INFLUENCE OF SOCIAL CULTURAL FACTORS AND LATRINE STATUS ON ADOPTION OF SANITATION PRACTICES IN RURAL AREAS

A CASE OF NZAUI SUB-COUNTY, MAKUENI COUNTY, KENYA

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other institution.

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DEDICATION

This work is dedicated to my father, Eliud Muteti and my mother, Emmaculate Wanza.

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OPERATIONAL DEFINITION OF TERMS

Community-Led Total Sanitation- A community-driven behaviour change approach of instilling fear, shame and disgust to trigger communities to understand the negative implications of open defecation.

Household- People living in the same dwelling unit with a common decision maker and may mostly share meals.

Improved sanitation- Having access to facilities that completely prevent human contact with excreta.

Rural areas- Regions that are geographically located away from cities or towns.

Sanitation- Conditions relating to the health of the public especially, as used in this study, on safe disposal of human excreta

Social cultural factors- Distinctive aspects in a society related to intellectual, material, emotional and spiritual characteristics that facilitate adoption of a particular behaviour.

Sanitation ladder- A sanitation monitoring tool used to determine sanitation progress towards the attainment of safe sanitation.

Sanitation practices- Patterns, habits and actions linked to correct utilization of safely managed sanitation infrastructure to enhance public health, improved well-being and environmental quality. **Latrine/Toilet/Sanitation facility**- Terms used to describe a room where people relieve themselves for either short call or long call.

Unimproved sanitation facilities- Toilets or latrines which do not completely prevent human faeces from human contact.

ABBREVIATIONS

ANOVA	Analysis of Variance
CHV	Community Health Volunteer
CLTS	Community-Led Total Sanitation
H/H	Household
KNBS	Kenya National Bureau of Statistics
MAXQDA	MAX Qualitative Data Analysis
MIRERC	Meru University Research Ethics Review Committee
NACOSTI	National Commission for Science, Technology and innovation
PHO	Public Health Officer
SD	Standard Deviation
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
TPB	Theory of Planned Behaviour
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

ABSTRACT

Provision of improved sanitation facilities has been pointed out as one of the common strategies of preventing sanitation-related diseases such as diarrhea. However, despite government efforts of improving sanitation standards, latrines in rural areas of developing countries remain rudimental and people still practice open defecation even with the presence of toilets. Unless factors that influence behaviour change are well comprehended, communities could continue stagnating in the sanitation ladder as a result of unacceptable toilets. The study objectives were: to examine the influence of social factors, cultural factors and latrine status on adoption of sanitation practices in rural areas. The study adopted convergent mixed methods research design where both qualitative and quantitative data was gathered simultaneously. Quantitative data was gathered using structured questionnaires from 100 household heads selected using cluster and proportionate simple random sampling techniques. Qualitative data was collected using an interview guide from a purposively selected focus group consisting of 9 participants. The quantitative data was analyzed using Statistical Package for Social Sciences (SPSS) version 25 which generated descriptive and inferential statistics to unveil the relationship between variables. The findings were organized into themes and presented in narratives. Pretesting of instruments was conducted among 10 participants from Nkomo Location in Meru County to test their validity. A coefficient of 0.72 was arrived at after employing the test-retest technique in determining reliability of instruments. 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 established that 30% of the households practiced open defecation. Knowledge alone did not motivate people to stop open defecation ($r=0.159$, $p=0.003$) but had a positive relationship with adoption of improved latrines (correlation coefficient, $r=0.099$, $p=0.022$). Engagement of non-skilled masons facilitated construction of unimproved toilets ($r=0.455$, $p=0.001$). Location of toilets far from households had an implication on women safety especially at night. Women roles such as fetching water and collecting firewood, and male roles like rearing livestock in deserted places with no toilets influenced open defecation ($r=0.477$, $p=0.000$). However, existing traditions and beliefs on witchcraft on faeces left in the open created fear of defecating in the open. Inadequate women involvement in sanitation decision-making increased women stresses of accessing unacceptable latrines which were abandoned for open defecation. There existed religions which associated the cause of diarrhea with demons which denoted a form of ignorance on sanitation realities. Results also showed a positive relationship between inadequate latrine maintenance and open defecation ($r=0.175$, $p=0.001$). Lack of privacy in toilets encouraged latrine abandonment ($r=0.242$, $p=0.015$). To boost improved latrine adoption, ownership and use, the study recommends active surveillance and training at the household level coupled with a community-driven system where members come together and assist each other to construct good toilets. Community-Led Total Sanitation practice should incorporate triggering exercises that not only targets open defecation but also enlightens residents on the dangers of adopting unimproved latrines. Further, the study recommends women inclusion in household sanitation matters and a review of sanitation policies to incorporate religious leaders as advocates of sanitation behaviour change. The study also recommends future studies on adoption of sanitation practices alongside environmental, demographic, economic and psychological factors in rural areas.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

The Sustainable Development Goals (SDGs) agenda 6.2 targets a universal achievement of improved sanitation and hygiene and an end of open defecation by 2030 (United Nations, 2015). Provision of adequate sanitation has been pointed out as one of the common strategies of preventing sanitation-related diseases such as diarrhea (Busienei *et al.*, 2019). However, according to Novotný *et al.* (2017), sanitation projects and solutions fail after few years due to acceptability and sustainability issues. Efforts by governments to improve sanitation services have unexpectedly yielded poor outcomes as even where toilets are available, people still practice open defecation (Busienei *et al*., 2019). In rural areas, sanitation is surrounded by social and cultural issues (Wasonga *et al.*, 2016) which should be addressed before providing toilet facilities else such solutions be unacceptable. Provision of latrines alone may thus not be a sustainable sanitation solution unless the population's behaviour changes and positive perception embraced.

Countries may significantly progress up the sanitation ladder when people embrace adoption of safe toilets and have the resources to construct improved sanitation facilities. Reports by WHO/UNICEF (2021) in New Zealand indicated that 76% of the population had safely managed sanitation facilities, 23% had attained basic sanitation services, and only 1% possessed unimproved sanitation facilities. In Europe, 98% of the population had attained improved and basic sanitation by 2020 (WHO/UNICEF, 2021). However, the reports on New Zealand and Europe show sanitation cases of high investment in toilet facilities. The use of improved toilets in developed countries could be attributed to priority to sanitation facilities

(Thakadu *et al.*, 2018) and the scenario could be different in developing countries. Although investment in the sanitation sector could improve health of the population, focusing on certain critical issues that dictate the success of household sanitation solutions is essential to avoid provision of latrines which are not used.

Maximizing access and use of safely managed sanitation facilities reduces the risk of human contact with excreta (Wasonga *et al*., 2016). Contact with excreta from unsafe sanitation facilities could result in diarrheal incidences responsible for 88% of children deaths in Sub-Saharan Africa (Demissie *et al.*, 2021). When sanitation facilities are safe, adequate and are utilized by both rural and urban population, health facilities would receive fewer sick residents. Although the importance of safe sanitation facilities is acknowledged, reports by WHO/UNICEF (2021) show that 3.6 billion people globally access unsafe sanitation facilities where 14% defecate in the open with the majority from developing countries. In developing countries like Kenya, only 33% of the population use latrines which prevent them from contact with excreta and 9% still practice open defecation (WHO/UNICEF, 2021). Approaches of increasing toilet coverage and use depend on interrelated dimensions of the hardware (facility) and behaviour (Novotný *et al*., 2017). Sanitation facilities are likely to be more acceptable when designed on specifications that include privacy-guaranteeing superstructure, proper roofing, self-cleansing floors, adequate ventilation for nuisance elimination, and proper location. It is thus essential that sanitation promotion strategies focus on improvement of latrine construction skills for appropriate designs.

Properly constructed or maintained latrines prevent human exposure to excreta (WHO/UNICEF, 2021) and encourage active utilization. In Kenya, a study by Mwirigi *et al.* (2020) found out that toilet utilization increased with access to functional and well

maintained latrines. Sanitation facilities constructed in developing countries are however at times pathetic and promote multiplication of germs on their surfaces as well as thriving of nuisances such as flies, cockroaches and maggots which could affect use. In Uganda, a study by Ssemugambo *et al.* (2021) that explored latrine characteristics found out that residents abandoned latrines because they were soiled and characterized by odour nuisances. Similarly in Lodwar, a study by Busienei *et al.* (2019) established that 27% of the available latrines were full to capacity and 12% had flooded floors with excreta scattered on the slabs. Unclean sanitation facilities could facilitate various faecal-oral and genito-urinary infections. Unless latrines are well maintained, their presence in the household may not warrant their use.

The presence of toilets and their use is rooted in traditions and beliefs (Stopnitzky, 2017; Wasonga *et al*., 2016). In India, a study by Stopnitzky (2017) established that construction of latrines was mandatory for males' households who wished to acquire a bride, a practice which saw an increase of 21% in toilet adoption and use. Adoption and use of toilet facilities could eliminate exposure of people to sanitation-related infections. Although traditions in India spearheaded latrine construction, the situation in Kenya was different. A study by Wasonga *et al*. (2016) in Kenya found out that latrines were set apart for men and women and that each household was required to have a separate toilet for in-laws since mixing of faeces for in-laws in a single toilet was a taboo. The study established that residents defecated in holes around the households especially at night because separate toilets were not readily available. Improperly disposed human faeces could be breading sites for diarrheal pathogens which are ferried to the rivers during rainy seasons causing water contamination which when consumed could cause water-borne diseases such as dysentery. Although such findings were reported in Kenya, different communities could have different traditions and

beliefs which affect latrine use. The study explored the beliefs and traditions surrounding sanitation practices among communities within the study area.

The role of gender in sanitation programming has been reported to constrain access to suitable sanitation facilities specifically for females (Caruso *et al.*, 2017; Khanna & Das, 2016). While exploring the sanitation practices among 69 participants in India, a study by Caruso *et al*. (2017) found out that when men took charge of toilet construction, toilets were located far from the households such that women feared visiting them. A different study in India by Routray *et al.* (2017) found out that in 80% of the households, power dynamics were limited to one gender. When involvement is skewed in sanitation matters, latrines established may be insecure and unacceptable to the users. In Odisha, a study by Sahoo *et al.* (2015) on sanitation stressors for women established that when men were the primary decision makers, the available toilets were unsafe for use and did not accommodate menstrual hygiene needs. The study showed that women struggled to cross high fences and walls to identify safer defecation sites and alternative solutions to dispose used sanitary materials with less anxiety. Unless gender empowerment is emphasized in sanitation policies, gender-based sanitation inequalities could continue being rampant. Given that gender roles may vary with communities, it was necessary to examine its influence on adoption of sanitation practices in the study area.

Rural sanitation is at times ignored and a lot of emphasis put on urban, peri-urban and informal settlements. The increasing number of children deaths in developing countries as a result of easily preventable diseases like diarrhea warrants urgent attention in rural sanitation where the children mostly live. Existing studies for instance by Businei *et al*. (2019), Crocker *et al*. (2016), Wasonga *et al*. (2016), Ssemugabo *et al*. (2021) and Mwirigi *et al*. (2020)

confirm that social cultural issues and the status of latrine facilities could influence adoption of sanitation practices. However, the studies examined sanitation issues in areas with different social and cultural orientations. Although behavioural issues differ from region to region (Wasonga *et al.,* 2016), there exist insufficient documentation on the influence of social cultural factors and latrine status on adoption of sanitation practices in rural areas which was the focus of this study.

1.2 Problem Statement

The Kenya Vision 2030 stresses on the need for universal improved latrine adoption as a fundamental facet towards eradication of diarrheal infection, poverty and mortalities (United Nations, 2015). However, the types of latrines adopted in developing countries, Kenya included, are sometimes rudimental and residents lag behind in attaining the expected sanitation behaviours. In Kenya, only 33% of the population has achieved improved sanitation and 9% still defecate in the open (WHO/UNICEF, 2021). In Makueni County, despite efforts to improve access to sanitation facilities, 46% of inhabitants possess unimproved latrines and the County consequently loses $6.38 million due to inadequate sanitation (World Bank, 2019). Poor sanitation could result in increased diarrheal morbidities and mortalities.

Approaches instituted by the government to promote improved sanitation such as community-led total sanitation and creation of awareness have not shown complete effectiveness in triggering a sustainable sanitation behaviour change. Although toilets may be provided, some communities continue to defecate in the open. Provision of toilets while ignoring the influence of social cultural factors and latrine status on sanitation practices could result in establishment of unacceptable toilets which are not used, which may continue

keeping communities down the sanitation ladder. This may make them fail to attain the expected sanitation standards.

Rural sanitation is at times ignored and a lot of empirical focus is put on urban, peri-urban and informal settlements (Ssemugabo *et al.,* 2021; Busienei *et al*., 2019; Winter *et al.,* 2019; Adugyamfi, 2018). There exist a literature gap on the influence of social cultural factors and latrine status on adoption of sanitation practices in rural areas. Given that social and cultural issues could differ from community to community, no research of this nature has so far been documented for the study area which was the aim of this study.

1.3 Objectives

The study was guided by the following objectives:

1.3.1 General Objective

To examine the influence of social cultural factors and latrine status on adoption of sanitation practices in rural areas.

1.3.2 Specific Objectives

1. To examine the influence of social factors on adoption of sanitation practices in Nzaui Sub-County, Makueni County.
2. To assess the influence of cultural factors on adoption sanitation practices in Nzaui Sub-County, Makueni County.
3. To examine the influence of latrine status on adoption of sanitation practices in Nzaui Sub-County, Makueni County.

1.4 Research Questions

1. How do social factors influence adoption of sanitation practices in Nzaui Sub-County, Makueni County?

2. What is the influence of cultural factors on adoption sanitation practices in Nzaui Sub-County, Makueni County?
3. How does latrine status influence adoption of sanitation practices in Makueni Sub-County, Makueni County?

