocultural norms like gender roles, institutional structures like health services, and demographic traits like age and education. Since male and female roles in sanitation decision-making are frequently driven by comparable multi-level dynamics, these insights are essential for pastoral communities.

Ssewanyana et al. (2019) used the SEM in another study conducted in Kenya to look into the factors that affect teenage violence and injury in rural coastal areas. The study emphasized the interaction of individual characteristics, peer influence, family structures, institutional support, and social norms by mapping factors across individual, interpersonal, institutional, community, and policy levels. Although the topic is different from sanitation, the methodological approach shows how SEM can clarify intricate connections between structural, sociocultural, and demographic elements that influence results. Because sanitation access is similarly impacted by multiple layers of social and structural variables, this approach is especially pertinent to the proposed study.

Lastly, in a mixed-methods study conducted in Ethiopia's Becho District, Bamlaku Golla (2024) used SEM to pinpoint the contextual, technological, and psychosocial factors that influence the adoption of sanitation. The results demonstrated that sanitation uptake was influenced by a variety of factors, including cultural views, technological accessibility,

economic limitations, and environmental factors including soil type and water availability. This emphasizes how crucial it is to examine sanitation within larger sociocultural and environmental contexts in addition to demographic and economic factors. This implies that understanding sanitation availability in Saku Sub-County will be heavily influenced by cultural customs, harsh conditions, and pastoral migration.

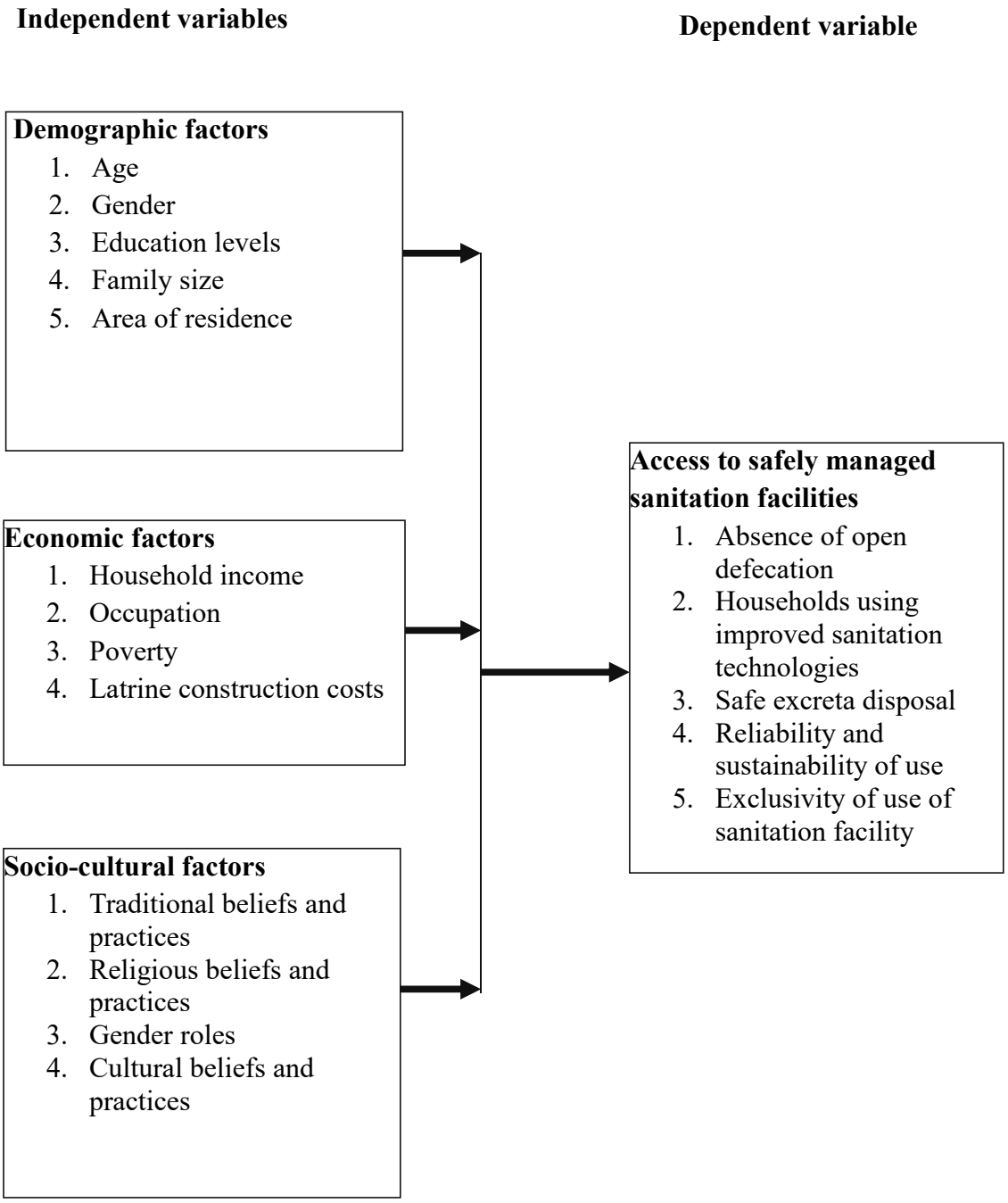
These studies collectively demonstrate the effectiveness of Bronfenbrenner's Social-Ecological Model in analyzing the multi-level variables influencing health and sanitation practices. The current study will be able to capture the intricate relationships between demographic characteristics, sociocultural norms, economic circumstances, institutional support, and larger environmental or policy contexts that affect access to safely managed sanitation by applying SEM to the Saku Sub-County context. By adopting the SEM, the paper aims to provide a comprehensive understanding of the multi-dimensional influences on access to safely managed sanitation facilities in pastoral communities, thereby informing policy interventions and advocacy efforts to improve sanitation outcomes.

2.6 Conceptual Framework

Figure 2.1 shows the conceptual framework for the study which illustrates the link between independent and dependent variables. The independent variables are demographic factors, economic factors and socio-cultural factors, while dependent variable is access to safely managed sanitation facilities. The demographic factors studied included: age, gender, education levels, family size, and area of residence. Economic factors studied included: household income, occupation, poverty and latrine construction cost while the factors categorized as socio-cultural included: gender roles, awareness, traditions, safety in latrines and cultural beliefs. Safely managed sanitation was gauged based on toilets or latrines types,

the practice of open defecation and availability of toilets in the households. The framework was essential for an objective discussion of findings.

Figure 2. 1



Conceptual framework

Source: Researcher (2024)

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter presents the research design, population, sample and sampling procedures, research instruments, data collection methods, and data analysis techniques. The section also explains the ethical considerations for the research conducted in Saku Sub-County.

3.1 Research Design

A cross-sectional descriptive research design was employed for this study. This design allowed for simultaneous measurement of both the outcome, that is: safely managed sanitation, and the associated socio-cultural, demographic, and economic factors (Setia, 2016). The study was conducted between March and April, 2024.

3.2 Study Area

The research was conducted in Saku Sub-County. The area is in Marsabit County, Kenya and is characterised by scarce resources such as water and poor sanitation standards (KNBS, 2019). The most predominant activity for the residents is livestock keeping as they are pastoralists. The area is crucial due its natural resources which make it serve as a key pastoral and agricultural area. The area, located in the Northern part of Kenya, is known for its diverse landscapes such as mountains, highlands and deserts. It also features a mix of ethnicities and cultures and unique geological formations (KNBS, 2019). This location was selected because there is limited information available about the Sub-county's access to safely managed sanitation facilities. Additionally, there is a lack of data on how socio-cultural, demographic, and economic factors influence access to these facilities. Therefore, it

was necessary to investigate the impact of these factors on access to safely managed sanitation facilities in Saku Sub-County.

3.2.1 Justification for the choice of study area

Saku Sub-County has been identified to have significant challenges related to open defecation and sanitation-related diseases (KNBS, 2019) making it a pertinent area for this study. Limited information on socio-cultural, demographic, and economic factors influencing sanitation access in the Sub-County highlights the need for an empirical investigation. Understanding the dynamics of sanitation in Saku Sub-County can contribute to the development of targeted interventions and policies for pastoral communities.

3.3 Target Population

The study targeted household heads from the households in Saku Sub-County. Household heads were selected because they comprehensively understood their families and would give reliable information as expected in the study. The Sub County's households as per KNBS (2019) Census data were sampled to yield the information required in the study. A household was defined as individuals who shared a common dwelling place and were under a common authority.

3.4 Inclusion and Exclusion Criteria

The study included Household heads aged 18 years and above and willing to participate. Household heads who had resided in the area of study for 6 months and above were also targeted. People aged below 18 years and those unwilling to participate in the survey were excluded. The study did not also engage household heads who had stayed in the area for less than 6 months. The main reason for the age consideration was due to ethical issues where participation in studies for people aged below 18 years in Kenya is prohibited. People who

had resided in the area for the mentioned period of time were thought to have a better understanding of the area's characteristics and sanitation-related issues as expected in the study.

3.5 Sample Size Determination and Sampling Techniques

It was necessary to calculate a representative sample from the entire population. The sample was determined using Yamane's (1967) formula at a margin of error of 0.1. The 0.1 (10%) margin of error was chosen as it is acceptable in social science research involving dispersed populations, allowing for a manageable sample size while still ensuring reliable and representative findings. Adam (2021) and Ali et al. (2021) argued on sufficiency of a margin of error of up to 1% which was considered appropriate in this study.

$$n = \frac{N}{1+N(e)^2} \quad (3.1)$$

Where:

n = desired sample size

N = total population size (no. of households in Saku Sub-County according to KNBS, 2019)

e= margin of error (10% for this study)

$$n = \frac{13559}{1 + 13559 \times 0.1^2}$$

n= 100 participants (household heads)

Stratified sampling technique was used in choosing the areas of study from Saku Sub-County. To select study participants who were household heads, Saku Sub-County was divided into its three constituent wards: Central, Sagante, and Karare. The Wards formed strata and households were picked from each stratum. A proportionate-to-size simple random sampling technique was employed to select household heads from each ward. The sample size for each ward was determined by calculating the proportion of households in

that ward relative to the total number of households in the sub-county, and then multiplying this proportion by the desired sample size. Distribution of samples per cluster is shown in the Table 3.1.

Sample calculation per stratum = $\frac{\text{Number (No) of households per ward}}{\text{Total no. of households in Saku Sub-County}} \times 100$ (3.2)

Table 3. 1

Sample distribution

Strata	No. of Households	Sample Size
Central ward	11294	83
Karare ward	899	7
Sagante ward	1366	10
Total	13559	100

Source: KNBS, (2019)

The predominance of pastoralism and agriculture as primary economic activities is common in semi-arid regions like Saku Sub- County.

3.6 Data Collection

Data was collected at the household level using semi-structured questionnaires. The questionnaires consisted of open and closed ended questions and gathered data on demographic, economic, social-cultural factors and management or status of sanitation facilities. Assessing respondents' characteristics in relation to age, family size, gender, education level, presence of children in the households and area of residence would unveil how such factors determined access to safe sanitation in the area. Similarly, the relationship between economic factors based on income for households, occupation of the household head, the cost for constructing latrines and poverty and socio-cultural factors particularly on

roles of males and females, traditions and cultural beliefs, safety in latrines and awareness was examined.

3.6.1 Pilot testing

A pilot study was conducted in Laisamis ward, Laisamis Sub-County, due to its similarities to the study area. The area selected for pilot study had pastoral communities and others who practiced agriculture. A pilot sample size of 10 household heads was selected for representation following Mugenda and Mugenda's (2003) assertations that 10% of the intended sample size is enough for pilot studies. The aim of the study was to ascertain reliability of the research instrument. Reliability of data collection instruments is essential to ensure that what the study intents to measure is accurately measured.