1.5 Justification

The Sustainable Development Goal agenda 6.2 expects that Kenya will have attained complete improved sanitation coverage by 2030 (United Nations, 2015). The insights generated in this study will enlighten the government of Kenya on utilization of available resources to focus on suitable sanitation interventions; hence directing them towards attainment of universal access to acceptable and sustainable sanitation. This research will inform the Ministry of Health to improve public health strategies tailored towards reduction of sanitation-related infections. The findings of this study could be of significance to the County Government of Makueni in increasing toilet coverage and use thus lead to reduction of the burden of sanitation-related diseases. Besides, the study will provide insights to community members on adoption of acceptable sanitation facilities at the community level. As well, it will yield extended knowledge useful for future research.

1.6 Assumptions

According to Creswell (2013), assumptions are the elements in a research that are presupposed by the researcher to be true. One of the assumptions for this study was that the population was composed of individuals with varying traits such as age, sex, education level, social and economic statuses. The researcher expected that participants would be willing to take part in the exercise and behave in the manner that they would were they not taking part in the study. Further, it was assumed that the participants targeted in this study would give

candid and honest responses to the given questions to generate the desired information. It was also assumed that the data gathered from the targeted population would provide sufficient insights on behaviour change. The study assumed that the methodology used was appropriate and would ensure attainment of what the study sought to address. The analysis method considered was assumed to be sufficient and useful in unveiling significant relationships on the study population.

1.7 Delimitations

Delimitations refer to the boundaries set by the researcher while conducting research (Simon & Goes, 2013). Delimitations also include variables and factors not to be considered in the research. The study was delimited to Nzaui Sub-County of Makueni County in Kenya. It involved data collection among the Public Health Officers, Community Health Volunteers, masons, a chief, and household heads at the household level thus institutions were exempted.

1.8 Study Limitations

A reliable and honest feedback was essential for this study. Nevertheless, there was no possibility of the researcher to influence the respondents' honesty. Although the questions were written in English, not every participant was in a position to understand questionnaires written in English. As such, the researcher verbally translated the questions into common and universally understandable languages such as Kiswahili and was always available to elaborate the questions in such cases.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter entails an overview of factors relating to the study problem. The researcher presents empirical evidence on the influence of social cultural factors and latrine status on sanitation practices. The chapter shows reviewed literature on the following themes: social issues, cultural factors, and status of latrines on how they influence adoption of sanitation practices. The section also covers theoretical and conceptual frameworks for the study.

2.2 Adoption of Sanitation Practices in Rural Areas

The World Health Organization and UNICEF (2021) recognizes the essence of adopting sanitation facilities which ensure that the population is not exposed to the risks of interacting with excreta (Wasonga *et al*., 2016). According to the United Nations (2015), countries are expected to not just increase toilet coverage but also ensure that toilets adopted in both rural and urban areas are improved. However, latrines availed in rural areas mostly remain unimproved and unacceptable (Busienei *et al*., 2019). A study by Kamara *et al.* (2017) established that Sub-Saharan African Countries have the lowest access to improved latrines. The same study showed that almost 50% of the population in Sub-Saharan Africa access unimproved sanitation options. The use of unimproved toilet facilities could be a major public health challenge due to its ability to facilitate diarrheal diseases like cholera and dysentery. Whilst concerted efforts by governments to fight diarrheal diseases have been shown (Demissie *et al.*, 2021), a better strategy could include capacity building through advocacy and provision of improved latrines.

Latrine provision at the household is a critical step in ensuring proper disposal of human excreta (Mwirigi *et al.*, 2020). However, the relationship between latrine ownership and use still remains questionable as communities may abandon or ignore even the available latrines. In Nepal, a study by Bhatt *et al.* (2019) found out that despite having latrines at households, residents used them as grain stores because it was considered ridiculous to defecate in well-built concrete latrines which could be effective store houses. From the study, construction of latrines in inappropriate places around households was among the reasons for toilets avoidance and continued open defecation. Defecation in the open could expose rural residents to vectors of diarrheal disease transmission and prevent rural communities from attaining improved sanitation standards. In India, although latrines were provided, a study by O'Reilly *et al.* (2017) found out that villagers locked latrines to avoid usage as they felt that continued utilization could facilitate easy pit filling which could attract high emptying costs. The study established that due to locking of latrines, residents defecated in the open places. Unless standard latrines are constructed and in acceptable places around the households, acceptability and use of latrines constructed at the households may not be guaranteed.

The practice of open defecation continues to be a global health challenge which affects 494 million people worldwide (WHO/UNICEF, 2021). A report by Novotný *et al.* (2017) indicated that open defecation is the main cause of diarrhea-related mortalities and morbidities especially among children under the age of five years. Although efforts to increase toilet coverage have been made (Osumanu *et al.*, 2019), there still exist people who practice open defecation even with access to toilets. In majority of the developing countries, cases of open defecation have remained lower except for Sub-Saharan Africa where open defecation cases rose from 204 million in 2015 to 220 million in 2020 (Osumanu *et al.*,

2019). A study by Belay *et al.* (2022) that explored open defecation practices in Sub-Saharan African Countries established a pooled open defecation prevalence of 22.55% in the region. In Kenya, a study by Busienei *et al.* (2019) established that the practice of open defecation peaked up to 72% even after provision of toilets. Although open defecation might seem a cheaper solution, the smell and sight of faeces left near households could reduce the environmental aesthetic quality and could cause embarrassment to residents. It was essential to address the factors that facilitate open defecation.

2.3 Influence of Social Factors on Adoption of Sanitation Practices

Every household should have a toilet block to cater for sanitation needs of household members, failure to which they may adopt poor sanitation practices such as open defecation (Mwirigi *et al*., 2020). In China, a study by Osumanu *et al.* (2019) on 367 households found out that 49.8% of households lacked sanitation facilities. The survey further indicated that the residents who did not have access to latrines defecated in bushes and rivers. Defecation in rivers could result in contamination of drinking water which when consumed by residents could facilitate transmission of diseases such as Cholera. A similar research in Meru by Mwirigi *et al*. (2020) on toilet utilization established that households which had their own latrines were twice likely to defecate in latrines than those who lacked. Studies by Osumanu *et al*. (2019) and Mwirigi *et al*. (2020) showed that people made use of toilet facilities when provided in homesteads. Although latrine presence at the household could eliminate open defecation practices, their structural inequalities such as presence of odour and improper location could produce situations that impede latrine uptake.

Other studies have indicated that owning sanitation facilities does not guarantee their use. A study by O'Reilly *et al.* (2017) in India found out that although 66% of households in the

study area possessed latrines, some people especially women and casual laborers practiced open defecation. Open defecation was preferred because it was more comfortable, pleasuarable and convenient than using toilets and saved time for daily chores. Another study in India by Juran *et al.* (2019) that examined barriers of latrine adoption established that although residents acknowledged the ability of latrines to promote household hygiene, toilets were considered sources of pollution to the environment. The most cited reason for failing to use the available toilets as reported by 50% of the participants was that defecation in the open was a dominant historical norm deemed acceptable by everybody else in the community. Unless the psychology of human behaviour in complex communities is unpacked, provision of toilet facilities alone may not be enough in triggering positive sanitation practices. This research sought to explore toilet adoption and use in rural areas.

Researchers have explored the influence of knowledge and awareness on adoption of sanitation practices. A study by Russpatrick *et al.* (2017) in Zambia engaged 13, 688 to find out whether villagers would progress up the ssanitation ladder through construction and use of improved toilets. The study found out that despite sanitation awareness creation in the community, 50% of the population slipped from adopting improved sanitation facilities to construction of toilets which did not completely prevent human contact with excreta. A similar study by Nkatha *et al.* (2020) in Kenya also established a link between inadequate knowledge on the importance of safe sanitation and reduced latrine utilization as a result of construction of latrines with unsafe pits which could not be easily maintained. Poorly maintained toilets could encourage habitation of diarrheal-causing microorganisms. In Ethiopia, a study by Abebe and Tucho (2020) established that although sensitization was done to the community, 15.9% of households continued with open defecation because the

toilets provided were rudimental and unacceptable. This practice of defecating in the open after sensitization was also identified by Busienei *et al*. (2019) in Lodwar, Kenya. Although sensitization was carried out in Lodwar, 72% of the population was reported to continue with open defecation which continued to facilitate sanitation-related diseases in the community. Given the findings that knowledge alone did not motivate people to change behaviour, for communities to move up the sanitation ladder, they needed to embrace progressive behaviour change efforts with routine surveillance of hygiene and sanitation aspects.

Studies by Abebe and Tucho (2020) in Ethiopia and Busienei *et al*. (2019) in Kenya on sensitization and open defecation show that communities require more than sensitization for them to change behaviour. Legal procedures against open defecation may be effective in preventing cases of open defecation among the population. For legal procedures to be understood and adhered to, sensitization at the household level would be a priority. It was necessary to find out how knowledge influences adoption of sanitation practices in rural areas.

Space is essential for the establishment of sanitation facilities (Abebe & Tucho, 2020). In a meta-analysis by Abebe and Tucho (2020) in Ethiopia, 13% of the reviewed articles reported that households with filled up sanitation facilities slipped back to the practice of open defecation due to inadequate space for toilet reconstruction. However, although spaces around the households were needed for toilet construction, a study by Alhassan and Anyarayor (2018) in India reported that such spaces encouraged open defecation other than construction of sanitation facilities. The study indicated a mean rank of 7.30 of the possibility to practice open defecation in the presence of open spaces . Similar findings were reported in Ghana by Osumanu *et al.* (2019) who found out that 48% of the respondents defecated in

vacant plots due to the presence of large unutilized tracks of land in rural areas. Latrine construction in the presence of open spaces was cited as a waste of resources. In Nepal, a study by Bhat *et al.* (2019) that explored the motivators of open defecation found out that although there were sufficient spaces for construction of toilets around the households, women raised concerns regarding smell from the toilets. The study established that construction of toilets near the households attracted vectors of disease transmission like flies and rats hence a reason for continued open defecation. Failure to construct or use the available toilets in the households could facilitate improper excreta management exposing the population to disease risk and unhealthy environment.

Increased skills for latrine erectors have been associated with increased toilet coverage, proper toilet designs and toilet acceptability (Venkataramanan *et al*., 2018). A randomized trial by Crocker *et al*. (2016) in West Africa that examined the impacts of training latrine constructors established a 19 percent point reduction in the practice of open defecation as toilets were built in proper designs. The latrines constructed had properly fitted ventilation pipes for nuisance (flies and odour) elimination and intact superstructures for user protection during harsh weather. However, the study showed that where there were no training interventions implemented, the latrines constructed were less durable, not easy to maintain and their superstructures did not offer maximum privacy. Access to poorly maintained toilets could encourage the spread of Urinary Tract Infections while the use of toilets with non-privacy guaranteeing superstructures could expose women to the risk of sexual assults when using toilets without privacy. The importance of mason skills was also acknowledged by Crocker *et al*. (2017) who monitored changes in toilet use for 3831 households in Ghana and Ethiopia after masons training. The study found increased latrine acceptability after boosting

mason's skills which led to a sustained decrease of up to 24 percent in open defecation rates due to properly designed sustainable toilets. Studies by Crocker *et al*. (2016) and Crocker *et al*. (2017) showed the significance of technical skills for toilet construction. However, the target for construction of improved toilets could be difficult to achieve without masons' ability to adopt toilet designs that overcome user constraints and acceptability issues.

Sanitation facilities located near households are easily accessible and safe especially for women (Hulland *et al*., 2015). In India, a study by Khanna and Das (2016) found out that women preferred latrines located near their homesteads as they were safe and they saved their time for household duties and the time spent while taking children for defecation far from the dwellings. However, in Odisha, a study by Hulland *et al*. (2015) established that women feared getting raped when using latrines situated far from their homes. The study showed that when toilet facilities were situated far from households, married women in Odisha had special defecation areas such as bushes near their homes. Faeces left in the open could attract cockroaches and houseflies which ferry diarrheal-causing germs into food exposing the population to the risk of developing enteric complications. Although location of toilets far from the households could be plagued with issues of safety, pit latrines located near homesteads could contribute to odor and fly nuisances (Gokçekuş *et al.,* 2020). The nexus between toilet location in the household and issues surrounding threats and fear of acquiring infections still remain underresearched which was the aim of this study.

2.4 Influence of Cultural Factors on Adoption of Sanitation Practices

Various beliefs surrounding utilization of toilets in different communities could encourage negative and restrictive sanitation behaviours. In India, a study by Nagla (2020) that examined the role of culture in facilitating sanitation problems found out that although toilets

were available, people preferred open defecation because it promoted body purity and long life. The study also revealed that men defecated in the open because they believed that latrines were for the sick. Faeces left in the open could be breeding sites for diarrhea-spreading vectors (Novotný *et al*., 2017). In a similar study by Dwipayanti *et al.* (2019) in Indonesia, residents believed that having latrines around the households was a form of impurity and pollution as certain spirits believed to cause illnesses were deemed to reside near homes. These extenuating sanitation-related beliefs were also noted by Osumanu *et al.* (2019) in Ghana where latrines were not used at night because residents believed that witches and evil spirits visited latrines at night and could cause misfortunes. In Kenya, Wasonga *et al.* (2016) found out that latrine sharing among in-laws was a taboo and facilitated open defecation practices among residents who could not afford to construct separate toilets. Although eradication of open defecation may seem easy by simply providing latrine facilities, sustained latrine use could be realized through community empowerment to refrain from unhealthy beliefs and to comprehend the repercussions of poor sanitation. Given that beliefs could differ ffrom community to community, there was need to find out existence of sanitation-related beliefs in the study area.

People from different religious backgrounds hold dearly their religious values (Adugyamfi, 2018) and therefore, insensitivity to the values related to sanitation could interfere with toilet adoption and use. A study by Vyas and Spears (2018) in South Asia that explored religion and sanitation found that Hindus held rituals of purity which discouraged latrine construction near homes as it was perceived as a source of pollution. When toilets were not provided near the homestead, residents defecated in bushes. Similarly, while examining culture and sanitation practices in Indonesia, a research by Dwipayanti *et al.* (2019) showed that latrines

were regarded as contaminants of certain areas around the households deemed as homes of certain spirits and could cause misfortunes. Traditional healers in the same report associated the cause of diarrheal diseases to unseen supernatural beings other than exposure to excreta. However, when people are misled, they may ignore their responsibilities in sanitation.Certainly, incorporation of religious leaders as sanitation change agents could increase toilet adoption and use.