The sociocultural and demographic features of Laisamis, which closely resemble those of the larger pastoral settlements in Saku Sub-County, made it justifiable to conduct the pilot test there. This provided a representative setting for improving research tools. Laisamis is a suitable location to evaluate the study instruments' validity, clarity, and reliability because it is primarily home to pastoralists who deal with similar sanitation challenges brought on by gender roles, cultural norms, mobility patterns, and financial limitations. Additionally, the region's accessibility and manageable population size made it easier to design and coordinate the pilot's logistics, guaranteeing prompt input for modifications prior to the primary data collection. Thus, the insight acquired offered an invaluable foundation for improving the efficacy of the research design while reducing the possibility of flaws and biases throughout the actual research.

3.6.2 Validity and reliability test

The analysis of the pilot study results revealed that economic factors, which contained one attitudinal item on the influence of economic status on sanitation adoption, recorded a Cronbach's Alpha of 0.72, indicating acceptable reliability. Socio-cultural Factors, which comprised 30 attitudinal items, posted an Alpha of 0.89, reflecting high internal consistency and confirming that the items coherently measured socio-cultural influences on sanitation. The Safely Managed Sanitation Facilities, which contained four attitudinal items, yielded a Cronbach's Alpha of 0.81, denoting good reliability. The reliability test resulted to a Cronbach's Alpha value of 0.87 surpassing the recommended threshold of 0.70 (Nunnally, 1978). These findings confirmed that the questionnaire was a reliable tool for assessing determinants of access to safely managed sanitation in the study area. Only minor modifications to item wording were necessary to enhance clarity before administration in the main survey. Reliability test results from the pilot study

Table 3. 2

Reliability test results from the pilot study

Construct	Number of items	Cronbach's alpha	Interpretation
Economic factors	1*	0.72	Acceptable
Socio-cultural factors	30	0.89	Highly Reliable
Safely managed sanitation	4	0.81	Good
Overall instrument	35	0.87	Highly Reliable

Source: (Researcher, 2024)

3.7 Data Analysis and Presentation

Data was analysed in descriptive statistics study in frequencies, percentage, mean and standard deviation. Descriptive analysis provides a clear and concise summary of the data, allowing for easy interpretation and understanding of key trends and patterns. It helped in providing a snapshot of the current situation regarding access to safely managed sanitation facilities and the influence of socio-cultural, demographic, and economic factors. The results were presented in tables.

To understand the relationship between social cultural, demographic and economic factors and safely managed sanitation facilities, inferential analysis was done using multivariate regression analysis. The regression analysis quantified the extent to which social cultural, demographic, and economic factors influenced access to safely managed sanitation facilities. By estimating the regression coefficients, the study was aiming at identifying the factors which had a statistically significant influence on access to safely managed sanitation facilities. The information could inform policymakers and stakeholders about the key determinants of sanitation access in the study area and guide the development of targeted interventions and policies to improve sanitation outcomes.

3.8 Ethical Considerations

An introduction letter from the Chairman of the Department of Civil and Environmental Engineering at Meru University of Science and Technology facilitated the acquisition of a research permit and authorization from the National Commission for Science, Technology, and Innovation (NACOSTI). Prior to data collection, permission was sought from County health managers and individual participants, who were assured of strict confidentiality.

Safeguarding participant privacy and adhering to ethical research standards were paramount throughout the study.

The data collected was stored in coded form without individual identifiers, with access limited to the principal investigator. This approach helped mitigate the risk of unauthorized disclosure or misuse of sensitive information. Participants' informed consent was obtained, and codes were used instead of respondents' real names. Participation in the study was voluntary. Research assistants and researchers were assured of the confidentiality of the information provided in the questionnaires, which were kept in a locked cupboard with limited access.

To ensure accurate data collection, participants who did not speak English were accompanied by trusted interpreters. These interpreters were briefed on the study's objectives and instructed to provide clear explanations in the participants' preferred language. Additionally, a robust password protection system was implemented for the database to maintain data security.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents the findings of the study conducted in Saku Sub-County, Marsabit County, Kenya, which aimed to examine the influence of socio-cultural, demographic, and economic factors on access to safely managed sanitation facilities. The results are organized and discussed under thematic and sub-thematic sections corresponding to the study objectives. The thematic areas include demographic characteristics of respondents, socio-cultural factors, economic factors, and demographic factors related to safely managed sanitation facilities.

Both descriptive and inferential statistical analyses were performed on the collected data. Descriptive statistics were used to summarize demographic, economic, and socio-cultural characteristics of the study population. Inferential statistics were employed to examine the relationships between independent variables (socio-cultural, demographic, and economic factors) and the dependent variable (access to safely managed sanitation facilities). This section also reports the response rate for the household-level surveys conducted in the study area.

4.1 Response Rate

The number of instruments distributed against the number returned was analysed and the results were as shown in Table 4.1.

Table 4. 1

Response rate

Ward	Questionnaires distributed	Questionnaires returned	Return rate
Central	83	83	100%
Karare	7	7	100%
Sagante	10	10	100%
Total	**100**	**100**	**100%**

Source: Researcher, (2024)

All the research instruments distributed in the households within the three clusters were are fully filled which translated to a total response rate of 100%. The findings showed that the questionnaires which were expected from all the areas were returned as expected. To maximize response rates, data collection was closely supervised by the researcher and research assistants. Questionnaires were administered directly to households, with assistance provided as needed to ensure understanding. For participants unable to complete questionnaires immediately, follow-up visits were conducted to retrieve and collect completed surveys. The cooperation accorded by the respondents to the researchers made the data collection exercise a success.

4.2 Demographic Characteristics of Respondents and Access to Safely Managed Sanitation Facilities

Respondent characteristics, including gender, age, household size, number of school-going children, education level, and place of residence, were analyzed to determine their potential influence on access to safe sanitation facilities within Saku Sub-County.

4.2.1 Participants' gender

The study aimed at establishing how gender related to the influence of safely managed sanitation facilities in pastoral communities in Saku sub-county. The results were as presented in table 4.2.

Table 4. 2

Gender of participants

Gender	Frequency	Percentage (%)
Female	49	49
Male	51	51
Total	100	100

Source: Researcher, (2024)

The majority (51%) of respondents were males, typically the household heads and primary decision-makers for sanitation matters. However, women constituted 49% of respondents, indicating that some households had female heads at the time of survey. The presence of female respondents suggests their potential role in sanitation decision-making, given their presence at households most times. A study by Agbadi et al. (2019) in Ghana found that female-headed households were more likely to adopt safe sanitation facilities. Similarly, research by Armah et al. (2018) showed that women, due to their direct involvement in household chores, including water and sanitation matters, might pay more attention to sanitation issues than male heads. However, while women, especially those who do not work, may desire to have safe toilets, their ability to adopt one may be limited. Convincing the able men or husbands of the importance of adopting a good toilet could be challenging (Cherunya et al., 2020).

4.2.2 Age of participants

The study further aimed to determine how the age of the respondents related to the influence of safely managed sanitation facilities among households in Saku Sub-County. Respondents were asked to state their ages, and the results are presented in Table 4.3.

Table 4. 3

Age Distribution of respondents

Age	Frequency	Percentage (%)
Less than 20	7	7
21 – 35 years	32	32
36 – 50 years	24	24
Over 50	37	37
Total	100	100

Source: Researcher, (2024)

Residents aged over 50 years were 37% while other participants' ages ranged between 21-35years (32%), 36-50 years (24%) and 7% were less than 20 years. The findings suggested that majority of the participants were within the economically stable age (Akpakli et al., 2018) thus could afford better sanitation facilities. An analysis on age versus the type of toilets constructed at the households showed that people aged 36-50 and those aged 50 years constructed more improved toilets, considered safe according to WHO/UNICEF (2022) such as ventilated improved toilets and flush toilets.

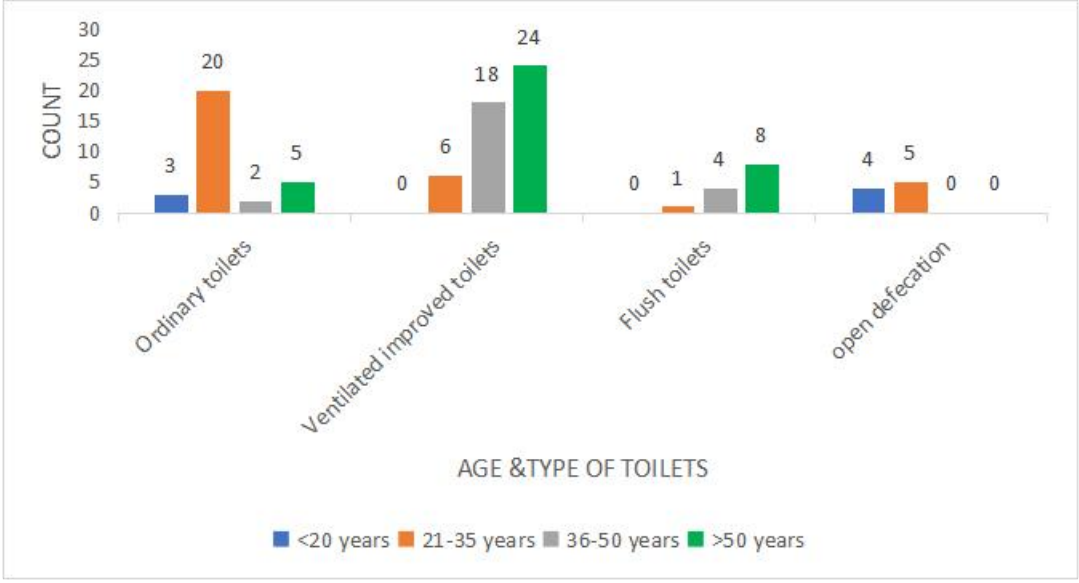
These results align with the study by Routray et al. (2017) in India, who found that older household heads were more likely to invest in improved sanitation due to their socio-economic stability and decision-making authority. Similarly, Girma et al. (2020) reported that age positively influenced access to sanitation services in Ethiopia, particularly among households led by mature adults who prioritized hygiene for family health. Conversely,

Ayalew et al. (2018) in Ethiopia found no significant relationship between age and sanitation access, suggesting that other factors, such as income and education, play a more decisive role. Collectively, these findings suggest that while age may influence SMS adoption in Saku Sub-County, its effect may be context-dependent and interlinked with other demographic and socio-economic determinants.

Results from an analysis of age versus type of toilets shown in Figure 4.1 show that participants aged 21-35 years and 20 years mostly adopted unimproved forms of toilets such as ordinary pit latrines and cases of open defecation were common in their households compared to residents aged more than them.

Figure 4. 1

Age versus type of toilets



Source: Researcher, (2024)

Open defecation cases for the younger households could be associated with the fact the households had young children who had a tendency of defecating and leaving the faecal matter in the open. Older household heads could embrace proper sanitation facilities because

of increased awareness on health risks from poor sanitation. In addition, older individuals might have more experience, resources, or priority for sanitation improvements.

Akpakli et al. (2018) have associated old age with increased chances of owning safe sanitation facilities due to their more stable financial status compared to the households headed by young adults. A similar study in Sub-Saharan African Countries by Armah et al. (2018) also established a significant relationship between age of household head and adoption of improved toilets. From the study, it can be concluded that older people were likely to prioritize investment in improved toilet structures due to their higher income levels and concern on the importance of safe sanitation compared to the young people whose less concern limited their willingness to invest in better sanitation facilities. The findings suggested the essence of age-based targeted interventions that can bridge any possible age-related disparity in sanitation.

These findings are consistent with Alemu et al. (2023), who reported that older household heads in Ethiopia were more likely to adopt improved sanitation facilities due to increased awareness and resource mobilization. Similarly, Abubakar (2019), in his analysis of Nigerian households, found that younger families were disproportionately dependent on unimproved sanitation and water sources, linking this trend to limited resources and competing priorities among younger household heads. On the other hand, Angoua et al. (2018) observed that age was not a significant determinant of sanitation access in peri-urban Abidjan; rather, settlement characteristics and socioeconomic status played a greater role. Taken together, these studies highlight that while age often correlates with better sanitation practices, the influence of contextual factors such as income levels, settlement type, and household composition may moderate this relationship.

4.2.3 Size of the household

Participants were requested to indicate the number of members in their households and the findings were as shown in Table 4.4. The aim was to establish how the number of people living in the household related to adoption of safely managed sanitation facilities at the household level.

Table 4. 4

Distribution of responses according to household size

Household size	Frequency	Percentage (%)
Less than 2	6	6
2 – 5	55	55
6 – 10	31	31
Over 10	8	8
Total	100	100

Source: Researcher, (2024)

The results showed that most (55%) of the households had 2 to 5 members followed by 31% of the households which had 6-10 household members. Households with over 10 and less than 2 members were only 8% and 6% respectively. Having fewer members for most of the households implied that such households were unlikely to incur frequent costs associated with exhaustion of toilets which quickly fill up due to overutilization. It cannot also be ignored that a whopping number of households had many members which implied that frequent emptying of toilets could be required as fill up rates are directly proportional to the number of household members. Frequent re-construction of household toilets could be expensive especially for the poor households which could attract unsafe practices such as use of unemptied toilets characterised by nuisances such as faecal matter and urine on the floors, flies or maggots which according to (Busienei et al., 2019) discourage use and open

defecation practices. Larger families may strain available resources, making it harder to allocate sufficient funds for sanitation improvements.

These findings are consistent with Girmay et al. (2022), who discovered that family size had a substantial impact on sanitation outcomes in Ethiopia. Because of the burden on available facilities, larger households had a harder time maintaining basic sanitation services. Similarly, Abubakar (2019) found that overcrowding was associated with poor sanitation practices and a greater reliance on unimproved choices, indicating that household size was a significant predictor of sanitation practices in Nigeria. However, in their research on peri-urban Abidjan, Angoua et al. (2018) found that socioeconomic level and settlement characteristics had a greater impact on sanitation access than household size, which was not a statistically significant predictor. This disparity emphasizes the significance of contextual elements and implies that, although household size may have an impact on Saku Sub-County's adoption of sanitation, this influence is entwined with other factors including income, settlement type, and cultural customs. The claims are in line with research by Donacho et al. (2022), which showed that access to sanitation in Ethiopia was adversely affected by bigger family numbers.

4.2.4 Presence of school going children living in the household

Respondents were asked to provide information on the number of school-going children in their households. The aim was to determine whether the presence of children attending school influenced access to safely managed sanitation in the area. The results are presented in Table 4.5.

Table 4. 5

Distribution of responses on number of school going children

Children	Frequency	Percentage (%)
Less than 2	31	31
2 – 5	60	60
6 – 10	9	9
Total	100	100

Source: Researcher, (2024)

Results from table 4.5 indicate that all the households surveyed had school going children with a variation in number where many (60%) had 2-5 children in school, 31% had less than 2 school going children and 9% of the households had 6-10 children who were attending schools. School attendance has been associated with the need to cater for children's expenses for instance on food, books, travel and school fees which could be expensive for the low-income families.

Having many children in school undoubtedly directly related to increased expenditure on children's school needs and necessities. When catering for the needs of children in school, a lot of finances is used and could leave little or no money for investment in improved sanitation options which could explain why access to safe sanitation facilities in the study area was low. Although going to school could boost children's knowledge on hygiene and the need for safe sanitation, children had no financial capacity to improve sanitation standards for their households as they were dependants in the households.

These findings resonate with Chase and Ngure (2016), who observed that household financial constraints in rural Kenya often forced families to prioritize immediate needs such as education and food over sanitation improvements, thereby perpetuating reliance on unimproved facilities. A similar study in Kenya by Busienei et al. (2019) showed that

competing priorities in households could influence the choice of poor sanitation facilities at the households. Similarly, Tumwebaze and Mosler (2015) noted that in Uganda, competing household priorities, particularly those linked to child-rearing and schooling, were significant barriers to latrine improvement and maintenance. In contrast, Garn et al. (2017) argue that school-going children can act as positive change agents, transferring hygiene knowledge and practices acquired at school to the household, which in some cases improved sanitation adoption and maintenance. This suggests a dual influence: while schooling imposes financial burdens that may limit sanitation investment, it also provides an avenue for sanitation-related behaviour change through children's exposure to school-based WASH programs.

4.2.5 Participants' level of education

To assess the relationship between education level and access to safely managed sanitation facilities, respondents were asked to specify their highest educational attainment. The results are presented in Table 4.6.

Table 4. 6

Responses according to level of education

Level of education	Frequency	Percentage (%)
No formal education	42	42
Primary	36	36
Secondary	10	10
Post-secondary	12	12
Total	100	100.00

Source: Researcher, (2024)

Table 4.6 reveals that the majority of respondents (42%) lacked formal education, while 36% completed primary education. A smaller proportion attained secondary (10%) or post-

secondary (12%) education. These findings suggest a correlation between higher education levels and increased likelihood of owning sanitation facilities, potentially due to higher earning potential among more educated individuals. This observation aligns with Akter et al.'s (2022) research, which linked higher education levels to improved sanitation access in Bangladesh. Despite education in Kenya being significantly subsidized at some levels, such as primary education, the presence of participants who had not attended school could be attributed to cultural practices that restricted people, especially women, from receiving an education (Warkineh & Gizaw, 2020).

4.2.6 Regression analysis on the influence of demographic factors on safely managed sanitation facilities

A multivariable regression analysis shown in Appendix B was conducted to examine the relationship between indicators of demographic factors and access to safely managed sanitation. For engagement in open defecation despite having toilets, the model, has an R-squared value of 0.0398 and an F-statistic of 0.6421 ($p = 0.6963$), indicating that none of the predictors were significant. The model for inadequate toilet facilities (R-squared = 0.1692, F-statistic = 3.1574, $p = 0.0073$) shows age ($\beta = -0.1648$, $p = 0.044$) and area of residence ($\beta = -0.5021$, $p = 0.014$) as significant predictors, with younger individuals and those in specific areas reporting more inadequate facilities. The model for the absence of toilets (R-squared = 0.0971, F-statistic = 1.6663, $p = 0.1380$) identifies the area of residence ($\beta = -0.3977$, $p = 0.025$) as a significant predictor, highlighting certain areas' higher propensity for lacking toilets. For improved toilets, the model (R-squared = 0.0961, F-statistic = 1.6480, $p = 0.1427$) indicates gender ($\beta = 0.2479$, $p = 0.019$) as a significant predictor, with men more likely to report improved conditions. Lastly, the model for the type of toilet (R-squared =

0.1396, F-statistic = 2.5150, p = 0.0267) shows gender (β = -0.4691, p = 0.050) and area of residence (β = -0.8066, p = 0.010) as significant predictors, with females and certain areas more likely to use particular types of toilets. Therefore, area of residence consistently influenced the aspects of access to safely managed facilities, with gender and age also emerging as significant predictors in some models.

The multivariable regression study sheds light on how demographic characteristics affect Saku Sub-County residents' access to safely managed sanitation (SMS) facilities. The results demonstrate that while several predictors stood out as crucial, not all demographic factors strongly influenced sanitation outcomes. In particular, age and place of residence had a substantial impact on the chance of reporting poor sanitation facilities, with younger people and residents of particular areas being more likely to experience these issues. Spatial differences in sanitation access throughout the Sub-County were further highlighted by the strong predictor of toilet absence by households. Another factor was gender; women were more frequently linked to particular toilet types, but males were more likely to report better facilities, suggesting that socio-cultural dynamics and household roles influence sanitation choices and use.

Bronfenbrenner's Social-Ecological Model (SEM) (1979), which places human behavior and consequences within nested environmental systems, could potentially be used to analyze these findings. Household characteristics like age and gender roles have a direct impact on sanitation practices at the microsystem level. While women's sanitation use reflects culturally embedded behaviors, younger households might not prioritize or have the resources for better toilets. Adoption of sanitation is further influenced at the mesosystem level by interactions between family and community circumstances, such as attendance at

school or social standards. The role of area of residence, where access is impacted by differences in infrastructure and services between rural and peri-urban populations, is a clear example of the ecosystem level. Lastly, disparities in sanitation use are sustained at the macrosystem level by gendered expectations and wider cultural norms. By applying SEM, it becomes clear that demographic predictors are not isolated but function within a multi-layered socio-ecological environment.

These results are consistent with those of Alemu et al. (2023), who found that age and place of residency had a substantial impact on sanitation access in Ethiopia, indicating regional disparities and generational differences in the uptake of better facilities. Abubakar (2019), who discovered that rural households in Nigeria disproportionately rely on unimproved water and sanitation alternatives compared to their urban counterparts, finds resonance in the geographical discrepancies seen in Saku. The gendered aspect of sanitation, however, is supported by Wasonga et al. (2016), who showed how traditional roles and expectations in Kenya gave men and women distinct obligations related to sanitation, which affected adoption and use. When combined, these findings highlight the complexity of demographic factors on sanitation and indicate that, in order to effectively improve access to SMS facilities in Saku Sub-County, interventions need to be context-specific as well as cognizant of gender and spatial disparities.

4.3 Influence of Social Cultural Factors on Access to Safely Managed Sanitation Facilities

Social and traditional cultural practices, deeply rooted in generational values and beliefs, are prevalent in all societies. While some of these practices contribute positively to community well-being, others, particularly those affecting women, can be harmful. This disparity

highlights the complex nature of cultural dynamics (UNICEF/WHO, 2022). This study sought to establish how socio-cultural factors influenced access to safe sanitation facilities in Saku Sub-County.

4.3.1 Gender roles/practices and access to safely managed sanitation

The study examined how issues of gender affected access to safely managed sanitation in Saku Sub-County. The aspects tested were on use of latrines and gender roles as shown in Table 4.7.

Table 4. 7

Gender roles and practices relating to safe sanitation

Prompt	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Mean (SD)
Females use latrines exclusively for long calls	72(72%)	18(18%)	2(2%)	1(1%)	7(7%)	100(100%)	1.99(0.81)
Males use latrines exclusively for long calls defecation	2 (2%)	5(5%)	19(19%)	32(32%)	42(42%)	100(100%)	3.73(1.08)
Female roles influence the prevalence of open defecation	31(31%)	19(19%)	16(16%)	10(10%)	24(24)	100(100%)	2.43(0.58)
Males roles influence the prevalence of open defecation	13 (13)	18(18)	8(8)	28(28)	33(33)	100(100%)	3.63(1.57)

Segregation of toilets by gender influences their utilization	22(22)	6(6)	8(8)	24(24)	40(40)	100(100%)	4.02(0.62)

Source: Researcher, (2024)

Findings showed that 72% of the respondents strongly disagreed and 18% disagreed that females used latrines exclusively for long call. The mean score for the responses on the prompt was 1.99, Standard deviation=0.81, which suggested a general disagreement to the statement. Regarding males exclusive use of latrines for long call, majority of the responses lied in the positive category as shown by 42% of the respondents who strongly agreed and 32% who agreed with the statement. The mean of 3.73 (Standard deviation=1.08) confirmed that response on the question was a general agreement. The findings suggested that most women did not only use latrines for long call urges, but also for short calls.