A study by Ahmed and Ahmed (2017) that explored acceptability of toilets among members of different religious backgrounds found that Muslims were reluctant to use dry conservancy systems due to their inability to support water-based purification (anal cleansing). The same study revealed that the Islam doctrine held strict procedures of minimizing interaction with excreta, a reason for their reluctance to use some toilets. Failure to accept and make use of the available toilets may result in inefficient excreta management which facilitates serious public health and environmental consequences. Although religious values are deeply embraced, some could encourage ignorance of sanitation realities and direct people into inefficient means of excreta management. In Ghana, Adugyamfi (2018) found out that cleaning rituals for Muslims emphasized more on body (anal) cleansing and ignored cleanliness of the environment (toilets). Besides, Adugyamfi (2018) highlighted that Christian churches mostly emphasized on members' spiritual needs and ignored the physical (sanitation) needs. Perhaps, prioritizing policies to eliminate improper faecal management could see increased construction and use of toilets across religions. This study sought to examine the religious values related to sanitation in the study area.

The presence of toilets and their use is rooted in traditions and misconceptions (Stopnitzky, 2017; Wasonga *et al*., 2016). Researchers demonstrated various traditions surrounding

sanitation in different communities. In India, Stopnitzky (2017) established that it was obligatory for men who wished to marry to have their own latrines. The fact that men could not acquire a bride without first constructing a household latrine led to 21% increase in adoption of latrine facilities. Similarly, traditions that spearheaded construction of sanitation facilities were identified in Ghana. A survey conducted on 252 participants in Nadwoli in Ghana by Alhassan and Anyarayor (2018) found that owning a sanitation facility was a sign of prestige. Adoption and use of toilet facilities could eliminate exposure of people to sanitation-related infections. Implementers of sanitation projects should support and encourage traditions which promote not only adoption but also use of toilets. Studies in India and Ghana however did not clarify whether residents made use of the availed toilets and that was the concern of this study.

Lived encounters of sanitation inadequacy specifically among females as well as gendered sanitation roles remain unresolved sanitation issues (Caruso *et al.*, 2017; O'Reilly, 2016). While exploring the sanitation practices among 69 participants in Rural Odisha, a study by Caruso *et al*. (2017) found that men had the primary role of constructing toilets while women participated in household chores. When men took charge of toilet construction, the sanitation facilities were situated far from the households such that women feared visiting or taking their children to the latrines. Similar findings were recorded in India by Routray *et al.* (2017) found out that in 80% of the sampled households, decisions to construct household toilets were entirely made by men. The study found out that power dynamics and hierarchies in households constrained women participation in making sanitation-related decisions. When women were not involved in sanitation, the sanitation facilities established were insecure. In Côte d'Ivoire, a study by Angoua *et al.* (2018) highlighted the need for women involvement

in sanitation programing to ensure sustainability of sanitation projects as women were the most affected by inadequate sanitation. This study aimed at confirming the involvement of women in sanitation matters in rural areas.

A study by Sahoo *et al.* (2015) in Odisha that sought to examine sanitation stressors for the female gender established that women struggled to cross high fences and walls to identify tidy places for menstrual management and defecation as they feared contracting genitourinary infections. When sanitation facilities are untidy, women could be forced to seek for alternative sanitation solutions which do not provoke anxiety for them. Unusable and unsafe toilets were also identified in India by O'Reilly (2016) where the toilets provided were filthy, creating unsafe sanitation conditions for women. However, a study by Pandya and Shukla (2018) revealed that, besides women involvement in determination of safer sites for situation of toilets, they also needed to own the responsibility of toilet maintenance to ensure that the sanitation facilities were acceptable and usable. If gender empowerment in sanitation policies could be embraced, gender-based sanitation inequalities would reduce. Given that gender roles may vary from community to community, it was necessary to examine gender roles and sanitation in the study area.

2.5 Influence of Latrine Status on Adoption of Sanitation Practices

Cleanliness and proper maintenance of sanitation facilities prevent accumulation of diarrheal microorganisms on the surface of toilets (Mwirigi *et al*., 2020). However, when toilets are untidy and not effectively maintained, residents are unlikely to comfortably make use of them. A study by Saxton *et al.* (2017) in Bangladesh found that the frequency of using sanitation facilities increased with latrine cleanliness. Although toilets in Bangladesh were provided, residents showed minimal utilization of toilets with poor conditions such as smell.

People who did not use the available toilets in the study area were reported to defecate in the open. When the population defecate in open places, toddlers in their households could consume soil contaminated with pathogens and could easily contract diarrheal infections. Similarly, in Uganda, Ssemugabo *et al*. (2021) assessed the characteristics of toilets adopted in Kampala and found that 63% and 49% of toilets where characterized with flies and offensive odour. The study reported that residents in Kampala did not make use of filthy and smelly toilets. Maybe, construction of toilets with odour and fly nuisance control principles could eliminate bad smell and flies in toilets. This study aimed at exploring the status of toilets with respect to nuisances in the study area.

Latrines constructed in proper designs are easy to maintain and effectively prevents human contact with excreta (Gokçekuş *et al*., 2020). According to Gokçekuş *et al*. (2020), properly designed latrines have a slab-covered pit with a reasonable depth and modifications which eliminate odour, insect nuisances and urine stagnation on the floor. A study by Obeng (2020) in Ghana on the effectiveness of ventilated improved pit latrines found out that the available toilets had poorly designed squat holes such that they promoted easy fouling. Further, the toilets had improperly fitted vent pipes which could not control flies and smell from the latrines as expected. The principles of flies and smell control could be effective if the toilets have the proper designs. In Lodwar, aiming at exploring latrine designs, condition, and structure, Busienei *et al*. (2019) established that 18% of household toilets were unimproved with poorly designed floors and others lacked slabs (Busienei *et al*., 2019). The study revealed that toilets needed proper designs for them to be accepted. Policy formulation on toilet designs could facilitate standardized designs for sanitation facilities. This study sought to examine toilet designs and use in the study area.

Properly constructed sanitation facilities should maintain privacy to promote and enhance dignity to their users (Garn *et al.,* 2017). For a toilet facility to ensure enough privacy, it should have lockable doors, a complete wall with a roof, and a well-sized pit which does not expose contents to users (Gokçekuş *et al*., 2020). Nevertheless, a study by Scorgie *et al.* (2016) in South Africa that explored toilet privacy issues established that some households possessed latrines without doors, others had unlockable doors and wall gaps. Users mentioned that they felt uncomfortable using toilets without doors and with tattered walls as children could peep through the open spaces into the latrines. In Northern Ghana, Nunbogu *et al.* (2019) showed that privacy assurance through construction of good super structures increased toilet use by 43%. However, latrine users in Ghana avoided toilets with no privacy. Toilet users could feel comfortable utilizing toilets facilities that maintain privacy. If standards for latrine superstructures could be clearly stipulated in sanitation policies, privacy concerns in toilets would be minimal. This study targeted at exploring privacy issues in sanitation facilities in Kenyan rural settings.

Sanitation facilities made of strong materials may be significantly durable (Crocker *et al.*, 2017). Although erection of latrines using locally available poor materials like grass or mud could be cheap, the use of weak materials in toilet construction makes them prone to easy collapsing which forces users to frequently construct new toilets (Crocker *et al*., 2017). In India, Doshi *et al.* (2016) established that latrines made of galvanized iron sheets, blocks and ceramic materials were durable yet expensive. Although the Indians adopted long-lasting strong toilets, their cost posed a great challenge on the rural poor population. A comparative study on materials, durability, and cost of latrines adopted in Ghana and Ethiopia by Crocker *et al*. (2017) found that in Ethiopia, residents considered cheap and locally available

materials like sticks, grass and mud as opposed to the expensive materials like cement and timber in Ghana for toilet construction. Even though toilets were availed in Ethiopia, the materials were weak and subject to easy collapsing which made the toilets to be unacceptable as residents abandoned them for the practice of open defecation. Perhaps, consideration of strong locally available materials for toilet construction could result in more durable sanitation facilities even to the poor. This study was designed to explore the materials used in construction of sanitation facilities in the study area.

The collapse and durability of toilets may be related with poor flooring and superstructure materials especially during harsh weather. While finding out the barriers to latrine use in Ethiopia, Alemu *et al*. (2017) demonstrated that the use of materials incapable of resisting harsh weather could contribute to inadequate adoption of toilets. Interviewees implied that heavy rains and hot conditions destroyed toilets made of straws, sacks and grass depriving users of privacy. Similarly, in Kenya, a survey by Busienei *et al*. (2019) on 403 participants in Lodwar pointed out that floods carried away loose toilet flooring materials such as sand and that heavy rains and sunny weathers facilitated rotting of timber used for flooring in toilets. As a result, 20% of residents in the study area avoided using such latrines in fear of falling into the pits. Although construction of sanitation facilities may be done, their ability to withstand harsh weather could be dependent on the type of materials used. If strong materials could be used for toilet construction, the status of sanitation facilities would be acceptable even in harsh weathers. Given that weather and climatic conditions vary from region to region, it was necessary to examine material sustainability in hot and arid areas, which was the focus of this study.

2.6 Theoretical Framework

This research was guided by the Theory of Planned Behaviour (TPB) hypothesized by Ajzen (1991). The theory relates an individual's behaviour with intent. It explains the behaviours over which the person can exercise self-control. The theory postulates that the intentions to engage in a given practice are determined by the attitude that the particular practice is likely to result in a known outcome (Ajzen, 1991). Thus, individuals subjectively evaluate the benefits and risks of the outcome of a behaviour before performing it. Various scientists have successfully applied the theory in explaining numerous health practices including drinking, utilization of health services, sanitation practices, smoking, among others. According to Ajzen (1991), motivation or intention versus behavioural control or ability governs behavioural achievement.

The theory of planned behaviour elaborates three sorts of beliefs which include control, behavioural and normative. Based on such beliefs, Ajzen (1991) developed the following constructs that represent an individual's control over certain behaviours: (a) subjective norms which revolve around the speculation on whether majority will support or denounce the behaviour. People are believed to perform the behaviours which are approved by their peers or by those they mostly esteem, (b) attitude which is the extent to which an individual possess an agreeable or unfavorable judgment on the practice of interest. The individual first considers the outcomes related to the behaviour, (c) intentions which refers to the factors motivating or influencing the given behaviour; behaviour is thus directly related to intention, (d) perceived power which involve the elements with the ability to impede or facilitate achievement of a certain behaviour. Such a construct leads to an individual's perceived actions control over those elements, (e) unplanned outcomes related to specific customary

codes of conduct that are influenced by a large group of people (social norms). The codes of conduct can be either standard or normative when it comes to a cultural context, and (f) perceived control over behaviour where people's conscience makes them experience a difficulty or an ease of engaging in the practice of interest.

The theory is relevant for this study in that individuals and household may adopt safe sanitation and hygiene practices like construction of improved toilets, use of the available latrines, and maintenance of sanitation facilities only after eradicating subjective norms, changing their attitudes on sanitation, and embracing perceived control only to positive sanitation practices.

Ajzen's theory however has several limitations in that the psychologist assumes that the individuals performing a given behaviour have already acquired the resources and opportunities regardless of their intention. Besides, the theory of planned behaviour neglects other variables like mood, threat, past encounters and fear that influence the intention to engage in a behaviour.

2.7 Conceptual Framework

A conceptual framework is a diagrammatic or visual representation of the link between variables (Regoniel, 2015). The conceptual framework for this study presents the association between the independent variables (social factors, cultural factors and latrine status) and the dependent variables (reduced cases of open defecation, increased latrine use, improved status of sanitation facilities, and reduced abandonment of available toilets). As indicated, adoption of sanitation practices may be influenced by social factors, cultural factors, and the status of latrines. The indicators for social factors included: presence or absence of toilets, knowledge, space, skills, and location and safety, for cultural factors were beliefs, religion, gender roles,

and traditions, and the indicators for latrine status included maintenance, privacy, slab status and materials.