However, for most men, latrines were exclusively used for long calls. The use of latrines for both long or short calls for women showed that they mostly practiced safe excreta disposal (both urine and faecal matter) unlike men who could have had other options such as urinating in urinals or in the open. Improper disposal of human waste, whether urine or faecal matter denoted unsafe sanitation practices for men as it contaminated the environment. Such practices could attract human waste-related pathogens capable of causing infections. Women could have had no other safe alternative for urinating other than in toilets since they are mostly conscious of their safety. A similar study in India indicated that women neither liked urinating nor defecating in the open as such could expose them to safety issues unlike men who were not concerned about safety of sanitation facilities.

On the statements regarding gender roles, a mean of 2.43 (standard deviation=0.58) and 3.63 (standard deviation=1.57) showed a general disagreement and a general agreement on contribution of female roles and male roles on sanitation practices like open defecation respectively. The results suggested that roles by women rarely attracted open defecation however, for men, they did. Although the mean for the statement on female roles showed a negative stand, it cannot be ignored that slightly more than one quarter of the participants (24% strongly agreeing and 10% agreeing) supported the statement which showed that some women performed roles which attracted the practice of open defecation. As reported in the open-ended bit of the questionnaire, female roles such as having to fetch water in deserted places and their roles of looking after children who mostly had a tendency of defecating in the open contributed to open defecation cases. For men, roles like herding in open fields and bushed where there were no sanitation facilities facilitated open defecation. Similar findings on the influence of gender roles on open defecation practices were reported in a study by Barasa and Waldman (2022) in Tanzania.

Concerning separation of toilets and utilization by gender, a mean of 4.02 (standard deviation=0.62) showed that toilet utilization was likely to be higher when the available toilets were separated by gender. Studies have confirmed that separation of toilets by gender improves safety for users and reduces chances of embarrassment while using toilets (Greed, 2019). Knowing that one would get embarrassment from the opposite gender while using toilets could make them avoid the toilets for other options including open defection (Busienei et al., 2019) which denote unsafe ways of managing human faecal matter.

Table 4.8 summarizes findings obtained from statements given to respondents in a 5-point scale to indicate their degree of agreement or disagreement with the statements.

Table 4. 8

Decision-making on sanitation matters at the household level

Prompt	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Mean (SD)
Females are the decision makers on sanitation matters	43(43%)	33(33%)	10(10%)	11(11%)	3(3%)	100(100%)	2.54(1.51)
Males are the decision makers on sanitation matters	22(22)	6(6)	8(8)	24(24)	40(40)	100(100%)	4.02(0.52)

Source: Researcher, (2024)

The mean of responses of 2.54 (standard deviation=1.51) on females as decision makers and of 4.02 (standard deviation=0.52) on males as decision makers implied that males were mostly the primary decision-makers on matters of toilets construction at the household level and that women had limited participation on deciding on sanitation matters for their households. Dominance of men as sanitation decision makers has been associated with increased likelihood of having household toilets which fait to address the needs of women (Burt et al., 2016). When user-friendly toilets are not provided at the households, residents whose needs are not met in such facilities can be tempted to defecate in open spaces or to dispose of other human waste such as sanitary towels in the open which could contaminate the environment. The findings suggested the need for equal involvement of both women and men in household sanitation matters to ensure inclusivity of toilets and to improve the type of toilets adopted at the household level.

4.3.2 Safety of latrines for use

Latrine safety is key to ensure that the facilities do not pose anxiety of fear to users and affect safe sanitation. This study sought to find out whether the distance of toilets away from households affected access to safely managed sanitation in the area. Participants' views on utilization of latrines located in secluded places away from households at night were examined using a five-point Likert scale. The findings were as shown in Table 4.9.

Table 4. 9

Latrines situated in secluded areas are mostly unused at night

	Frequency	**Percent**
Strongly disagree	5	5
Disagree	15	15
Neutral	8	8
Agree	36	36
Strongly agree	36	36
Total	**100**	**100**

Mean=3.97 (SD=0.97)

Source: Researcher (2024)

Majority of the participants' stand was on the positive response (36% showing strongly agree and other 36% indicating agree) (mean=3.97, Standard deviation=0.97). Location of latrines far from households affected latrine use especially at night and could have resulted in unsafe sanitation status due to poor practices of urinating and defecating around the compound. The reasons raised by participants which were associated with unsafely managed sanitation and touched on construction of household toilets a significant distance from households were that toilet pits were deemed as traps for livestock by herdsmen. Studies by Gayawan et al. (2023) in Nigeria and Busienei et al. (2019) in Kenya have confirmed that

location of toilets far away from households risk safety of toilet users especially women, which was a factor associated with open defecation practices, a poor way of excreta disposal. These indicate that the location of latrines away from households significantly affected their use, particularly during night hours. This contributed to unsafely managed sanitation, as some household members resorted to urinating or defecating around the compound instead of using the distant facility. Qualitative insights revealed that households often constructed toilets some distance away to minimize risks to livestock, as herdsmen perceived pits as potential traps for animals.

In a similar vein, Routray et al. (2015) found that women frequently avoided latrine facilities located distance from homesteads at night due to cultural beliefs and safety concerns in rural Odisha, India. In Guwahati, India, Jewitt et al. (2018) further confirmed that irregular usage of sanitary facilities was caused by seasonal flooding and inadequately situated toilets. Toilet distance is a key factor in determining the adoption of safe sanitation, according to this research findings.

However, Jenkins and Curtis (2005) found that convenience and social status were more powerful motivators for adoption than distance as a barrier to latrine use in rural Benin. Similarly, in their study on urban sanitation in Kampala, Uganda, Tumwebaze et al. (2014) found that safety concerns did not significantly alter usage patterns, especially among men, even if some latrines were situated far from homes. These conflicting viewpoints imply that the position of latrines may have a highly context-specific impact on safe sanitation practices, influenced by gender roles, cultural norms, and settlement patterns.

4.3.3 Sanitation-related beliefs and taboos and access to safely managed sanitation

The study sought to investigate whether there existed customs surrounding sanitation in the study area. In a five-point Likert scale which ranged from 1-strongly disagree, 2 disagree, 3 neutral, 4 agree and 5 strongly agree, participants were requested to rate their extent of agreement to a statement on customary practices. The results were as presented in the Table 4.10.

Table 4. 10

Distribution of responses on open defecation is a customary practice

Response category	Frequency	Percent
Strongly Agree	24	24.00
Agree	26	26.00
Neutral	17	17.00
Disagree	24	24.00
Strongly disagree	9	9.00
Total	**100**	**100**

Mean=3.56, SD=1.33

Source: Researcher, (2024)

The results from Table 4.10 revealed the distribution of responses regarding the practice of open defecation as a customary practice in the locality. The data indicates that a considerable portion of the respondents, 50% (with 24% strongly agreeing and 26% agreeing), believed that open defecation was indeed a customary practice. The customary practices of having 'Morans' or warriors spent their time in bushes were among the factors reported to encourage open defecation, thus unsafe sanitation status in the area. However, 24% of the respondents disagreed, and 9% strongly disagreed with this statement, while 17% were neutral. The significant split in opinion highlights that while open defecation was perceived as customary by a large segment of the population, there was also a notable portion that either disagreed or remained indifferent. This suggests a complex social dynamic and points

to the need for targeted interventions and educational campaigns to address and possibly change this practice in the community. This aligns with the findings from Girmay et al. (2022), who noted that cultural and social norms significantly influenced sanitation practices in Ethiopia . Addressing these socio-cultural barriers through community education and engagement is essential for improving sanitation access in Saku Sub-County.

These results are in line with those of Wasonga et al. (2016), who found that traditions in Nyakach, Kenya, greatly influenced sanitation behaviors, such as taboos around the use of latrines with children and in-laws, which encouraged open defecation. Similarly, Busienei et al. (2019) in Lodwar, Kenya, discovered that cultural variables played a significant role in the maintenance of open defecation, including the association of this practice with honor, brides' dignity, and nomadic lives. Routray et al. (2015) also revealed in rural Odisha, India, that rituals and daily routines profoundly embedded in social and cultural systems were impediments to latrine adoption, underlining the relevance of culture in sanitation results.

Some research, on the other hand, dispute these conclusions by downplaying the significance of culture and focusing instead on impediments related to infrastructure and the economy. In rural Benin, for instance, Jenkins and Curtis (2005) contended that households use latrines mostly for convenience and social prestige, and that open defecation was primarily linked to a lack of affordable sanitation choices rather than customs. Similar findings were made by Tumwebaze et al. (2014), who studied sanitation in Kampala, Uganda, and found that although there were cultural norms, practical limitations like cost, space, and upkeep had a greater impact on sanitation behavior than customs. Jewitt et al. (2018) demonstrated that cultural factors might not be sufficient to account for sanitation

disparities by highlighting environmental and infrastructure issues, such as flooding and subpar building, as major causes of open defecation.

4.3.4 Traditions and access to safely managed sanitation

Respondents were asked to indicate whether there were traditions in the area which discouraged individuals from constructing toilets. The responses were as summarized in Table 4.11.

Table 4. 11

Certain traditions in this area discourage individuals from constructing toilets

Response category	Frequency	Percent
Strongly Agree	27	27.00
Agree	23	23.00
Neutral	17	17.00
Disagree	20	20.00
Strongly disagree	13	13.00
Total	**100**	**100**

Source: Researcher, (2024)

The data as shown in Table 4.11 revealed varying opinions regarding whether certain traditions discouraged individuals from constructing toilets. Fifty (50%) of the responses were from participants who either agreed or strongly agreed with the notion. The results indicated that half of the population perceived traditional practices and taboos as significant barrier against toilets construction which was considered among the factors that nurtured unsafe sanitation status in the area. Further probing using the open-ended responses showed that traditionally, the communities in the study area mostly practiced livestock keeping and that open defecation practices was embraced as human faecal matter was seen as ‘fertilizer’ for grass (animal feeds). The findings underscored the need for context-specific

interventions to address sanitation practices within the community. Existence of sanitation-related traditions and taboos was also noted in Ethiopia by Girmay et al. (2022) and in Tanzania by Barasa and Waldman (2022). Addressing these social cultural barriers through community education and engagement could be essential for improving sanitation access in Saku Sub-County.

4.3.5 Toilet usability in relation to hygiene

The contribution of respondents on behaviours when toilets are less maintained was sought. Participants responded on the question regarding presence of urine and faeces on the floor and latrine avoidance. The data shown in Table 4.12 highlight opinions regarding avoidance of toilets with stagnant urine or faeces on the floor

Table 4. 12

Toilets with stagnant urine or faces on the floor are avoided

Response category	Frequency	Percent
Strongly Agree	22	22.00
Agree	23	23.00
Neutral	11	11.00
Disagree	26	26.00
Strongly disagree	18	18.00
Total	100	100

Mean=2.87, SD=1.74

Source: Researcher, (2024)

Around 22% of respondents strongly agreed and 23% agreed that toilets which had urine and faecal matter on the floors were avoided. Conversely, 26% strongly disagreed and 18% disagreed with the opinion and 11% remained neutral on the matter. The findings indicated a mixed perspective on the importance of maintaining clean and hygienic toilet facilities as shown by a mean of 2.87 (standard deviation=1.74) which on average implied neutral

opinions. Thus, some people could avoid toilets with dirty floors in fear of interacting with pathogens haboured by the dirt in the toilet floors. Studies by Temesgen et al. (2021) in Ethiopia and Simiyu et al. (2020) in Kenya have shown a correlation between toilet maintenance status and unsafe sanitation which concurred with the results from this study. The results suggested a need for increased awareness and education on proper maintenance of sanitation facilities to ensure the widespread adoption of hygienic behaviours and to promote safely managed sanitation facilities at the household level.