Independent variables

SOCIAL CULTURAL FACTORS AND LATRINE STATUS

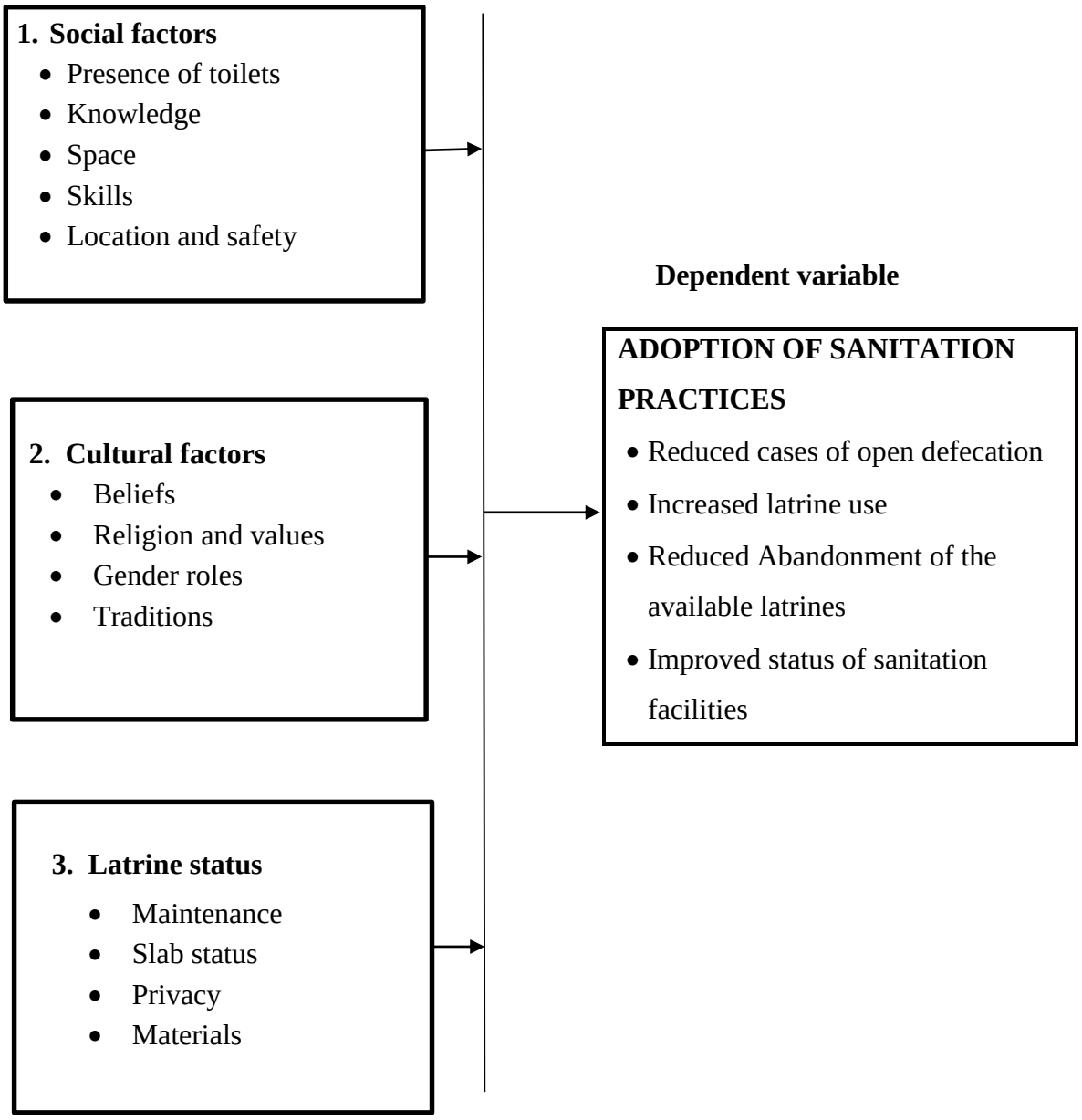

Figure 2. 1 Conceptual Framework

CHAPTER THREE

METHODOLOGY

3.1 Introduction

In this chapter, the study outlines the study methodology. A justification is provided for the selected method used in answering the study questions. Under this section, details on sampling approach, participants, and ethical issues are also outlined. Besides, the process of data collection and analysis is elucidated.

3.2 Study Site Description

The survey was done in Nzaui Sub-County of Makueni County which borders Kitui County to the East, Kajiado County to the West, Machakos to the North and Taita Taveta to the South. Nzaui sub-county was selected because it was one of the water-stressed areas which reports $ 6.38 million losses annually as a result of inadequate sanitation (World Bank, 2019). The researcher thus sought to explore sanitation issues for areas with water scarcity. The main economic activity for the people in Nzaui Sub-County is agriculture; they majorly grow maize, beans, mangoes and oranges. Since the area is an arid and semi-arid region, it experiences frequent droughts as the amount of rainfall experienced barely supports agriculture. The region has a total population of 126, 701 people and 30806 households (KNBS, 2019). It is predominantly inhabited by the Kamba tribe, who live in homesteads containing male household heads, their wives, children, and sometimes their children's families. Nzaui Sub-County is not served by any sewer network and therefore, onsite systems were the predominant sanitation solutions (World Bank, 2019).

3.3 Research Design and Approach

A mixed methods approach which involved both qualitative and quantitative techniques was used. According to Bentahar and Cameron (2015), mixed methods permit collection of data from various sources. The researcher considered convergent mixed methods design where both qualitative and quantitative data was gathered simultaneously (Creswell, 2013). The design permitted the researcher to treat the strands in the analysis phase as independent and eventually merge the data when interpreting, enabling the information presented to be comprehensive and reliable as the design allowed for accurate view of objectives from a group or individual point of view.

3.4 Study Population

The study consisted of household heads selected from the households within Nzaui Sub-County, Public Health Officers, Community Health Volunteers, a chief, and masons.

Table 3. 1 Distribution of population and households in Nzaui Sub-County

Ward	Number of Households	Population
Mbitini	6867	28413
Mulala	8051	30252
Matiliku	4884	20453
Nguu	6369	27468
Kalamba	4635	20115
Total	**30806**	**126, 701**

Obtained from KNBS 2019 census data

3.5 Determination of Sample Size and Sampling Technique

Out of the 30, 806 households in Nzaui Sub-County, a representative sample was selected with the participants being household heads. The basis of picking household heads for participation was that they took overall charge of their families and therefore they were likely to give the desired information concerning their homes. Following the arguments of Mwirigi *et al*. (2020), members of one household share a single toilet block hence the grounds for considering households. Public Health Officers and Community Health Volunteers were engaged as they were assumed to have an in-depth knowledge and information on sanitation issues at the community and the household level. On the other hand, masons were also considered since they were the people who designed and constructed sanitation facilities. A chief was involved because he was the community watchdog and understood household matters in his community.

3.5.1 Determination of Sample Size

The researcher applied Yamane's (1967) formula in calculating the number of participants for the study. Although Yamane (1967) recommended a margin of error of 5%, Adam (2021) proposed a remodeling to the sampling error to be up to 10% at all confidence levels. The 10% margin of error (sampling error) has successfully been applied by other researchers like Ali *et al.* (2021), Ratsasanasart (2019), and Islam (2018) in determining sample sizes for their studies, thus it was effective for this study. The sample size was therefore determined as follows:

$n=N/(1+N(e^2)$

Where, n= desired sample

N=Total number of households

e=sampling error (taken to be ±10%)

=30, 806 / (1+30, 806 (0.1^2)

The sample size was 100 households

3.5.2 Sampling Technique

Cluster sampling technique was employed in categorizing Nzaui Sub-County into clusters of five Wards namely, Mbitini (6867 households), Mulala (8051 households), Nguu (6369 households), Kalamba (4635 households), and Matiliku (4884households) (KNBS, 2019). Cluster sampling technique was appropriate because the population was heterogeneous. The researcher then considered simple random technique to identify participants within the wards as it ensured that all subjects had an equal chance of being considered for participation.

To fairly select representatives from each Ward, the researcher employed the proportionate random sampling technique where participants were chosen from unequally distributed clusters (Mukadi, 2016). Thus, the number of respondents per cluster (n_c) was obtained from the ratio of households in a cluster (N_c) to the total number of households in the Sub-County (N) against the intended total sample size (n) as illustrated in the derived formula below:

$n_c = (N_c \div N) \times n$

Where, n= The sample size for the entire Sub-County

N_c=Number of households in the cluster

N=Total number of households in the Sub-County

n_c= Sample per cluster

Table 3. 2 Distribution of samples for Nzaui Sub-County

Ward	Number of Households per cluster or Ward N_c)	Sample per Ward (n_c) =($N_c \div N$) ×n
1. Kalamba	4635	15
2. Matiliku	4884	16
3. Mbitini	6867	22
4. Mulala	8051	26
5. Nguu	6369	21
Total Wards=5	**Total households (N) = 30806**	**Desired sample size (n)=100**

Additionally, the study considered purposive sampling technique to select 2 Public Health Officers, 2 Community Health Volunteers, 2 household heads, 1 Chief, and 2 Masons as interviewees for focus group discussions.

3.6 Eligibility Criteria

The study targeted household heads within Nzaui Sub-County. Individuals aged below the age of 18 years did not participate in the study.

3.7 Research Instruments

The primary data collection instruments were structured questionnaires which were used to obtain quantitative data from household heads at the household level. Observation checklists were also employed at the household level. On the other hand, interview guides for focus group discussions aided in the collection of qualitative data. Topics related to toilets were most likely to be sensitive and there was a need to ensure that participants did not feel embarrassed while taking part in the study and that they did not have a feeling of invasion of privacy when the researcher was observing toilets. As a result, the researcher first created a good rapport and clearly elaborated to the participants what they expected from the survey, giving few examples of the sensitive questions they were to encounter in the questionnaire or interview and assuring them that participation was voluntary and that they were free to

decline participating. Further, permission to make observation on toilets was sought from the respondents and reassurance given on the confidentiality of the information obtained.

3.7.1 Piloting

It was necessary for the researcher to test the suitability of data collection instruments and ensure standardization before the actual fieldwork. Piloting was undertaken in Nkomo Location, a region in Tigania West Sub-County of Meru County. Following the arguments of Mugenda and Mugenda (2003), the suitable number of participants in a pilot study is 10% of the total sample thus, a total of 10 respondents were randomly selected from the location to participate in the pilot study. The exercise ensured that any probable instrument errors were identified and the unclear questions rephrased. The 10 questionnaires distributed to 10 respondents were returned fully filled. Validity test showed that the research instruments could effectively measure the influence of social cultural factors and latrine status on adoption of sanitation practices. A reliability test showed that the instruments were reliable given a Cronbach's alpha greater than 0.7.

3.7.2 Validity of Instruments

The extent at which data collection instruments were able measure the parameters they were designed to measure was tested prior to the real data collection exercise to ensure that the study yielded authentic results (Kimberlin & Winterstein, 2008). To test validity, opinion from experts and peers was sought and the results from pilot study checked and corrections made before the actual data collection exercise. Opinion was sought from four experts, who were well versed with sanitation and had a Doctor of Philosophy in a related field. The peers considered had a prior experience in sanitation-related data collection and analysis. These characteristics qualified the experts and peers to conduct appropriate confirmation of

instruments' validity. The instruments were found to be effective and would yield logical data.

3.7.3 Reliability of Instruments

Any research instrument ought to generate consistent results even after repeated surveys (Thanasegaran, 2009). For this study, the test-retest technique was used on participants of pilot study to test research instrument reliability. The researcher subjected the same participants to the same trials on two separate instances to test whether the scores for one test were similar or closer to the previous test. A reliability test using Cronbach's alpha was carried out to ascertain whether the dataset was fit for analysis. Results yielded a Cronbach's alpha of 0.72 as shown in Table 3.3 which was slightly above 0.7 indicating that the instruments were reliable.

Table 3. 3 Reliability statistics

Cronbach's Alpha	Number of Items
.72	3

3.8 Data Collection

Quantitative data was gathered using structured questionnaires. According to Creswell (2013), structured questionnaires are data collection tools consisting of standardized enquiries with fixed choices. These questionnaires were considered as they did not impose a high cognitive load on participants; they minimized the episodes of thinking when respondents were undertaking the survey (Rowley, 2014). Besides, the use of structured questionnaires facilitated easy coding and analysis of data. On the other hand, the method for gathering qualitative data was focus group discussions. A focus group discussion guide consisting of open-ended questions was used during the discussions. In addition, an

observation checklist guided the researcher in data collection through observation. The researcher used observation methods in exploring cases of open defecation and the status of latrine facilities in terms of maintenance, the state of the superstructure, odour, flies or maggots, size and condition of the slab.

3.8.1 Use of Questionnaires

Information at the household level was gathered by the use of structured questionnaires. The tool entailed demographic information, the influence of social factors, cultural issues, and latrine status on adoption of sanitation practices. Household heads filled in the questionnaires after conceding to take part in the study. The actual names of participants were not captured in the questionnaires to hide their identity and ensure privacy of information.

3.8.2 Observation

Observation method is a technique of gathering data through direct exploration (Creswell, 2013). An observation check-list containing information on the status of sanitation facilities in terms of cleanliness, presence of nuisances such as smell, flies, maggots and cockroaches was used. It also entailed data on, presence of faeces in the open, the materials and size of the super structure and the condition of the latrine slab and the aperture. The data gathered was treated with strict confidentiality through observing privacy of the highest degree on the information gathered from households. The data in soft copy was stored in password-protected computers to avoid access by a third party. The information in hardcopies was stored in a lockable box and kept in a private place. Respondents were reassured of the safety of their information and that it was not to be used for any malicious reasons. As well, the actual names of participants were not used when reporting so that no third party would recognize the identity of the respondents.

3.8.3 Focus Group Discussion

Qualitative data was collected via a focus group discussion consisting of nine purposively selected participants to unveil knowledge gaps on the influence of social cultural factors and latrine status on adoption of sanitation practices. For this study, the participants for focus group discussion were, 2 Public Health Officers, 2 masons, one Chief, 2 Community Health Volunteers, and 2 household heads who received a verbal invitation to participate in the discussion scheduled in the middle of the household survey exercise. One focus group discussion was conducted among the 9 participants and occurred at convenient times and accessible venue for every participant. The discussion protocol included 15 open-ended questions and stayed not longer than 60 minutes. Responses were recorded through notes taking with a pen and a notebook and also through audio recording using a mobile phone. The audio data was transcribed and thematic analysis done on written texts.

3.9 Data Analysis

This study used both qualitative and quantitative data analysis methods. Quantitative data analysis was conducted on responses from the questionnaires distributed at the households while qualitative data analysis was done on findings from focus group discussion. The Statistical Package for Social Sciences (SPSS) software version 25 was used for analysis of quantitative data while thematic analysis was conducted on non-numerical data using the MAXQDA software.

3.9.1 Analysis of Quantitative data

Quantitative data obtained from questionnaires at the households was analyzed using both descriptive and inferential statistics in SPSS version 25. Descriptive data which entailed the indicators of social cultural factors and latrine status was presented in frequencies,

percentages, means and standard deviations in tables and graphs. Correlation analysis using Pearson's Product Moment approach was conducted to establish the link between indicators of social factors, cultural factors and latrine status on adoption of sanitation practices and findings presented in tables.

3.9.2 Analysis of Qualitative Data

A separate analysis for the qualitative data was conducted. The audio files which had been recorded were transcribed to produce written texts which were compared with the handwritten notes to check for word similarities and generalizations. The data was then coded and grouped into themes using the MAXQDA software. Following the arguments of Braun and Clarke (2014), thematic analysis is a suitable method when the researcher desires to understand behaviours, thoughts and people's experiences. The analysis method involved identifying, examining, and reporting repeated themes. Sentences or phrases with the same meaning were highlighted to formulate codes which explained the texts. Common and recurring patterns formed themes which were reviewed to confirm their suitability, usefulness and accuracy. Further, the generated themes were defined to reveal the meaning of each theme. Themes were considered relevant and met saturation criteria when more than 50% of participants contributed to that given theme and the results were presented in narratives. The distribution of themes was as shown in Appendix V.