4.2.6 Regression analysis on the influence of social cultural factors on safely managed sanitation facilities

Access to securely managed sanitation was found to be highly influenced by socio-cultural characteristics, including gender roles, awareness, cultural beliefs, traditions, and safety perceptions, according to the regression analysis. Out of all the models, gender roles were the most reliable predictor (Appendix C). For example, despite the presence of sanitation facilities, open defecation was strongly positively correlated with gender roles (coefficient = 0.359, $p < 0.001$). This implies that persistent gendered norms still have an impact on sanitation behavior, especially in situations when males, kids, or traditional groups like warriors believe using toilets is unnecessary or even against cultural norms. These results are consistent with those of O'Reilly and Louis (2014), who noted that in India, women were disproportionately affected by inadequate sanitation but lacked decision-making authority, which frequently led to ongoing open defecation. According to Hirai et al. (2016), men's cultural norm-driven aversion to purchasing or using toilets in Ghana also contributed to the continuation of unhygienic practices.

Additionally, awareness was crucial, especially when it came to the adoption of better sanitary practices and the lack of proper toilets. However, awareness and the type of toilet used were shown to be negatively correlated (coefficient = -0.203, p = 0.008). This research suggests that although households may recognize the value of better sanitation, information by itself is not enough to influence behavior, particularly in situations where structural, cultural, or economical hurdles still exist. Jenkins and Curtis (2005) brought attention to this phenomenon in Benin, pointing out that cultural and financial barriers caused adoption to lag even in areas with high understanding of the advantages of sanitation. In a similar vein, Tumwebaze and Mosler (2014) made the case from Uganda that in order for information to have a lasting impact on behavior, it must be combined with tactics to change societal norms. Access to sanitation was influenced by cultural customs and beliefs in a varied way. Certain customs may impede adoption, as seen by the negative correlation between cultural beliefs and sanitation outcomes (coefficient = -0.130, p = 0.040). For example, usage may be restricted by taboos surrounding the sharing of restrooms between men and women or in-laws. Similar results were reported by Routray et al. (2015) in rural Odisha, India, where despite the provision of toilets, open defecation was encouraged by ingrained taboos and views about cleanliness. On the other hand, the adoption of better sanitary facilities was positively impacted by traditions as well (coefficient = 0.084, p = 0.018). This demonstrates how customs can be used constructively, particularly when upgraded restrooms are reinterpreted as status or purity markers. Abubakar (2017) noted in Nigeria that while cultural practices promoted open defecation in some communities, others viewed modern sanitation as a sign of prestige, thereby encouraging adoption.

The study also found that the type of toilet used was strongly predicted by feelings of safety (coefficient = 0.232, p = 0.016). Safety issues including the possibility of harassment, snakebite, or structural collapse were given top priority by households, particularly for women and children. This result is in line with that of Kwiringira et al. (2014), who discovered that women frequently avoided nighttime latrines in Kampala's informal settlements out of concern for their safety and instead used unsanitary alternatives like buckets or plastic bags. Winter and Barchi (2016) also highlighted how women's sanitation decisions were heavily influenced by privacy and safety concerns in sub-Saharan Africa, highlighting the fact that access is not just about availability but also about perceptions of security and dignity.

In summary, the statistical significance of the regression models supported the notion that sociocultural determinants play a major role in access to sanitation. These findings highlight the fact that sanitation is closely related to social structures, cultural values, and gendered dynamics and is not only an infrastructural issue. Particularly noteworthy is the persistent importance of gender roles in all models, which highlights the need for sanitation interventions that address decision-making disparities, break taboos, and encourage inclusive behaviors in addition to providing facilities. It is evident from research like those by Hirai et al. (2016) and O'Reilly and Louis (2014) that gender-responsive and culturally aware approaches are necessary to achieve properly managed sanitation.

4.4 Influence of Economic Factors on Access to Safely Managed Sanitation Facilities

Economy is one of the crucial factors that influences how a community or an individual have access to good and sanitation practices. The research done also targeted at understanding whether economic factors determined access to safe sanitation facilities in the specific context of the study area.

4.4.1 Household income

The study sought to investigate how household income influences access to safely managed sanitation facilities in Saku sub-county, and the results were presented in the table 4.13.

Table 4. 13

Total household income per month (Ksh)

Salary grid	Frequency	Percentage (%)
Less than 10,000	81	81.00
10,000 – 30,000	18	18.00
30,001 – 50,000	1	1.00
Above 50,000	0	0.00
Total	100	100

Source: Researcher, (2024)

Table 4.13 reveals that the majority (81%) of Saku Sub-County residents earn less than 10,000 Kenyan shillings, with 18% earning between 10,000 and 30,000 Kenyan shillings, and only 1% earning above 30,000 Kenyan shillings. The predominance of low-income earners is likely attributed to the economic vulnerabilities of pastoral communities, whose livelihoods are susceptible to environmental shocks like drought and disease. This economic instability significantly hinders investment in improved sanitation facilities, consequently limiting access to adequate sanitation within the sub-county.

This finding aligns with research by Donacho et al. (2022), which identified monthly income as a significant predictor of sanitation access in Jimma, Ethiopia. Higher income levels generally correlate with greater financial capacity to invest in and maintain sanitation facilities.

This finding is in line with other research showing that one of the best indicators of access to safely managed sanitation is household income or wealth status. Legge et al. (2021), for

example, found that household socioeconomic status, including income and asset ownership, strongly predicted transitions to improved sanitation in a longitudinal cohort study conducted in Kwale County, Kenya. In a similar vein, Njuguna (2024) discovered that open defecation was largely determined by poverty in Kenyan households, with less wealthy families having disproportionately limited access to improved sanitation. These findings are further supported by willingness-to-pay studies conducted in rural Kenya, which demonstrate that household income plays a significant role in determining the adoption of improved sanitation products like SATO and SAFI toilets. Even when low-cost options are available, lower-income households show limited capacity to invest (Mulatya et al., 2021). On a larger scale, regional and international evaluations highlight a steady income-sanitation gradient, where poorer households are disproportionately excluded and wealthier households are more likely to have access to improved sanitation (Hyun et al., 2019).

However, not all research agrees that access to better sanitation is solely determined by affluence. According to Pessoa Colombo et al. (2023), the usage of sanitary facilities in low-income environments was significantly influenced by perceived safety and built environment features, sometimes outweighing the influence of household wealth. Similarly, a local study on sanitation in stunting loci found no statistically significant correlation between family income and access to basic sanitation. This suggests that barriers related to income may be lessened by targeted subsidies, community-based interventions, and non-financial factors like facility design and cultural norms (Irza, 2023). These results suggest that although household wealth plays a significant role in determining access to sanitation in Saku Sub-County, it should be viewed as one of several interrelated determinants influencing sanitation investment and behavior.

4.4.2 Occupation of the household head

The study sought to investigate how occupation of the household head influenced access to safely managed sanitation facilities in Saku sub-county, and the results were as presented in the table 4.14.

Table 4. 14

Occupation of the household head

Employment status	Frequency	Percentage (%)
Salaried employee	14	14.00
Casual labourer	23	23.00
Self-employed	33	33.00
No work at all	30	30.00
Total	100	100

Source: Researcher, (2024)

Results from Table 4.14 show that 33% of the respondents were self-employed, followed by 30% who were unemployed, 23% who were casual laborers, and 14% who were salaried employees. The occupation of the household head is a crucial factor that influences access to safely managed sanitation facilities in pastoral communities (Barasa & Waldman, 2022). Occupation affects income levels and the prioritization of resources, which directly impact access to quality sanitation facilities. In Saku, household heads with alternative sources of income other than livestock may have a steadier income, allowing them to allocate resources to better sanitation facilities.

Earlier research produced similar results. In their research on urban poor communities in Uganda, Tumwebaze et al. (2014) found that the type of occupation had an impact on sanitation behavior, with households with informal or casual jobs being less able to afford private latrines and more dependent on shared or unimproved facilities. According to Akter et al. (2022), homes in Bangladesh and Pakistan with people in steady jobs, including skilled

labor or salaried employment, were much more likely to embrace and uphold improved sanitation than those with jobless or informal workers. Similarly, Alemu et al. (2017) found that family heads' occupational stability was positively correlated with their adoption and continued usage of improved sanitation in an Ethiopian study, indicating that consistent cash flows improve access and affordability. According to Abubakar's (2017) research on sanitation access in Nigeria, households headed by self-employed or casual workers were less likely to build better sanitation facilities because of their inconsistent income and unstable economic circumstances. On the other hand, there was a strong correlation between better sanitation results with salaried employment.

However, some research warns against focusing too much on occupation as the only factor. In a multi-country investigation, Jenkins and Scott (2007) contended that although occupational income is important, cultural norms, prestige perceptions, and community-wide behaviors can occasionally influence sanitation decisions more than economic status alone. In pastoral settings like Saku Sub-County, this implies that the relationship between occupation and sanitation may be exacerbated by structural elements like mobility, customs, and public perceptions regarding open defecation.

Further prompts were made on the income status of the household head’s spouse to understand whether it related with access to safely managed sanitation facilities. The findings were as summarized in Table 4.15.

Table 4. 15

Occupation of the house hold head spouse

Spouse employment status	Frequency	Percentage (%)
Salaried employee	1	1.00
Casual labourer	9	9.00
Self-employed	21	21.00
No work at all	69	69.00
Total	100	100

Source: Researcher, (2024)

The results from Table 4.15 showed that most spouses did not work (69%) while others were self-employed at 21%, casual labourers at 9% and salaried being only 1%. Occupation of the spouse of the household head affects household income and prioritization of resources, which contribute to the overall practices and access to good sanitation facilities. Spouses who can supplement the household income make it possible to access better sanitation facilities for the household, compared to those who do not work. The results in Saku sub location, with majority of the spouses unemployed could be due to gender roles, whereby women were left behind to take care of children and perform house chore while the men went away to work. In many cases, the absence of a second income earner intensifies financial vulnerability, particularly in pastoral and low-income contexts where household budgets are already constrained.

This observation is supported by a number of studies. Compared to households that were only dependent on one earner, Arm et al. (2018) discovered that households with both spouses making an economic contribution were more likely to have better sanitary facilities. Similarly, Abubakar (2017) found that in Northern Nigeria, women's involvement in

income-generating activities greatly enhanced the ability of households to make decisions regarding sanitation investment, indicating that spousal occupation directly improves sanitation outcomes and household resilience. The results suggest that having two sources of income made it easier to mobilize resources and less dependent on external support.

This tendency is also consistent with comparative studies from South Asia. Because their revenues were frequently used to improve home welfare, a research conducted in Nepal by Devkota and van Teijlingen (2010) found that households with women involved in small-scale economic activities, such as farming and selling, had improved sanitation coverage. Similarly, studies conducted in India by Jalan and Ravallion (2003) demonstrated that patterns of resource allocation were influenced by the job status of the spouse, with households with economically engaged women investing more on water and sanitation infrastructure.

However, conflicting data indicates that spousal occupation is not always a deciding factor. Tumwebaze and Mosler (2015) contended that the degree to which spousal income resulted in better sanitation results was constrained by cultural views and power disparities in decision-making in Kampala, Uganda's low-income settlements. The direct impact of spousal employment on access to sanitation was reduced in these situations because family heads, who were mostly men, maintained financial authority even when their spouses were employed. This emphasizes how crucial it is to take into account intra-household decision-making and gender dynamics in addition to spousal occupation when attempting to explain sanitation outcomes.

4.4.3 Wealth quantile

Respondents were requested to select the category that described their wealth quarntile as shown in Table 4.16.

Table 4. 16

Wealth quantile

Wealth level	Frequency	Percentage
Poor	24	24.00
Low income	40	40.00
Middle income	29	29.0
High income	7	7.00
Total	**100**	**100**

Source: Researcher, (2024)

Forty percent (40%) of the respondents rated themselves as low-income earners, 29% were middle income earners, the poor were 24% and high-income earners were only 7%. Wealth quintiles divide the population into groups based on their level of wealth, from the poorest to the wealthiest. According to the results in this study, the poor, who were 24%, could often lack resources to invest in improved sanitation facilities while the low-income earners, who were the majority, might have slightly better financial means buts still face significant barriers to good sanitation facilities. The moderate earners had more stable incomes and could afford basic improved sanitation facilities. High income earners would have the best sanitation facilities likely to be safe for use if priorities to other needs would not overshadow the need for provision of improved sanitation facilities. The influence of wealth quantiles on sanitation access was also noted in a study by Busienei et al. (2019) in Kenya.

These results are consistent with those of Chankrajang and Muttarak (2017), who found that household investments in water and sanitation infrastructure are strongly influenced by

socioeconomic inequality, especially wealth disparities. In a similar vein, Munamati et al. (2016) highlighted the income-linked inequities seen in Saku Sub-County by finding that households with higher incomes were more likely to have access to improved sanitation facilities in Sub-Saharan Africa. Similar findings from Sub-Saharan Africa were presented by Abubakar (2017), who discovered that poor sanitation coverage is largely determined by low wealth status, particularly in rural and semi-arid areas.

However, a research by Lantagne et al. (2021) found that sociocultural norms and behavioral patterns, which restricted latrine adoption regardless of financial capabilities, occasionally prevented even households in higher wealth quintiles from having access to improved sanitation. This implies that although affluence is a significant driver, sanitation outcomes are also influenced by other contextual factors as cultural preferences, education, and policy enforcement.

4.4.4 Average latrine construction costs

The study sought to investigate how latrine costs influenced access to safely managed sanitation facilities in Saku Sub- County as summarized in Table 4.17.

Table 4. 17

Average latrine construction cost in Ksh

Cost range	Frequency	Percentage (%)
10,000 – 20,000	2	2.00
20,000 – 30,000	22	22.00
30,000 – 40,000	67	67.00
More than 40,000	9	9.00
Total	100	100

Source: Researcher, (2024)

Findings shown in Table 4.17 show that 22% of respondents reported a construction cost ranging from KShs.20,000 to 30,000 and only 2% reported costs between KShs.10,000 and 20,000 while 67% of participants indicated costs exceeding 30,000 Ksh, with 9% reporting costs above KShs. 40,000. The average cost of constructing a latrine could depend on various factors such as type of latrine, materials used, labour costs and geographic conditions (Barasa & Waldman, 2022). By considering the local conditions and leveraging community resources, it could be possible to optimize the cost and improve access to good sanitation facilities. A similar study by Kanda et al. (2021) also associated latrine construction costs with adoption of low standard toilet structures which did not meet the criteria for safe sanitation facilities.

4.4.5 Regression analysis on the influence of economic factors on safely managed sanitation facilities

The analysis shown in Appendix D examined the influence of economic factors on various aspects of safely managed toilet facilities, including engagement in open defecation despite having toilets, inadequate toilet facilities, absence of toilets, improved toilets, and type of toilet. The economic factors considered in the model included household income, occupation of the head of household, occupation of the spouse, wealth quantile, and average latrine cost. The model for engagement in open defecation despite having toilets (R-squared: 0.2051, F-statistic: 4.8520, $p = 0.0005$) identified occupation of the spouse ($\beta = 0.8158$, $p < 0.001$) as a significant predictor, with higher engagement linked to the spouse's occupation. For inadequate toilet facilities (R-squared: 0.1466, F-statistic: 3.2305, $p = 0.0098$), both the occupation of the spouse ($\beta = 0.2528$, $p = 0.026$) and wealth quantile ($\beta = -0.2885$, $p = 0.009$) were significant, with higher wealth quantiles associated with fewer reports of inadequacy.

The absence of toilets (R-squared: 0.1771, F-statistic: 4.0457, $p = 0.0023$) was significantly influenced by house income ($\beta = 0.3501$, $p = 0.038$), wealth quantile ($\beta = -0.2520$, $p = 0.006$), and average latrine cost ($\beta = 0.1356$, $p = 0.044$), indicating that higher income and latrine costs correlated with more reports of toilet absence, while higher wealth quantiles correlated with fewer reports. Improved toilets (R-squared: 0.1268, F-statistic: 2.7292, $p = 0.0239$) were significantly predicted by wealth quantile ($\beta = -0.2166$, $p = 0.003$), with higher wealth quantiles linked to fewer reports of improved sanitation facilities. Occupation of the spouse and wealth quantile consistently emerged as significant predictors across multiple models.

The regression models show how Saku Sub-County's sanitation results are influenced by a variety of socioeconomic factors. The discovery that the spouse's work was a significant predictor of open defecation even in the presence of toilets ($\beta = 0.8158$, $p < 0.001$) highlights how household labor dynamics and financial diversity affect sanitation behaviors. This is consistent with research by Coffey et al. (2017), which found that latrine adoption and use in rural India are influenced by household decision-making roles, namely the economic contribution of women. Similar to this, a study conducted in Nigeria by Abubakar (2017) showed that spousal work status affected sanitation practices by influencing household priorities and financial stability.

Regarding limited facilities, the substantial impact of the spouse's occupation and wealth quantile indicates that the adequacy of sanitation infrastructure is influenced by both income-generating ability and total household wealth. This is corroborated by Jenkins and Scott (2007), who discovered that wealth levels and affordability restrictions played a

significant role in determining the existence of latrines as well as their sustainability and sustainability.

The fact that the absence of toilets is substantially correlated with household income, wealth quantile, and average latrine cost demonstrates the dual nature of income: while higher income may make it possible to build toilets, the results also imply that higher latrine costs and conflicting priorities may, ironically, lead to an increase in absence scenarios. This is consistent with research by Bartram and Cairncross (2010), who pointed out that even for comparatively affluent households in low-resource environments, the high cost of sanitary facilities frequently continues to be a barrier.

It is interesting to note that, in contrast to popular belief, the model on upgraded toilets showed that lower reports of improved sanitation facilities were associated with greater wealth quantiles. Even while this seems contradictory, it might be a reflection of issues unique to the region, like conflicting goals, cultural beliefs, or the need to use old sanitary techniques in spite of having more money. Similar anomalies were noted by O'Reilly et al. (2017) in rural Tamil Nadu, India, where ingrained sociocultural norms occasionally prevented wealthier households from prioritizing sanitation improvement. This paradox emphasizes that, although important, financial status is not the only factor that determines improved sanitation outcomes.

CHAPTER FIVE: CONCLUSION, RECOMMENDATIONS AND PUBLICATION

5.0 Introduction

This chapter summarizes the study findings based on the themes of demographic, socio-cultural, and economic factors, and their impact on access to safely managed sanitation facilities. The section also includes conclusions drawn from the study findings, recommendations, and considerations for publication.

5.1 Summary of Findings

The first objective of this study sought to establish how demographic factors influenced access to safely managed sanitation facilities, the results from the study show how within demographic factors in Saku sub-county influenced access to safe sanitation facilities. The gender distribution revealed that 51% were males and 49% were females, suggesting shared responsibilities related to sanitation. Age distribution showed that 37% were over 50 years, indicating older individuals' involvement in sanitation matters. Most households (55%) comprised 2-5 people, highlighting the influence of household size on sanitation management. Households with 2-5 school-going children (60%) were the majority, suggesting different sanitation needs compared to those with fewer children. Education levels indicated that 42% had no formal education, which could limit awareness and knowledge about sanitation. Additionally, 81% of respondents resided in rural areas, reflecting the rural nature of Saku sub-county and potential challenges in accessing sanitation facilities. Multivariate regression analysis identified significant predictors for access to sanitation facilities: for inadequate toilet facilities, age ($\beta = -0.1648$, $p = 0.044$) and area of residence ($\beta = -0.5021$, $p = 0.014$) were significant, with younger individuals and those in certain areas reporting more inadequacies. For the absence of toilets, area of

residence (β = -0.3977, p = 0.025) was significant, highlighting certain areas' higher propensity for lacking toilets. For improved toilets, gender (β = 0.2479, p = 0.019) was significant, with men more likely to report improved conditions. For the type of toilet, gender (β = -0.4691, p = 0.050) and area of residence (β = -0.8066, p = 0.010) were significant, indicating that females and residents of certain areas were more likely to use specific types of toilets. Overall, area of residence consistently influenced access to safely managed sanitation facilities, with gender and age also being significant predictors in some models, underscoring the importance of considering demographic factors when addressing sanitation challenges in pastoral communities.

The second objective examined how social cultural practices influenced the use of sanitation facilities in Saku sub-county, revealing significant insights. Issues related to open urination, particularly by men, contributed to unsafe human waste disposal practices in the area, leading to unsafe sanitation conditions. The remote location of toilets from households contributed to toilet avoidance due to safety concerns, consequently promoting unsafe practices like open defecation. Cultural norms, such as those associated with 'morans' or warriors, coupled with the perception of toilets as livestock hazards and open defecation as beneficial for pasture growth, influenced the community's sanitation behaviors. Additionally, the lack of gender-segregated toilets exacerbated safety and privacy concerns, particularly for women, discouraging toilet use. Predominance of men as main decision makers could have facilitated the choices of open defecation thus unsafe sanitation due to their possibility of ignoring the special needs of women. Further, access to toilets with low hygiene status was associated with avoidance for alternative options like open defecation. These findings

emphasize the need for socially and culturally sensitive interventions and educational programs to improve sanitation practices in Saku Sub-County.

The third objective aimed at determining how economic factors influenced access to safely managed sanitation facilities. The majority of households earn less than 10,000 Ksh per month, with only a small fraction earning above 30,000 Ksh. Employment distribution shows that most household heads are self-employed or unemployed, while the majority of their spouses do not work. Wealth distribution indicates that 40% of the population falls into the low-income category, with only 7% in the high-income bracket. Latrine construction costs are predominantly above KSh.30,000, posing a financial barrier for many. Multivariate analysis highlights the occupation of the spouse and wealth quantile as significant predictors across various sanitation outcomes. Higher household income and latrine costs correlate with an increased absence of toilets, while higher wealth quantiles generally correspond to improved sanitation facilities. These findings underscore the critical impact of economic status on sanitation access and the need for targeted interventions to address these disparities.

5.2 Conclusion

The study concluded that access to safely managed sanitation facilities in Saku Sub-County was low due to the influence of demographic, socio-cultural, and economic factors. Regarding the first objective, which assessed demographic factors, it was concluded that age, level of education, and household size influenced access to safely managed sanitation in the region. The study's findings emphasized the importance of considering demographic factors when addressing sanitation challenges within pastoral communities.

Findings from objective two suggested that traditions, gender roles, beliefs, safety of toilets as well as hygiene status were key in determining access to safe sanitation. Thus, the

importance of inclusive decision-making processes on household sanitation matters that consider diverse perspectives and challenge traditional gender roles in sanitation management cannot be overemphasized. Addressing sanitation challenges in Saku Sub-County could require a cultural-centric approach, but with an aspect of demystification of beliefs and cultures which negatively impact sanitation in the area.