3.10 Ethical Considerations

It was imperative for the researcher to adhere to several ethical issues while conducting the study. First, the study was subjected for scientific approval by supervisors and ethical approval sought from the Meru University Institutional Research and Ethics Review Committee (MIRERC). A research permit was obtained from the National Commission for

Science, Technology and Innovation and a letter of introduction from Meru University of Science and Technology to enable the researcher to collect data. There was a written consent form which was signed by respondents to ascertain their participation willingness. Additionally, participants were told about their right to leave the survey or stop answering questions at any time in case they felt uncomfortable even if the survey was midway.

Privacy of the highest degree was observed on the data gathered. The data in soft copy was compressed into a zipped folder and protected using a private password to avoid access by a third party. The information in hardcopies was stored in a lockable box and kept in a private place. Furthermore, respondents were reassured of the safety of the information they gave and that it was not to be used for any malicious reasons. The actual names of participants were not used when reporting and thus pseudo coding was considered to hide the actual identity of the respondents.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents results from statistical analysis of the findings from a study conducted in Nzaui Sub-County of Makueni County and their interpretation is presented per objectives. Descriptive and inferential statistics for each variable are presented in tables and graphs. Response was also noted from focus group discussion conducted and is presented in narratives.

4.2 Response Rate

The rate of response for the study was as depicted in Table 4.1.

Table 4. 1 Response rate

Ward	Expected number	Number that showed up	Percent
Kalamba	15	15	15%
Matiliku	16	16	16%
Mbitini	22	22	22%
Mulala	26	26	26%
Nguu	21	21	21%
Total	**100**	**100**	**100%**

The study involved 100 respondents. The research instruments used included structured questionnaires, interview guides for focus group discussion, and observation checklists. Questionnaires were administered to 100 households. The 100 questionnaires distributed to the respondents who were household heads were returned fully filled, an indication that the data collected was adequate. As well, a focus group discussion was held among 9 participants who included 2 Public Health Officer, 2 household heads, 2 Community Health Volunteers,

2 masons, and 1 Chief. The group showed up in time and responded to the questions adequately. Self-administration of the questionnaires led to 100% response rate which qualified the data gathered appropriate for analysis and reporting.

4.3 Demographics

In this section, summary statistics based on respondents' gender, age, level of education, religion, occupation and household size are presented.

4.3.1 Gender Distribution

From Table 4.2, most of the respondents were males, taking 57% of the total sample while 43% of the participants were females. This implied that more males than females took part in the study. The higher number of male respondents could be attributed to the culture held on the males as the household heads and the primary decision makers in the society. The findings also implied that women took lesser roles in decision making and women availed themselves only when the males, who were the household heads, were absent.

Table 4. 2 Participants distribution by gender

Gender	Frequency	Percent	Valid Percent
Male	57	57%	57%
Female	43	43%	43%
Total	**100**	**100%**	**100%**

4.3.2 Distribution by Age

It is shown in Table 4.3 that the highest number of participants in the survey were aged between 18-33 and 34-49 years both covering 38% of the sample. The high participation of the group aged between 18 and 33 and 34-49 years indicated that most families were headed by young adults who were mostly not occupied. Only 24% of the respondents were aged

above 50 years. The low participation rate of household heads above 50 years could be attributed to the fact that such members did not live in the village or were absent at the time of the study.

Table 4. 3 Distribution of respondents by age

Age (Years)	Frequency	Percent	Valid Percent
18-33	38	38%	38%
34-49	38	38%	38%
Above 50	24	24%	24%
Total	**100**	**100%**	**100%**

4.3.3 Distribution by Education Level

Most of the respondents (43%) had attained post-secondary level of education followed by 31% who had schooled up to secondary level, 24% had reached primary level and only 2% had no formal education as shown in Table 4.4. These findings indicated that more people in the study area had attained at least basic education. Having at least basic education was a suggestion that people in the study area were literate. The 2% of the respondents who had not attained formal education could have been raised up during the period when education was not valued especially for the female gender. Literacy level could have an implication on adoption of sanitation practices.

Table 4. 4 Participants distribution by education level

Education level	Frequency	Percent	Valid Percent
No education	2	2%	2%
Primary	24	24%	24%
Secondary	31	31%	31%
Pot-secondary	43	43%	43%
Total	**100**	**100%**	**100%**

4.3.4 Distribution by Religion

Results in Table 4.5 illustrate that almost all the respondents (98%) were Christians and only 2% were Muslims. There were no Hindus or people who did not belong to any religion. These findings showed that Christianity was the predominant religion in the study area. Some religious practices facilitate adoption of sanitation practices (Adugyamfi, 2018). Christians do not mostly have religious barriers to sanitation and therefore the implications of Christianity being the predominant religion was that residents in the study area had no sanitation hindrances tied to religion. The number of anal washers (Muslims) was almost negligible. Anal washing practices could be a challenge especially in regions faced with water scarcity like Nzaui Sub-County.

Table 4. 5 Respondents distribution by religion

Religion	Frequency	Percent	Valid Percent
Christians	98	98%	98%
Muslims	2	2%	2%
Hindus	0	0%	0%
No religion	0	0%	0%
Total	**100**	**100%**	**100%**

4.3.5 Distribution by Occupation

In Table 4.6, 31% of participants were casual labourers, 28% were salaried employees, 21% were self-employed, and 20% had no work at all. The implication of having majority of the respondents being casual labourers, unemployed and others self-employed could be that there were no employment opportunities presented for the residents. On the other hand, having 28% of the participants on the salaried category implied that some people especially those who had attained post-secondary education level were economically stable. The findings

therefore showed that majority of the residents might have had challenges in affording the construction of improved sanitation facilities.

Table 4. 6 Distribution of participants by occupation

Occupation	Frequency	Percent	Valid Percent
Salaried	28	28%	28%
Casual	31	31%	31%
Self-employed	21	21%	21%
No work	20	20%	20%
Total	**100**	**100%**	**100%**

4.3.6 Distribution Based on Household Size

Most of the households had 2 to 5 members covering 56% of the sampled population followed by 6-10 members (33%) as indicated in Table 4.7. Households with more than 10 members were 8% while only 2% of the households had less than 2 members. The suggestion of having few household members could be that residents understood the importance of family planning. As well, having less members could also imply that some families had aged people whose children had moved to independent households. According to Wasonga *et al*. (2016), sanitation challenges with regard to use of toilets may not be common for households with few members as opposed to large-sized families where members struggle to share the few available sanitation facilities. Thus, the implication of having few household members was that they did not strain in sharing sanitation facilities.

Table 4. 7 Participants distribution by household size

Size	Frequency	Percent	Valid Percent
<2 members	3	3%	3%
2-5	56	56%	56%
6-10	33	33%	33%
>10	8	8%	8%
Total	**100**	**100%**	**100%**

4.4 Descriptive Statistics

This section describes responses on sanitation practices in Nzaui Sub-County and the influence of social cultural factors and latrine status on adoption of sanitation practices in frequencies, percentages and means. The findings are presented in tables and graphs.

4.4.1 Adoption of Sanitation Practices

The study sought to establish existence of sanitation practices such as abandonment of latrines when provided, open defecation and construction of unimproved sanitation facilities. To find out whether residents possessed improved or unimproved latrine types, respondents were requested to indicate the type of sanitation facilities they used and the findings are contained in Table 4.8.

Table 4. 8 Types of sanitation facilities adopted in the study area

Sanitation facility type	Frequency	Percent	Valid Percent
Traditional pit latrine	75	75%	75%
Ventilated improved pit latrine	23	23%	23%
Flush toilets	1	1%	1%
No latrine facility	1	1%	1%
Composting toilets	0	0%	0%
Buckets	0	0%	0%
Total	100	100%	100%

Findings from Table 4.8 indicate that 75% of the residents used traditional pit latrines, 23% had ventilated improved pit latrines, 1% used flush toilets and only 1% did not possess a latrine. Traditional pit latrines are unimproved forms of sanitation options and cannot completely prevent people's contact with excreta (WHO/UNICEF, 2021) and their widespread adoption implied that residents were below the expected sanitation standards.

Adoption of unimproved latrines could expose the population to the risk of directly or indirectly interacting with excreta.

It was also observed that some households in the study area defecated in the open as indicated in Table 4.9.

Table 4. 9 Open defecation cases

	Frequency	Percent	Valid Percent
Defecation in toilets	70	70%	70%
Open defecation	30	30%	30%
Total	**100**	**100%**	**100%**

From Table 4.9, open defecation was only recorded in 30% of the households while 70% of the households had zero cases of open defecation. These findings demonstrated that defecation in the open was not widely practiced in Nzaui Sub-County. The reason for open defecation could be attributed to ignorance of the available toilets and lack of caregiver awareness on the need for effective disposal of children excreta as demonstrated in the focus group discussion findings.

"Since my children use diapers, I find it difficult to put them inside the pit latrine so there is a special place within the compound where I gather them and burn them after they dry up. When I throw diapers in compost pits, dogs pick them and in the process of eating faeces they pour in the open. You know you cannot know where the faeces are unless you follow keenly."

Data in Figure 4.1 reveals the findings obtained from observations made on status of latrines in Nzaui Sub-County.

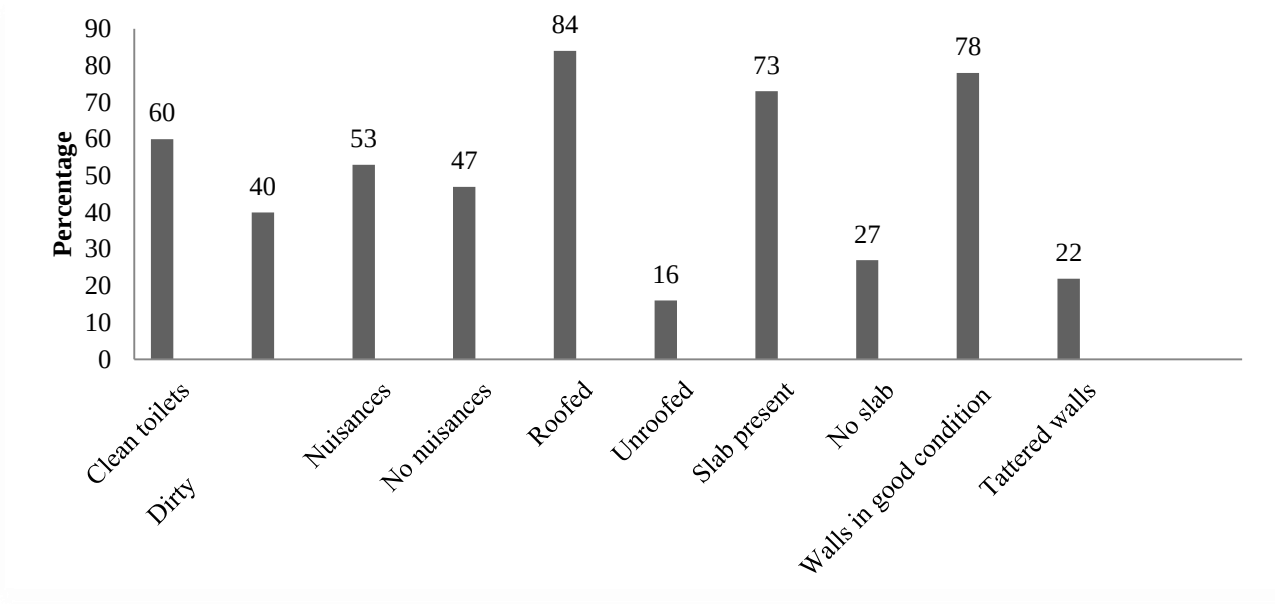

Figure 4. 1 General Status of Latrine Facilities

From Figure 4.1, 60% of the toilets were maintained clean while the rest were dirty. More than half of the toilets (53%) were characterized by nuisances such as flies and odour and only 47% lacked nuisances. Concerning toilet structure, 84% were roofed and 16% lacked roofs and 27% of the toilets in the area had no slabs. The toilets whose walls were in good condition were 78% and 22% were tattered.

The high percentage of maintained toilets indicated that most of the residents embraced toilet cleanliness as a way of promoting hygiene at the household level. Dirty sanitation facilities could discourage communities from using the toilets. These findings were confirmed by Mwirigi *et al.* (2020) in Meru who found out that the presence of unmaintained toilets put off toilet users from visiting the toilets (Mwirigi *et al.,* 2020). Maintenance of toilets is therefore essential in encouraging their utilization. Presence of odour and fly nuisances in toilets implied that residents were indirectly exposed to the risks of contracting sanitation-related diseases. As well, sanitation facilities without roofs were likely to be unusable especially during the rains. Improperly designed slabs were likely to be falling and would

pose fear of slipping inside toilet pits and the absence of good walls would lower the dignity and privacy of toilet users. The findings were in line with results obtained in Ethiopia by Scorgie *et al.* (2016) who found out that residents avoided toilets that had holes around the walls as children would see them while inside the toilets. These findings thus indicated that there existed a number of unacceptable and unimproved sanitation facilities in Nzaui Sub-County.

Table 4. 10 Summary of adoption of sanitation practices

	N	Mean	Mode	Minimum	Maximum
Latrine use	100	2.6757	2.5	1.9	3.4
Open defecation	100	2.5970	2.5	1.5	5.0
Unimproved toilets	100	3.3094	3.5	1.75	4.5
Valid N (list wise)	100				

From Table 4.10, adoption of unimproved toilets was the main form of sanitation practices in the study area covering a mean of 3.3094. Issues of latrine use had a mean of 2.6757 and open defecation was the least common type of sanitation practices which took a mean of 2.5970.

From the findings, most of the toilets adopted in Nzaui Sub-County did not prevent human contact from excreta. Residents were therefore low in the sanitation ladder and were exposed to the risks of poor sanitation such as interaction with nuisances like flies which easily transmit diarrheal diseases. For residents to move up the sanitation ladder, they needed to adopt improved toilets which were easy to maintain, did not encourage habitation of fly and odour nuisances and had a self-cleansing floor for easy maintenance. Adoption of unimproved toilets was also noted by Busienei *et al.* (2019) in Lodwar where the available

toilets encouraged habitation of vectors for diarrhea transmission such as flies. Results also implied that some residents in Nzaui Sub-County felt uncomfortable with using the available sanitation options and responded by ignoring them. Abandoned toilets even when provided were also noted by Wasonga *et al.* (2016) in Kisumu and Russpatrick *et al.* (2017) in Zambia where the communities ignored the available toilets for open defecation. From the findings, open defecation cases were rare in Nzaui Sub-County which confirmed that open defecation was a solution for few residents.

4.4.2 Influence of Social Factors on Adoption of Sanitation Practices

From the study, the influence of social factors like presence of toilets, knowledge, space availability, toilet location, and skills was established. The results were presented in frequencies, percentages means and Standard Deviation (SD).

4.4.2.1 Influence of Presence of Toilets on Adoption of Sanitation Practices

Respondents were asked to indicate their level of agreement to some statements given in a five-point likert scale to reveal whether presence or absence of sanitation facilities influenced their utilization. Results were as shown in Table 4.11.

Table 4. 11 Influence of presence of toilets on adoption of sanitation practices

	Toilet presence encourage use	Open defecation resulting from lack of toilets	Insufficient shared toilets discourage use
Strongly disagree	44 (44%)	42 (42%)	18 (18%)
Disagree	49 (49%)	47 (47%)	67 (67%)
Neutral	3 (3%)	5 (5%)	5 (5%)
Agree	4 (4%)	4 (4%)	8 (8%)
Strongly agree	0 (0%)	2 (2%)	2 (2%)
Total	**100 (100%)**	**100 (100%)**	**100 (100%)**

From the results in Table 4.11, 44% of the respondents strongly disagreed that toilet presence encouraged its use, 49% disagreed and only 4% of the respondents agreed. Of the sampled participants, 42% strongly disagreed that open defecation resulted from lack of toilets, 47% disagreed, 4% agreed and 2% strongly agreed that lack of toilets facilitated open defecation. On matters relating to insufficient shared toilets, 18% of participants strongly disagreed that insufficient toilets shared among different households discouraged their use, 67% disagreed, 4% agreed and 2% strongly agreed. The results showed a mean of 3.85, SD=0.644, implying that many respondents supported that toilet presence at the household influenced adoption of sanitation practices.

The findings showed that some residents failed to use sanitation facilities even when toilets were available. The results of the study in Nzaui Sub-County rhymed with the findings obtained in Nepal by Bhattet *et al.* (2019) who reported that residents ignored using the available sanitation facilities. The implication of the high negative opinion was that open defecation was hardly tied to toilet presence. Residents would ignore the available sanitation facilities when they were not acceptable and user-friendly. Similar findings were presented by O'Reilly *et al.* (2017) in India where even with the provision of toilets, residents still defecated in the open because they were not comfortable with the sanitation facilities provided. Results also revealed that sharing of toilets among households did not influence toilet use, an indication that all groups in the households could comfortably share toilets and there existed no barriers to toilet sharing in the community. Thus, even with strained access to toilets, people in the study area would strive to use the available toilets, an implication that defecating in the open was the least option for the residents even with strained access to sanitation facilities.

4.4.2.2 Influence of Knowledge on Adoption of Sanitation Practices

The researcher also desired to examine whether knowledge influenced adoption of sanitation practices in Nzaui Sub-County. Participants were required to indicate their degree of agreement to the statements and the findings were recorded in Table 4.12.

Table 4. 12 Influence of knowledge on adoption of sanitation practices

	OD risks children to diseases	Lack of caregiver awareness and open disposal	Children faeces not harmful	Information sharing influence use	Unimproved toilets and disease transmission
Strongly disagree	0 (0%)	1 (1%)	23 (23%)	41 (41%)	35 (35%)
Disagree	1 (1%)	6 (6%)	38 (38%)	27 (27%)	53 (53%)
Neutral	3 (3%)	3 (3%)	16 (16%)	21 (21%)	10 (10%)
Agree	37 (37%)	40 (40%)	17 (17%)	10 (10%)	1 (1%)
Strongly agree	59 (59%)	50 (50%)	6 (6%)	1 (1%)	1 (1%)
Total	**100 (100%)**	**100 (100%)**	**100 (100%)**	**100 (100%)**	**100 (100%)**

The study revealed that 59% of the respondents strongly agreed that open defecation put children at risk of diseases, 37% agreed and only 1% of the respondents disagreed. Of the sampled population, 50% strongly agreed that lack of caregiver awareness had an influence on open disposal of children faeces, 40% agreed, 6% disagreed, and 1% of the population sampled strongly disagreed with the argument. As well, the analysis revealed that 23% of the respondents strongly disagreed with the argument that children's faeces was not as harmful as adult faeces, 38% disagreed, 17% agreed and 6% of the respondents strongly agreed with the opinion. With respect to information sharing, 41% of the participants strongly disagreed that it influenced sanitation practices, 27% disagreed, 10% agreed and only 1% of the respondents strongly agreed that information sharing was essential in behaviour change. About exposure of people to diseases by unimproved sanitation facilities,

35% of the participants strongly disagreed that unimproved toilets were capable of enabling disease transmission, 53% disagreed, 1% agreed and other 1% of the respondents strongly agreed with the argument. The results showed a mean of 3.98, SD=0.498, indicating that participants supported that knowledge influenced adoption of sanitation practices.

The findings signaled that majority of the residents understood that faeces from all sources was equally dangerous and needed to be handled properly. The population did not however acknowledge the essence of adopting improved toilets which were able to cut the link between human contact with excreta. Adoption of unimproved sanitation facilities would encourage habitation of flies and cockroaches in toilets which are potential vectors for the transmission of diarrheal infections including cholera and typhoid. Respondents in the focus group discussion conducted supported that knowledge alone was not sufficient to trigger adoption of healthy sanitation behaviours and that other factors including financial capabilities of residents impeded them from improving toilets as revealed in the focus group discussion;

"Even if you teach people about toilets, if they have no capacity to construct good toilets they will still construct toilets made of sacks and polythene papers."

The findings confirmed that residents with low incomes would struggle to build toilets in their households irrespective of the set public health standards. A respondent during the focus group discussion explained that;

"Teaching or educating the community about toilet use is not an issue, the problem arose when the person being taught could not afford the construction materials and costs associated with toilet construction. Like in Usemei Village, we organized ourselves as a community to support the construction of a simple latrine for an old poor woman."

From the residents' report, it was noted that the community was willing to use good toilets but inadequate resources prevented the construction of standard superstructures. The findings were similar to the results obtained in Ghana by Radin *et al.* (2020) who indicated that despite being aware of the best toilet designs, residents failed to construct toilets because they could not meet the toilet construction costs.

4.4.2.3 Influence of Availability of Open Spaces on Adoption of Sanitation Practices

The study also established the influence of availability of open spaces on adoption of sanitation practices. The results were as presented in Table 4.13.

Table 4. 13 Influence of availability of open spaces on adoption of sanitation practices

	No latrine construction when near bushes	Open defecation when in bushes	Defecation in the open spaces at night	Toilet construction with presence of open spaces
Strongly disagree	11 (11%)	19 (19%)	8 (8%)	1 (1%)
Disagree	48 (48%)	54 (54%)	43 (43)	17 (17%)
Neutral	26 (26%)	16 (16%)	13 (13)	13 (13%)
Agree	13 (13%)	7 (7%)	29 (29%)	50 (50%)
Strongly agree	2 (2%)	4 (4%)	7 (7%)	19 (19%)
Total	**100 (100%)**	**100 (100%)**	**100 (100%)**	**100 (100%)**

As depicted in Table 4.13, 11% of the participants strongly disagreed that people did not construct latrines when they resided near bushes, 48% disagreed 13% agreed and 2% strongly agreed. Of the sampled population, 19% strongly disagreed that open defecation was done when people were in bushes, 54% disagreed, 7% agreed while 4% strongly agreed. In addition, the study showed that 8% of the respondents strongly disagreed that people defecated in the open spaces at night, 43% disagreed, 29% agreed, and 7% strongly agreed with the argument. Regarding toilet construction in the open spaces, 19% of respondents strongly agreed that toilets were mostly constructed when there were open spaces around the

households, 50% agreed, 17% disagreed and only 1% strongly disagreed. Overall, residents showed a neutral stand on the influence of space availability around the household on adoption of sanitation practices (Mean=3.05, SD=0.604).

The findings confirmed that open defecation even in bushes was not a common practice in the study area although it would sometimes happen possibly because there existed no toilets in the bushes. The results demonstrated that majority of the residents in the study area embraced latrine adoption. Defecation in the open spaces at night was not mostly practiced although it would happen, as supported by few, possibly because some people feared visiting toilets at night. In addition, availability of space around the households mostly encouraged toilet construction. Thus, residents were likely to construct toilets if they had sufficient spaces around the households. When asked whether open spaces around the households influenced adoption of sanitation practices, participants in the focus group conducted in the same region reported that the spaces available were too open to encourage defecation in the open showing that people had to construct toilets in the available open spaces to avoid such privacy issues. A respondent said that:

"There were no thickets around. The open spaces available were too open, they could not allow you to hide and relieve yourself as you would just be seen by passers-by from a distance."

The findings were in line with the results obtained in Ethiopia by Abebe and Tucho (2020) who demonstrated the essence of open spaces around the households in encouraging toilet adoption. The study findings therefore contradicted with the findings of Alhassan and Anyarayor (2018) in India who reported that people did not construct toilets when they were

near open spaces. The difference between the findings could be attributed to the different values held between the communities.

4.4.2.4 Influence of Skills on Adoption of Sanitation Practices

Table 4.14 illustrates the findings from respondents who were required to indicate their extent of agreement to statements on the influence of mason skills and training on adoption of sanitation practices.

Table 4. 14 Influence of skills on adoption of sanitation practices.

	Skilled masons available when needed	Skilled masons construct improved toilets	Untrained masons and good latrines	Mason training wastes resources	H/H head dictating toilet design
Strongly disagree	16 (16%)	1 (1%)	4 (4%)	3 (3%)	1 (1%)
Disagree	36 (36%)	2 (2%)	17 (17%)	5 (5%)	8 (8%)
Neutral	6 (6%)	13 (13%)	17 (17%)	18 (18%)	6 (6%)
Agree	34 (34%)	60 (60%)	37 (37%)	35 (35%)	43 (43%)
Strongly agree	8 (8%)	24 (24%)	25 (25%)	39 (39%)	42 (42%)
Total	**100 (100%)**	**100 (100%)**	**100 (100%)**	**100 (100%)**	**100 (100%)**

The study showed that 16% of the respondents strongly disagreed that masons with toilet construction skills were available when needed, 36% disagreed, 34% agreed and only 8% strongly agreed. Concerning capability of skilled masons to construct improved toilets, 60% of the respondents agreed that masons with toilet construction skills constructed improved toilets, 24% strongly agreed, 2% disagreed and 1% of the respondents strongly disagreed. The study also showed that 37% of the respondents agreed that untrained masons constructed good toilets, 25% strongly agreed, 17% strongly disagreed, and only 4% disagreed. From the study, 35% of the participants agreed that mason training was a waste of resources, 19%

strongly agreed, 23% strongly disagreed and 5% disagreed with the statement. From the findings, 42% strongly agreed that household heads dictated toilet designs, 43% agreed, 8% disagreed and only 1% strongly disagreed. At a mean of 3.05, SD=0.463, participants agreed that in the absence of mason skills, latrines adopted remained unimproved and could be abandoned for open defecation.

People with the desired knowledge of constructing toilets in good designs were mostly not available when needed. The implications of these findings were that better toilets could be adopted when skilled masons were engaged to construct toilets. Similar conclusions were made by Croker *et al.* (2017) in Ghana and Ethiopia who revealed that mason training on toilet construction resulted in properly designed sustainable sanitation facilities as it equipped masons with the necessary skills for erecting toilets. The results showed that the ability to construct latrines could not only be based on mason training but also on their experience in the work. Masons played few roles in household toilet designs. This could explain the reason why even trained masons constructed toilets in poor designs as they performed their tasks following the instructions of the household heads who might have known nothing about toilet designs. It was revealed from the focus group discussion that despite having skills, masons constructed toilets following the instructions of the head of the household, who was usually male.

"Mostly people acquired the person to dig pit latrines with the instructions of the household head. If you did not do what you were instructed, then you would pay yourself for the extra pits dug."

A male respondent said, *"Like in my home, I am the one who decides on every household matter, but when I am away, my wife can do that."*

The findings showed that household heads had the mandate of dictating the design of toilets to be constructed in their households. Given that skills were among the factors influencing adoption of improved latrines, sanitation facilities adopted in the villages would be of low standards when their designers do not acknowledge the standard designs. The study findings implied that there was need to sensitize communities on the Publich Health approved toilet designs for adoption by masons in order to improve toilet conditions in Nzaui Sub-County.

Toilet erectors were never present unless they were imported from other areas. The following argument was made by a respondent during the focus group discussion:

"There were trained masons but not specifically for toilet construction. Mostly, the people who came to construct the toilets were imported from some place.''

The implication of these findings was that masons were not readily available when needed, they were to be obtained from other regions.

4.4.2.5 Influence of Latrine Location on Adoption of Sanitation Practices

The influence of latrine location in relation to safety was studied and the results tabulated as shown in Table 4.15.

Table 4. 15 Latrine location and adoption of sanitation practices

	Harassment when toilets are located far from H/H	Toilets far from H/H and open defecation	Exposure to nuisances for toilets located near the H/H
Strongly disagree	31 (31%)	15 (15%)	19 (19%)
Disagree	38 (38%)	59 (59%)	55 (55%)
Neutral	14 (14%)	14 (14%)	12 (12%)
Agree	9 (9%)	9 (9%)	12 (12%)
Strongly agree	8 (8%)	3 (3%)	2 (2%)
Total	**100 (100%)**	**100 (100%)**	**100 (100%)**

When asked whether toilet users were harassed when visiting toilets located far from the households, 31% of participants strongly disagreed with the statement, 38% disagreed, 9% agreed, and 8% of the participants strongly agreed. Relating to toilet location and open defecation, 15% of the participants strongly disagreed that toilets located far from the households encouraged open defecation, 59% disagreed, 9% agreed while 3% strongly agreed with the opinion. When asked whether toilets located near the households exposed members to nuisances, 19% of the respondents strongly disagreed, 55% disagreed, 12% agreed and 2% strongly agreed. A mean of 3.20 and a standard deviation of 0.582 was recorded indicating that participants recognized latrine location as a predictor for adoption of sanitation practices.