Based on the findings on economic factors, it was concluded that investment in safe sanitation facilities was affected by inadequate money for improvement of sanitation facilities. There is need for sanitation-marketing on subsidized but improved infrastructure options to cover the low-income residents and to boost their capacity to afford safe toilets for use in their households.

5.3 Recommendations

The results of this study highlight the necessity of culturally sensitive and context-specific interventions to improve pastoral communities' access to properly managed sanitation in Saku Sub-County. First, impediments originating from gender dynamics, sociocultural norms, and economic limitations should be addressed through customized behavior change initiatives. Active stakeholder involvement and prior demographic surveys are crucial for predicting obstacles and guaranteeing the sustainability, ownership, and uptake of sanitation solutions.

Secondly, targeted health education and community involvement programs should be strengthened by the Ministry of Health through Public and Community Health Promoters. These initiatives must challenge gendered power dynamics and cultural norms that impede the construction and usage of toilets, especially for women, while progressively promoting

inclusive decision-making. The social and health advantages of better sanitation should be emphasized, encouraging a change in mindset while honoring cultural beliefs.

Finally, particularly in distant pastoralist contexts, policy interventions should guarantee that services are inexpensive, safe, and accessible while giving gender equity first priority in sanitation decision-making. Adoption of healthy habits may be accelerated by awareness campaigns emphasizing the value of sanitary facilities. Simultaneously, it is important to encourage community-based strategies, headed by development officers and locally skilled latrine builders, to spread information about affordable, secure, and long-lasting toilet designs, especially for low-income households.

5.3.1 Suggestions for further research

More research is needed to examine the impact of sociocultural factors on sanitation practices in various contexts in Kenya and beyond, given the study's constrained scope and timing. To capture differences among regions with distinct socio-cultural dynamics, future research should use comparative and longitudinal approaches. Furthermore, studies should look into how multi-level governance and policy frameworks help stakeholders participate in the delivery of community services like water and sanitation. Developing comprehensive, egalitarian, and sustainable sanitation strategies would require such knowledge.

5.4 Publication

Chichia, M. L., Kirimi, L. M., Mberia, J. K., & Eliud, G. K. (2026). Demographic and social-cultural dynamics on access to safe sanitation in pastoral communities: a case of Saku Sub-County, Marsabit, Kenya. *African Journal of Science, Technology and Social Sciences*, *4*(2), SS 156–165. https://doi.org/10.58506/ajstss.v4i2.256

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APPENDICES

Appendix A. Questionnaire

The questionnaire has been designed to collect data on the influence of Social cultural, demographic and Economic Factors on Access to Safely Managed Sanitation Facilities in Saku Sub-County, Marsabit County, Kenya. Participation in this study is on voluntary basis. If you agree to take part in this study, please proceed to answer the questions that follow.

Instructions: Kindly mark the appropriate box or provide your response as applicable

SECTION A : DEMOGRAPHICS

1. Location

   Community/village ……..

2. Gender of the respondent

Female [ ] Male [ ]

3. Age of respondent

Less than 20 years [ ] 21 to 35 years [ ] 36 to 50 years [ ] Over 50 years [ ]

4. Level of education

No formal education [ ] Primary [ ] Secondary [ ] Post-secondary level [ ]

5. Religion

Muslim [ ] Hindu [ ] Christianity [ ] Any other (Specify.....…

6. Household size

Less than 2 members [ ] between 2 to 5 members [ ] between 6 to 10 members [ ] Over 10 members [ ]

7. Number of school going children

Less than 2 members [ ] between 2 to 5 members [ ] between 6 to 10 members [ ] Over 10 members [ ]

8. Area of residence of the household

Rural [ ] Urban [ ]

9. Geopolitical zone/ward

……..

10. Ethnicity

……..

11. Have acccess to electricity

No [ ] Yes [ ]

12. Marital status of the head

Single [ ] Married [ ] Divorced [ ] Widowed [ ]

SECTION B: ECONOMIC FACTORS

1. Total household income per month (Kshs)

   Less than 10000 [ ] 10000 – 30000 [ ] 30001 -50000 [ ] Above 50000

2. House type

Privately owned permanent house [ ] privately owned temporary house [ ] Relative house [ ] Rental house [ ]

3. Occupation of household head

   Salaried employee [ ] Casual labourer [ ] Self-employed [ ] No work at all [ ]

4. Occupation of household head's spouse

   Salaried employee [ ] Casual labourer [ ] Self-employed [ ] No work at all [ ]

5. Wealth quantile

   Poor [ ] Low-income [ ] Middle-income [ ] High-income [ ] Rich [ ]

6. Average latrine construction costs (Kshs) ……...

7. Please select the most appropriate response for the statement below:

   Economic status of residents affect adoption of safely managed sanitation facilities

   Strongly agree [ ] Agree [ ] Neutral Disagree [ ] Strongly disagree [ ]

SECTION C: SOCIO-CULTURAL FACTORS

To what extent do you agree with the following statements?

	Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
1.	Males use latrines exclusively for long calls (defecation)					
2.	Females use latrines exclusively for long calls (defecation)					
3.	Young children refrain from using toilets for defecation					
4.	Latrines situated in secluded areas are mostly unused at night					
5.	Latrines located in secluded places are generally unused during the day					
6.	Open defecation is a customary practice in this locality					
7.	Household members resort to open defecation when a functional toilet is					

	unavailable					
8.	Males practice open defecation while away from home tending to livestock					
9.	Women practice open defecation while away from home fetching water or firewood					
10	Male roles influence the prevalence of open defecation					
11	Female roles influence the prevalence of open defecation					
12	Segregation of toilets by gender influences their utilization					
13	Males are the primary decision-makers on sanitation matters, including toilet construction, in this region					
14	Females are the primary decision-makers on sanitation matters, including toilet construction, in this region					
15	Individuals resort to defecating in bushes when available toilets are malodorous and infested with flies and maggots					
16	Household members refrain from using available latrines					
17	Latrines with openings around the walls are avoided					
18	Toilets with stagnant urine or fences on the floor are avoided					
19	Unroofed toilets are deserted during rainy weather					
20	I opt for relieving myself in bushes when sharing the available toilet with children					
21	Open defecation poses a risk of diseases to children					
22	The dissemination of information through public health campaigns influences the use of toilets					
23	Children's faeces are perceived as less					

	harmful than adult faeces					
24	According to tradition, children's faeces should not be disposed of in pit latrines					
25	Urinating in the open result in Diseases					
26	Diarrhoea is attributed to demons and evil spirits					
27	Pit latrines are thought to harbour evil spirits					
28	Religious leaders discuss sanitation matters in churches and mosques, encouraging people to use toilets					
29	Children's faeces are not considered harmful and can be left in the open as food for dogs					
30	Certain traditions in this area discourage individuals from constructing toilets					

Explain how gender is related to safe sanitation in the area……..

Are there beliefs/traditions in this region that influence safe sanitation? Yes ( ) No ( ).

If yes, state them…….

Please outline/explain other reasons why you think influence access to better sanitation in this area ……..

SECTION D: SAFELY MANAGED SANITATION FACILITIES

1. Water source

Borehole [ ] Buy from vendors [ ] River/canal/spring [ ] Connected to the water supply system [ ] other sources (specify) …….

2. What kind of toilet facility do your household members use?
    a) Flush toilets [ ]
    b) Ordinary (traditional) pit latrines [ ]
    c) Ventilated improved pit latrines (with vent pipe) [ ]

d) Composting toilet [ ] Bucket latrines [ ]
e) No facility, defecation done in the open [ ]

3. To what extent do you agree with the following statements

Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
The availability of toilets within a household promotes their utilization.					
The absence of toilets has an impact on the practice of open defecation in public spaces.					
Inadequate toilet facilities shared among multiple households act as a deterrent to their utilization.					
Individuals engage in open defecation despite the provision of toilets.					

Appendix B. Multivariate Regression on Demographic Factors and Access to Safely Managed Sanitation Facilities

Equation	Obs	Parms	RMSE	"R-sq"	F	P
engaging_i~s	100	7	1.381736	0.0398	.6420675	0.6963
inadequate~s	100	7	.7259807	0.1692	3.157378	0.0073
absenceof_~s	100	7	.6367469	0.0971	1.666255	0.1380
improved_t~s	100	7	.4893707	0.0961	1.648001	0.1427
type_of_to~t	100	7	1.109427	0.1396	2.514982	0.0267
	Coef.	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
engaging_in_od_despite_toilets						
gender	-.1869434	.294143	-0.64	0.527	-.771053	.3971662
age	.1720245	.1535524	1.12	0.265	-.1329003	.4769492
education_level	-.0471834	.1468284	-0.32	0.749	-.3387554	.2443887
househol_size	.180547	.2173261	0.83	0.408	-.2510196	.6121136
number_children	.0854015	.2701087	0.32	0.753	-.450981	.6217839
area_residence	-.1500002	.3795171	-0.40	0.694	-.903646	.6036456
_cons	2.933653	1.068628	2.75	0.007	.8115698	5.055736
Inadequate_toilet_facilities						
gender	.0271279	.1545463	0.18	0.861	-.2797704	.3340261
age	-.1647546	.0806783	-2.04	0.044	-.3249658	-.0045435
education_level	-.0961016	.0771454	-1.25	0.216	-.2492971	.0570939
househol_size	-.0575796	.1141858	-0.50	0.615	-.28433	.1691707
number_children	-.0398592	.1419184	-0.28	0.779	-.321681	.2419626
area_residence	-.5021315	.1994029	-2.52	0.014	-.8981061	-.1061569
_cons	5.530241	.56147	9.85	0.000	4.415273	6.645209
absenceof_toilets |						
gender	.109284	.1355502	0.81	0.422	-.1598919	.3784599
age	.0371103	.0707618	0.52	0.601	-.1034085	.1776291
education_level	-.0440184	.0676631	-0.65	0.517	-.1783839	.0903471
househol_size	-.0853332	.1001507	-0.85	0.396	-.2842125	.1135462
number_children	.026985	.1244745	0.22	0.829	-.2201967	.2741667
area_residence	-.3976544	.1748933	-2.27	0.025	-.7449578	-.0503509
_cons	4.762334	.492457	9.67	0.000	3.784412	5.740256
improved_toilets						
gender	.2478809	.1041769	2.38	0.019	.0410063	.4547556
age	.0331815	.0543838	0.61	0.543	-.074814	.141177

education_level	-.0707221	.0520024	-1.36	0.177	-.1739884	.0325443
househol_size	-.0747456	.0769706	-0.97	0.334	-.2275939	.0781028
number_children	.0405214	.0956647	0.42	0.673	-.1494496	.2304925
area_residence	.0202732	.1344139	0.15	0.880	-.2466463	.2871927
_cons	4.308811	.3784769	11.38	0.000	3.557231	5.060392
type_of_toilet						
gender	-.4691187	.236174	-1.99	0.050	-.9381134	-.000124
age	.1707412	.1232907	1.38	0.169	-.0740897	.4155721
education_level	-.1327544	.1178918	-1.13	0.263	-.3668641	.1013554
househol_size	-.0953536	.174496	-0.55	0.586	-.4418681	.2511609
number_children	.1522804	.2168764	0.70	0.484	-.2783931	.5829539
area_residence	-.8065783	.3047228	-2.65	0.010	-1.411697	-.2014592
_cons	3.024972	.8580252	3.53	0.001	1.321104	4.72884

Source: Researcher, (2024)

Appendix C. Multivariate Regression Analysis on Socio-Cultural Factors and Access to Safely Managed Sanitation Facilities