The fact that harassment was rare in the region could be attributed to the culture in the area which did not condone harassment of people or that the toilets were not located in quite lonely places. The results also implied that residents did not fear visiting toilets located away from their dwellings. These findings contradicted those of Hulland *et al.* (2015) in Odisha who reported that women feared getting raped while visiting toilets situated away from their households. The contradiction could be related to the varying social cultural values held between the two communities whereby victimization or harassment was perhaps never entertained in the Kamba culture.

The results also implied that open defecation, even when toilets were far, was not a common practice in the study area. The results were echoed by the findings from the focus group discussion where participants argued that people in Nzaui Sub-County did not mostly engage themselves in open defecation. A respondent from the focus group discussion reported that;

"There were many people in this community would not accept leaving their faeces just that way, they would rather dig a small hole to hide their faeces."

The findings revealed that there were still people, though few, who could defecate in the open especially when toilets were unreachable. Such people could probably be children who feared visiting toilets at night. The same was reported in India by Caruso *et al.* (2017) who found out that children were not taken to toilets situated in far places especially at night. Toilets located near the households were likely to be frequently cleaned by the readily available household members and thus they did not expose people to flies although there were some people who, even when available in their households, were reluctant to clean toilets encouraging accumulation of maggots, odour or flies in the toilets. In Ethiopia, Gokçekuş *et al.* (2020) observed that toilets situated near the households were despised as they facilitated interaction of household members with faeces ferried by the flies from nearby toilets. Diseases such as cholera and diarrhea could easily spread among the exposed population.

4.4.2.6 Summary on the Influence of Social Factors on Adoption of Sanitation Practices

Table 4.16 shows the average scores for responses on the influence of social factors on adoption of sanitation practices. All indicators had a mean of more than three (3) suggesting participants' agreement that the factors influenced adoption of sanitation practices. However, each factor had a different degree of facilitating adoption of sanitation practices. At the highest mean of 3.98, respondents supported that knowledge influenced adoption of sanitation practices, followed by toilet presence at the households which recorded a mean of 3.85, space availability (mean=3.54) and toilet location and safety (mean=3.20). Majority of

the participants demonstrated a nearly neutral stand on the influence of mason skills on adoption of sanitation practices (mean=3.05).

Table 4. 16 Summary of means and standard deviation for social factors

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Knowledge	100	3.98	.498	2.60	5.00
Toilet presence	100	3.85	.644	1.25	5.00
Space availability	100	3.54	.604	1.60	4.60
Location and safety	100	3.20	.582	1.00	4.60
Mason skills	100	3.05	.463	1.60	4.40
Valid N (List wise)	**100**				

4.4.3 Influence of Cultural Factors on Adoption of Sanitation Practices

This study examined the influence of cultural factors on adoption of sanitation practices. Results on the cultural factors like gender roles, traditions, religion and beliefs were as discussed.

4.4.3.1 Influence of Gender Roles on Adoption of Sanitation Practices

The study aimed at examining the extent of support to the statements given on the influence of gender roles on adoption of sanitation practices in Nzaui Sub-County. The findings are summarized in Table 4.17.

Table 4. 17 Gender roles and adoption of sanitation practices

	Male as decision makers	Male roles influence OD	Female roles influence OD	Toilet separation by gender influence use
Strongly disagree	1 (1%)	15 (15%)	7 (7%)	14 (14%)
Disagree	2 (2%)	41 (41%)	27 (27%)	39 (39%)
Neutral	9 (9%)	21 (21%)	31 (31%)	35 (35%)
Agree	39 (39%)	21 (21%)	31 (31%)	9 (9%)
Strongly agree	49 (49%)	2 (2%)	4 (4%)	3 (3%)
Total	**100 (100%)**	**100 (100%)**	**100 (100%)**	**100 (100%)**

The study showed that 49% of the respondents strongly agreed that males were the decision makers on toilet construction, 39% agreed with the statement, 1% strongly disagreed and 2% disagreed. Regarding male roles, 15% of participants strongly disagreed that male roles influenced open defecation, 41% disagreed while 21% agreed and only 2% strongly agreed that roles taken by men influenced defecation in the open. From Table 4.17, 4% of the respondents strongly agreed that female roles influenced open defecation, 31% agreed, 27% disagreed and 7% strongly disagreed. Concerning toilet separation by gender, 14% strongly disagreed that it influenced toilet use, 39% disagreed, 9% agreed and only 3%strongly agreed. From a mean of 3.41, participants demonstrated that gender roles had an influence on adoption of sanitation practices (SD=0.580).

Men were the primary decision-makers on sanitation matters at the household level, a situation attributable to the cultural values in the area that men took control of household matters. The type of toilets proposed by men could overlook the menstrual and security needs of women in toilets. The fact that male roles influenced adoption of sanitation practices was echoed by Caruso *et al.* (2017) where the sanitation facilities established in rural Odisha were

insecure such that women looked for alternative sites for defecation. The fact that females were mostly engaged in household chores such as looking after children who had the tendency of defecating in the open, fetching water and collecting firewood, and male roles such as rearing livestock in bushes where there were no toilets facilitated open defecation. This was revealed in the focus group discussion where respondents said;

"In the evening, I had to go to the forest to look for firewood and even sometimes rivers were far away. When we were there, we had no other option than using the bush. When you walked around the forests you would meet faeces for boys who looked after cows and goats."

"My children used diapers and sometimes they hid to defecate behind the house. You know you could not know where the faeces were unless you followed keenly."

The findings also showed that having separate toilets for males and females did not guarantee their use although support to the importance of toilets separation by gender could be attributed to the fact that males and females desired privacy and each gender would feel comfortable while using separate toilets. The importance of toilet separation in enhancing users' comfortability was also acknowledged by Wasonga *et al.* (2016) in Kenya.

4.4.3.2 Influence of Religion and Beliefs on Adoption of Sanitation Practices

The responses on the influence of religion and beliefs on adoption of sanitation practices were presented in Table 4.18.

Table 4. 18 Religion and beliefs and adoption of sanitation practices

	Association of diarrhea with demons	Pit latrines and evil spirits	Children faeces not harmful	Church leaders talk about sanitation matters
Strongly disagree	57 (57%)	46 (46%)	45 (45%)	62 (62%)
Disagree	39 (39%)	48 (48%)	36 (36%)	30 (30%)
Neutral	0 (0%)	6 (6%)	11 (11%)	0 (0%)
Agree	3 (3%)	0 (0%)	6 (6%)	7 (7%)
Strongly agree	1 (1%)	0 (0%)	2 (2%)	1 (1%)
Total	**100 (100%)**	**100 (100%)**	**100 (100%)**	**100 (100%)**

Most of the respondents (57%) strongly disagreed that diarrhea was associated with demons, 39% disagreed, 3% agreed and 1% strongly agreed. On the other hand, 46% of participants strongly disagreed and 48% disagreed that toilet pits haboured evil spirits. Besides, 45% of the sampled population strongly disagreed that children's faeces were not harmful, 36% disagreed, 6% agreed and 2% strongly agreed with the statement. About church leaders discussing sanitation matters in churches, 62% strongly disagreed that leaders talked about matters on toilets, 30% disagreed, and none of the respondents agreed. From the findings, religion and beliefs factors had a mean of 2.19, SD=0.731 which implied that participants disapproved the influence of religion and beliefs on adoption of sanitation practices in the study area.

It can be deduced from the findings that beliefs that would make people fear visiting toilets were not held in Nzaui Sub-County. Residents were aware of the real causes of diarrhea including poor sanitation. Few people showed support to the statement possibly because there could have been some religions which held a strong belief on the role of demons in facilitating diseases. Findings obtained from the focus group discussion showed that people

understood the pathophysiology of diarrhea apart from the 'Kavonokyas' who associated the cause of diarrhea with demons.

"The people at risk of acquiring diarrhea were those who did not use toilets and left their faeces in the open. Faeces left in open was carried to the rivers where people get diarrhea after consuming the water from the rivers. It was necessary to appreciate each other's religion; I only know that some 'Kavonokyas' associate diseases with demons."

These findings implied that majority of the residents were aware that children's faeces could cause diseases. The widespread awareness could be ascribable to the high literacy levels in the region as people had attended school and learnt about the negative implications of poor sanitation. The study further showed that sanitation matters were not prioritized in gatherings such as churches.

4.4.3.3 Influence of Traditions on Adoption of Sanitation Practices

Table 4.19 illustrates the responses on the association between traditions and sanitation practices.

Table 4. 19 Traditions and adoption of sanitation practices

	Traditions discouraging toilet construction	Traditions encouraging OD	Traditions encouraging toilet construction
Strongly disagree	22 (22%)	27 (27%)	6 (6%)
Disagree	69 (69%)	71 (71%)	8 (8%)
Neutral	9 (9%)	2 (2%)	6 (6%)
Agree	0 (0%)	0 (0%)	42 (42%)
Strongly agree	0 (0%)	0 (0%)	38 (38%)
Total	**100 (100%)**	**100 (100%)**	**100 (100%)**

The findings illustrated that 22% of the respondents strongly disagreed that there existed traditions which discouraged toilet construction in Nzaui Sub-County, 69% disagreed while there were no participants supporting the case. Of the total respondents, 27% strongly disagreed on the existence of traditions which encouraged open defecation, 71% disagreed, and none of the respondents was for the opinion. There were therefore no traditions which spearheaded defecation in the open places. Further, 38% strongly agreed on the existence of traditions that encouraged toilet construction in the region, 42% agreed, 6% strongly disagreed and 8% disagreed. From a resultant mean of 2.61 and standard deviation of 0.573, traditions held in the study area did not encourage adoption of poor sanitation practices.

The findings signaled that the traditions which existed in the area encouraged positive sanitation practices. These findings were supported by the results obtained from discussions in the focus group which revealed the existence of witchcraft on faeces left in the open as uttered by a respondent that;

"People feared leaving their faeces in the open as they would be taken for witchcraft purposes. When your faeces was left in the open, a witch would carry the faeces, pour ash on it and make you develop rashes around the anal parts."

Traditions of this sort could encourage people to actively make use of sanitation facilities as opposed to open defecation due to fear of witchcraft. Such oral traditions carried from one generation to another promoted toilet use in the study area.

4.4.3.4 Summary on the Influence of Cultural Factors on Adoption of Sanitation Practices

On average, gender roles had the highest influence on adoption of sanitation practices as shown by the highest mean of 3.41, followed by traditions (mean=2.61) and religion and

beliefs (mean=2.19) as illustrated in Table 4.20. The results implied that respondents agreed on the influence of gender on adoption of sanitation practices. As well, the findings demonstrated a general disagreement on the influence of religion and beliefs and traditions on adoption of sanitation practices.

Table 4. 20 Summary of means and standard deviation for cultural factors

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Gender	100	3.41	.580	2.00	5.00
Traditions	100	2.61	.573	1.00	4.33
Religion and beliefs	100	2.19	.731	1.00	4.50
Valid N (List wise)	100				

4.4.4 Influence of Latrine Status on Adoption of Sanitation Practices

This study also sought to establish the relationship between the status of latrines in terms of maintenance, slab status, privacy and materials and the findings were as presented in Table 4.21.

Table 4. 21 Latrine status and adoption of sanitation practices

	Ignoring unclean latrines	Poor slab and easy soiling	Use of latrines with tattered walls	Material and latrine durability
Strongly disagree	5 (5%)	4 (4%)	59 (59%)	6 (6%)
Disagree	12 (12%)	6 (6%)	28 (28%)	2 (2%)
Neutral	16 (16%)	10 (10%)	4 (4%)	5 (5%)
Agree	54 (54%)	45 (45%)	3 (3%)	43 (43%)
Strongly agree	13 (13%)	35 (35%)	6 (6%)	44 (44%)
Total	**100 (100%)**	**100 (100%)**	**100 (100%)**	**100 (100%)**

From the study, 13% of the respondents strongly agreed that they could not use unclean latrines, 54% agreed, 12% disagreed and 5% of the respondents strongly disagreed. Regarding latrine slab status, 35% of the participants strongly agreed that poorly constructed slabs facilitated easy soiling of latrines, 45% agreed, 6% disagreed and only 4% strongly disagreed with the statement. Of the total respondents, 59% strongly disagreed that they could use sanitation facilities with tattered walls, 28% disagreed, 3% agreed and 6% strongly agreed with the opinion. It is also illustrated in table 4.21 that the type of latrine material affected its durability. From the study, 44% of the respondents strongly agreed that the type of latrine material had an influence on durability, 43% agreed, 2% disagreed, and 6% of the participants strongly disagreed.

The findings revealed that latrines characterized by flies and urine stagnation on the slabs were unfriendly to users and they could be avoided on the grounds of uncleanliness. These results concurred with the findings obtained by Saxton *et al.* (2017) in Bangladesh where residents demonstrated minimal utilization of unclean toilets. The acknowledgement by some few people that they could still make use of untidy sanitation facilities could be attributed to the fact that some residents did not mind about the status of toilets and could not trade toilet use with open defecation. When asked why toilets would remain unclean, a female respondent in the focus group discussion mentioned strained water access and poor status of the slab that made it difficult to clean toilets.

"I liked cleaning my toilet but if I had to fetch water from the water point which was many kilometers away, with the cost of one jerrycan of water being 20 shillings, I would prefer fetching drinking water and not water for cleaning toilets."

Further, the study showed that latrines with narrow apertures were subject to easy fouling as approximation to small-sized apertures could be challenging. As well, urine and faeces stagnation on the slab would happen when slabs lacked a self-cleansing mechanism. The findings agreed with those of Obeng (2020) in Ghana who reported easy fouling of the toilets with poorly designed slabs. Defecation outside the toilet pits was relative to open defecation as faeces left on toilet floors and slabs could facilitate interaction of residents with excreta.