Equation	Obs	Parms	RMSE	"R-sq."	F	P
engaging_i~s	100	6	1.284529	0.1612	3.613149	0.0049
inadequate~s	100	6	.7146955	0.1862	.301489	0.0014
absenceof_~s	100	6	.6113413	0.1587	.547197	0.0055
improved_t~s	100	6	.470695	0.1548	3.442909	0.0067
type_of_to~t	100	6	1.090831	0.1593	3.561295	0.0054
| Coef. Std. Err. t P>|t| [95% Conf. Interval]						
engaging_in_od_despite_toilets						
gender_roles	.3593646	.0942325	3.81	0.000	.1722637	.5464655
awareness	-.0502576	.0878646	-0.57	0.569	.2247147	.1241996
cultural_beliefs	-.0083413	.1125597	-0.07	0.941	-.2318312	.2151485
traditions	.05694	.0943573	0.60	0.548	-.1304088	.2442887
safety_latrines	.0093096	.1111394	0.08	0.933	-.2113602	.2299795
_cons	2.380655	.5509968	4.32	0.000	1.286638	3.474672
inadequate_toilet_facilities						
gender_roles	.1384722	.0524298	2.64	0.010	.0343717	.2425728
awareness	.127312	.0488867	2.60	0.011	.0302462	.2243778
cultural_beliefs	-.1303558	.0626268	-2.08	0.040	-.2547027	-.0060088
traditions	.0924418	.0524992	1.76	0.082	-.0117967	.1966802
safety_latrines	-.0559028	.0618365	-0.90	0.368	-.1786807	.0668751
_cons	.50681	.3065676	11.44	0.000	2.898113	4.115507
absenceof_toilets |						
gender_roles	.1385703	.0448478	3.09	0.003	.0495241	.2276166
awareness	.0453638	.0418171	1.08	0.281	-.037665	.1283926
cultural_beliefs	-.0511981	.0535701	-0.96	0.342	-.1575629	.0551666
traditions	-.0153966	.0449072	-0.34	0.732	-.1045608	.0737677
safety_latrines	.0872568	.0528942	1.65	0.102	-.0177658	.1922794
_cons	3.668414	.262234	13.99	0.000	3.147742	4.189086
improved_toilets						
gender_roles	.0802309	.03453	2.32	0.022	.0116707	.148791
awareness	.0767222	.0321966	2.38	0.019	.0127951	.1406492
cultural_beliefs	-.0412724	.0412457	-1.00	0.320	-.1231667	.0406219
traditions	.0835972	.0345757	2.42	0.018	.0149462	.1522481

safety_latrines	.0059995	.0407253	0.15	0.883	-.0748614	.0868605
_cons	3.924218	.201904	19.44	0.000	3.523333	4.325104
type_of_toilet						
gender_roles	.0702743	.080023	0.88	0.382	-.0886132	.2291618
awareness	-.2028304	.0746153	-2.72	0.008	-.3509808	-.05468
cultural_beliefs	-.0731057	.0955865	-0.76	0.446	-.262895	.1166836
traditions	.0177533	.080129	0.22	0.825	-.1413447	.1768512
safety_latrines	.2324507	.0943804	2.46	0.016	.0450562	.4198452
_cons	1.577903	.4679107	3.37	0.001	.648855	2.50695

Source: (Researcher, 2024)

Appendix D. Multivariate Analysis on Economic Factors and Access to Safely Managed Sanitation Facilities

Equation	Obs	Parms	RMSE	"R-sq"	F	P
engaging_i~s	100	6	1.250435	0.2051	4.852002	0.0005
inadequate~s	100	6	.7318616	0.1466	3.230489	0.0098
absenceof_~s	100	6	.6046341	0.1771	4.045737	0.0023
improved_t~s	100	6	.4784335	0.1268	2.729178	0.0239
type_of_to~t	100	6	1.13481	0.0901	1.861711	0.1084

	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
engaging_in_od_despite_toilets |						
house_income	.5954246	.3435437	1.73	0.086	-.0866894	1.277539
occupation_head	.1037348	.1444462	0.72	0.474	-.1830665	.390536
occupation_spouse	.8158221	.1906237	4.28	0.000	.4373342	1.19431
wealth_quantile	-.0145976	.184979	-0.08	0.937	-.3818777	.3526825
avg_latrine_cost	-.0022355	.1370861	-0.02	0.987	-.2744231	.2699521
_cons	-.4145785	1.167092	-0.36	0.723	-2.731867	1.90271
inadequate_toilet_facilities |						
house_income	.2327066	.2010711	1.16	0.250	-.1665248	.631938
occupation_head	-.0901573	.0845422	-1.07	0.289	-.2580179	.0777033
occupation_spouse	.2528396	.1115693	2.27	0.026	.0313162	.474363
wealth_quantile	-.2885168	.1082655	-2.66	0.009	-.5034805	-.0735531
avg_latrine_cost	-.0695744	.0802345	-0.87	0.388	-.2288818	.0897331
_cons	4.048749	.6830819	5.93	0.000	2.692474	5.405024

absenceof_toilets						
house_income	.3501235	.1661167	2.11	0.038	.0202948	.6799521
occupation_head	.0348475	.0698453	0.50	0.619	-.103832	.1735271
occupation_spouse	-.0212318	.092174	-0.23	0.818	-.2042454	.1617818
wealth_quantile	-.252016	.0894445	-2.82	0.006	-.4296102	-.0744218
avg_latrine_cost	.1355736	.0662864	2.05	0.044	.0039603	.2671869
_cons	3.943843	.5643343	6.99	0.000	2.823344	5.064342
improved_toilets						
house_income	.2352683	.1314445	1.79	0.077	-.0257178	.4962543
occupation_head	-.0245115	.0552671	-0.44	0.658	-.1342456	.0852225
occupation_spouse	.0486054	.0729352	0.67	0.507	-.0962092	.19342
wealth_quantile	-.2165947	.0707755	-3.06	0.003	-.3571211	-.0760684
avg_latrine_cost	.0043176	.052451	0.08	0.935	-.099825	.1084603
_cons	4.6309	.4465452	10.37	0.000	3.744274	5.517526
type_of_toilet						
house_income	-.0338647	.3117767	-0.11	0.914	-.6529047	.5851752
occupation_head	.1228819	.1310895	0.94	0.351	-.1373993	.3831631
occupation_spouse	-.2313441	.172997	-1.34	0.184	-.5748337	.1121456
wealth_quantile	-.281648	.1678743	-1.68	0.097	-.6149662	.0516703
avg_latrine_cost	.0973598	.1244099	0.78	0.436	-.1496591	.3443786
_cons	2.433296	1.059173	2.30	0.024	.3302841	4.536309

Source: (Researcher, 2024)

Appendix E. Research Permit

MERU UNIVERSITY INSTITUTIONAL RESEARCH & ETHICS REVIEW COMMITTEE (MIRERC)

Email: mirerc@must.ac.ke *Website:* https://research.must.ac.ke/research-ethics/

REF: MU/1/39/28 Vol.3 (038) Date: 23rd November, 2023

TO: Marcus Labaru Chichia

Dear Sir/madam

RE: Influence of Social-Cultural and Economic Factors on Access to Safely Managed Sanitation Facilities in Pastoral Communities in Saku Sub-County, Kenya

This is to inform you that ***MIRERC*** has reviewed and approved your above research proposal. Your application approval number is ***MIRERC035/2023.*** The approval period is ***23rd November, 2023– 22nd November, 2024.***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***MIRERC***.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***MIRERC*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***MIRERC*** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***MIRERC***.

You may also be required to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI), visit: https://research-portal.nacosti.go.ke and also obtain other clearances that your study may require.

Yours sincerely

Prof. Peter Masinde, Ph.D.
Chairperson, MIRERC

MUST IS ISO 9001:2015 and ISO/IEC 27001:2013 CERTIFIED

Appendix F. Journal Article Publication

AFRICAN JOURNAL OF SCIENCE, TECHNOLOGY AND SOCIAL SCIENCES. 4 (2) 2025, SS 156-165 OPEN ACCESS

AFRICAN JOURNAL OF SCIENCE, TECHNOLOGY AND SOCIAL SCIENCES

Journal website: https://journals.must.ac.ke

A publication of Meru University of Science and Technology

Demographic and social-cultural dynamics on access to safe sanitation in pastoral communities: A case of Saku sub-County, Marsabit, Kenya

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ARTICLE INFO

Keywords:
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ABSTRACT

The Sustainable Development Goals (SDGs) agenda 6.2 aim for universal access to safely managed sanitation by 2030 and also emphasizes eradication of open defecation as a way to promote pathogen-free environment. Despite efforts to improve sanitation standards, significant challenges still persist, particularly in developing regions inhabited by pastoral communities and could be linked to unique components in the society. This study investigated the influence of demographic and social-cultural factors on access to safely managed sanitation in pastoral communities of Saku Sub-County, Kenya, where sanitation access is notably low. A cross-sectional descriptive design was employed. Semi-structured questionnaires were used to collect data from a sample of 100 household heads, calculated using Yamane's adjusted formular. The data was analysed using Statistical Package for Social Sciences (SPSS) version 26 in descriptive and inferential statistics. Findings showed that gender roles were significant predictors of toilet adoption at the households (β=0.138, p=0.01). The nature of work for women such as having to look for water and for men like herding in lonely places where there were no toilets attracted open defecation cases. Latrine utilization was minimal at night due to safety concerns among females as indicated by 72% of the respondents. The cultural beliefs held in the region had a negative influence on toilet adoption (β=-0.130, p=0.040) while level of awareness on sanitation-related matters among the residents positively influenced adoption of safe toilets, thus increased access to safe sanitation (β=0.127, p=0.011). Construction of toilets near some households was undermined by the fear that the toilet pits would kill or injure livestock, which seemed to be given the highest priority. Traditions that revolved around restriction of latrine sharing between grown-ups and children attracted cases of open defecation even with access to toilets which suggested a need for toilets separation. The study recommended exploration of different context-appropriate mechanisms for triggering behaviour change to enhance sanitation standards among pastoral communities. An assessment of demographic characteristics, social and cultural practices prior to implementation of sanitation solutions, along with stakeholder involvement, could help in spotting any drawbacks towards ownership, uptake and sustainability of sanitation solutions.

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Appendix G. Plagiarism Report

DrillBit

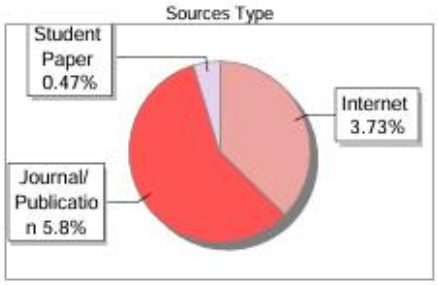
The Report is Generated by DrillBit Plagiarism Detection Software

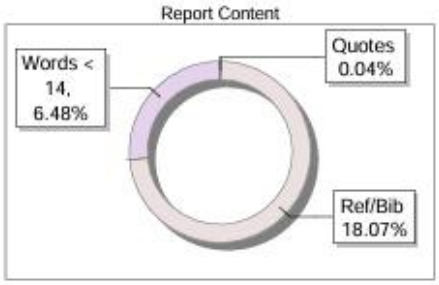
Submission Information

Author Name	MARCUS LABARU CHICHIA
Title	INFLUENCE OF SOCIAL-CULTURAL, DEMOGRAPHIC AND ECONOMIC FACTORS ON ACCESS TO SAFELY MANAGED SANITATION FACILITIES IN PASTORAL COMMUNITIES IN SAKU SUB-COUNTY, KENYA
Paper/Submission ID	3457763
Submitted by	mmusungu@must.ac.ke
Submission Date	2025-04-02 15:59:51
Total Pages, Total Words	94, 20804
Document type	Thesis

Result Information

Similarity **10 %**





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