The study also established that the use of latrines with tattered walls was not embraced. The negative opinion could be attributed to the need for privacy when using toilets. These findings were confirmed in the focus group discussion held in the region where participants demonstrated their reluctance of using sanitation facilities which did not guarantee privacy as it was a taboo to be seen by men and children while using toilets. A female respondent said;

"*I could not visit a toilet that has holes in the walls, it is a taboo to be seen by men and children when inside the toilet. Going to hide in bushes would be better than getting into a toilet without a door where everyone was seeing you."*

Similar findings were confirmed by Scorgie *et al.* (2016) in South Africa where toilet users felt uncomfortable using toilets with wall gaps whereby children used to peep through the open spaces. Results from the qualitative study indicated that residents' financial status prevented them from constructing sanitation facilities with good privacy-guaranteeing superstructures. The following statement was made during the discussion:

"Actually, we have always desired to construct good toilets but we were disadvantaged in terms of finances, that was why I do not wonder when I find a person in this area having a toilet with half a door made of sacks."

Toilets made of poor materials which would include grass, polythene papers, and sacks were short-lived compared to those constructed using strong materials such as blocks and bricks. Similar findings were established in Ethiopia by Alemu *et al.* (2017) who pointed out that the use of materials like sacks and grass resulted in collapse of toilets especially during harsh weather. As well, Busienei *et al.* (2019) demonstrated the same results in Lodwar where poor toilet flooring materials were easily rotting. Frequent construction of toilets after frequent collapsing could be expensive especially in the low-income areas where people struggle to survive (Alemu *et al.*, 2017).

4.4.4.1 Summary on the Influence of Latrine Status on Adoption of Sanitation Practices

From Table 4.22, at a very high mean of 4.21, SD=0.94, particiants agreed that the type of materials used to construct latrines had an influence on adoption of improved latrines. Similarly, status of latrine slabs influenced adoption of sanitation practices such as latrine abandonment and open defecation at a mean of 4.00, SD=0.56. At a mean of 3.57, participants agreed that maintenance of toilets influenced latrine use (SD=0.61). However, a mean of 2.04, SD=0.94 showed that a high number of participants felt that latrines with tattered walls did not have an influence on the use of toilets.

Table 4. 22 Summary of means and standard deviation for indicators of latrine status

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Materials and durability	100	4.21	.94	1.00	5.00
Slab status	100	4.00	.56	1.00	5.00
Maintenance	100	3.57	.61	1.00	5.00
Tarttered walls	100	2.04	.94	1.00	5.00
Valid N (List Wise)	100				

4.5 Correlation Analysis

The study examined the relationship between the dependent variable (adoption of sanitation practices) and the independent variables (social factors, cultural factors and latrine status). Correlation analysis was done using Pearson's Product Moment Approach to determine the link between variables and findings were as illustrated in Table 4.23. Correlation between variables was considered significant when the significance, p-value, was less than 0.05. The correlation results illustrated in Table 4.23 indicate existence of a significant relationship between majority of the indicators and adoption of various forms of sanitation practices implying that social cultural factors and latrine status influenced adoption of sanitation practices in the study area.

4.5.1 Correlation Between Social Factors and Adoption of Sanitation Practices

Results on indicator variables of the study showed that latrine presence in the household had a moderate and positive significant relationship with latrine use ($r=0.337$, p-value$=0.005<0.05$). The correlation between latrine presence and open defecation was significant ($r=0.297$, p-value$=0.003<0.05$). Knowledge showed a weak significant relationship with latrine use ($r=0.159$, p-value$=0.023<0.05$) and with adoption of improved latrines ($r=0.099$, $p=0.022$). Besides, the relationship between knowledge and open defecation was 0.404 which was statistically significant as shown by a p-value of $0.000<0.05$. Availability of open spaces around the households had a significant relationship with latrine use ($r=0.236$, p-value$=0.018<0.05$) and negatively correlated with open defecation ($r=0.305$) with a significant value of $0.002<0.05$.

Toilet construction skills showed a strong link with adoption of improved latrines at $r=0.455$, p-value$=0.001$ but the relationship was non-significant with sanitation practices like open

defecation. Besides, the correlation between availability of resources and adoption of improved toilets was negative, weak but significant ($r=-0.012$, $p=0.005<0.05$). Toilet location in relation to safety demonstrated a strong significant correlation with open defecation ($r=0.488$, p-value=0.000) and a weak relationship, $r=0.021$, $p=0.041$ with latrine use.

Latrine use increased with presence of sanitation facilities within the households. However, the significant relationship between toilet presence and open defecation implied that residents would still ignore the available latrines especially when they were not acceptable and user-friendly. Similar findings were presented in Zambia where even with the provision of latrines, residents considered open defecation because they were uncomfortable with the toilets provided (Russpatrick *et al.*,2017). Possessing sanitation-related knowledge increased chances of latrine use and adoption of improved toilets. However, even with knowledge the findings indicated that cases of open defecation would still increase, an implication that knowledge alone was not enough to trigger avoidance of open defecation.

Having open spaces around the households encouraged toilet construction and use and minimized the chances of open defecation. In Ethiopia, Abebe and Tucho (2020) also found increased latrine construction with open spaces around households. The findings further signaled that improved latrines would be constructed where skilled masons were engaged for latrine construction. As well, adoption of improved toilets was dependent on availability of resources such as materials or finances. On the other hand, toilet location far from households increased chances of latrine non-use and maximized the probability of defecating in the open especially when available toilets were unsafe for some members.

4.5.2 Correlation Between Cultural Factors and Adoption of Sanitation Practices

Indicators of cultural factors such as gender roles, religion and beliefs and traditions were correlated with sanitation practices to reveal the direction and extent of relationship between the variables. Findings showed that the correlation between gender roles and latrine use was significant ($r=0.324$, p-value$=0.001<0.05$). Similarly, the correlation between gender roles and open defecation was positive and significant ($r=0.477$, p-value$=0.000<0.05$). There was no significant relationship between gender roles and improved toilets given a p-value greater than 0.05. As well, the relationship between religion and beliefs and open defecation and with improved toilets was non-significant, p-value>0.05. However, religion and beliefs significantly correlated negatively with latrine use ($r=-0.287$, p-value$=0.004$). Traditions and open defecation recorded a negative relationship (-0.259) which was significant (p-value$=0.009<0.05$).

The findings suggested that gender roles facilitated latrine use issues and increased chances of open defecation practices. On the other hand, the negative relationship between religion and beliefs and latrine use implied that the factors minimized chances of latrine use. Further, findings on the negative relationship between traditions and open defecation suggested that the traditions held in the area minimized the probability of defecating in the open.

4.5.3 Correlation Between Latrine Status and Adoption of Sanitation Practices

The study also established the relationship between status of latrines in terms of materials, maintenance, slab status and privacy and adoption of sanitation practices. The correlation findings showed that latrine maintenance had a significant relationship with latrine use ($r=0.230$, p-value$= 0.021<0.05$) and with open defecation ($r=0.175$, p-value$=0.001<0.05$). Slab status in terms of soiling and urine stagnation recorded a negative correlation (-0.251)

with latrine use which was statistically significant (p-value=0.014<0.05). Access to toilets with slabs characterized by soiling and urine stagnation showed a statistically significant relationship with open defecation (r=0.342, p-value=0.000<0.05). Besides, access to latrines with tattered walls showed a significant correlation with open defecation (r=0.242, p-value=0.015) and a weak negative significant relationship (r=-0.071, p-value=0.031) with latrine use. The findings also showed a significant relationship between the durability of latrine construction materials and adoption of improved toilets (r=0.186, p-value=0.044<0.05). The correlation between latrine material durability and latrine use or open defecation was statistically non-significant (p>0.05).

From the correlation results, increased maintenance of latrines increased the chances of latrine use. Thus, the latrines which were not maintained clean would be ignored for open defecation. Using toilets with faeces and urine on the slabs discouraged latrine use and encouraged open defecation practices. Similarly, residents did not prefer using latrines with tattered walls as they did not maintain privacy. These findings concurred with results obtained by Scorgie *et al.* (2016) in South Africa where residents abandoned toilets which had holes around the walls because they feared that children would peep through the holes while using the toilets. The results also suggested that some residents would opt for open defecation when the available toilets lacked proper privacy-guaranteeing walls. Besides, availability of durable materials for latrine construction influenced adoption of improved sanitation facilities.

Table 4. 23 Correlation between social cultural factors, latrine status and sanitation practices

		Latrine use	Open defecation	Improved toilets
Toilet presence	Pearson	.337	.297	-.168
	Correlation	.005	.003	.093
	Sig. (2-tailed)			
Knowledge	Pearson	.159	.404*	.099
	Correlation	.023	.000	.022
	Sig. (2-tailed)			
Open spaces	Pearson	.236	-.305	.241
	Correlation	.018	.002	.051
	Sig. (2-tailed)			
Mason skills	Pearson	-.165	.186	.455*
	Correlation	.099	.063	.001
	Sig. (2-tailed)			
Availability of	Pearson	.000	.061	-.012
resources	Correlation	.997	.542	.005
	Sig. (2-tailed)			
Latrine location v/s	Pearson	.021	.488	-.169
safety	Correlation	.041	.000	.091
	Sig. (2-tailed)			
Gender roles	Pearson	.324	.477	.041
	Correlation	.001	.000	.085
	Sig. (2-tailed)			
Religion and beliefs	Pearson	-.287	.095	.138
	Correlation	.004	.056	.068
	Sig. (2-tailed)			
Traditions	Pearson	.065	-.259	.055
	Correlation	.518	.009	.587
	Sig. (2-tailed)			
Latrine maintenance	Pearson	.230	.175	.180
	Correlation	.021	.001	.074
	Sig. (2-tailed)			
Slab status	Pearson	-.251	.342	.077
	Correlation	.014	.000	.444
	Sig. (2-tailed)			
Tattered walls	Pearson	-.071	.242*	.169
	Correlation	.031	.015	.092
	Sig. (2-tailed)			
Material durability	Pearson	.038	.164	.186
	Correlation	.704	.103	.044
	Sig. (2-tailed)			

**Correlation is significant at the 0.01 level (2-tailed)*

Correlation is significant at the 0.05 level (2-tailed)

CHAPTER FIVE

CONCLUSION, RECOMMENDATIONS AND PUBLICATION

5.1 Introduction

Chapter five (5) explains the summary of the findings based on the influence of social factors, cultural factors and latrine status on adoption of sanitation practices and presents the conclusions and recommendations based on the findings per each objective. A publication based on the findings of the objective on the influence of cultural factors on adoption of sanitation practices is attached as appendix V.

5.2 Summary

The study examined the influence of social cultural factors and latrine status on adoption of sanitation practices in rural areas of Nzaui Sub-County. A previous report by WHO/UNICEF (2021) had documented that the sanitation status especially in the rural areas of developing countries is still low with little progress up the sanitation ladder. The study was therefore necessary to unveil the influence of social factors, cultural factors and latrine status on adoption of sanitation practices in rural areas. Data from households and focus group discussion formed the foundation of the study. The researcher conducted a household survey to find out the sanitation practices in the households and the possible factors related to adoption of sanitation practices like latrine abandonment, open defecation and contruction of uniproved toilets. Further, a discussion that consisted of a team of purposively selected individuals who included a chief, PHO, masons, selected household heads and CHVs also formed the basis of the study. From the findings, the study area's rural sanitation status need attention if at all communities have to attain improved sanitation standards as envisioned in

SDG 6.2 in 2030. The findings on the influence of each variable on adoption of sanitation practices were as summarized in this section.

5.2.1 Influence of Social Factors on Adoption of Sanitation Practices

Defecation in the open did not mostly result from lack of toilets as 44% of the participants strongly disagreed that presence of toilets in the households encouraged their use and other 49% disagreed. Some people would fail to use toilets even when they were available. Toilet use was not influenced by latrine sharing among different houses as more than three quarters of the members would endeavor to use toilets even with strained access. Almost every respondent was aware of the negative impacts of poor sanitation. However, 50% of the participants strongly agreed and 40% agreed that lack of caregiver awareness on proper management of children excreta resulted in indiscriminate disposal of children faeces. While sensitizing people on good toilet designs, sanitation experts should also consider awareness creation on caregivers using diapers to adopt proper ways of disposing of children excreta.

At a mean of 3.98, participants agreed that knowledge influenced adoption of sanitation practices. Results also indicated that availability of open spaces near dwellings encouraged toilet construction and use. Defecation in the open when people were near bushes was not commonly practiced although it would sometimes happen as there existed no toilets in bushes. The presence of toilets in the household was essential as it encouraged proper disposal of excreta. Location of toilets far from the households had an implication on women safety and could be avoided especially at night. At a mean of 3.05, respodents agreed that mason skills were essential in construction of improved toilets thus, without trained masons, the type of toilets constructed could be poor. These results showed that there was a direct

relationship between social factors like availability of open spaces around the household, mason skills and toilet location on adoption of sanitation practices in the rural areas.

5.2.2 Influence of Cultural Factors on Adoption of Sanitation Practices

Most of the respondents (49%) strongly agreed and other 39% greed that men were the primary decision makers on matters of sanitation. Gender roles influenced open defecation practices as indicated by 31% of the participants who strongly agreed that female roles influenced open defecation and 4% agreed with the statement. The findings indicated the need for women participation in decision making on sanitation matters which could promote construction of gender-friendly sanitation facilities. The study also showed that 38% of participants strongly agreed that traditions held in the area encouraged people to use toilets and 42% agreed on the existence of the traditions. Such traditions included the practice of witchcraft on faeces left in the open. From the study, sanitation matters were not prioritized in religious gatherings and some religions associated the cause of diarrhea with demons, indicating the need to sensitize religious members on sanitation realities.

5.2.3 Influence of Latrine Status on Adoption of Sanitation Practices

Access to unclean toilets was a serious factor as majority of the participants (54%) agreed and 13% strongly agreed that they could not use toilets characterized with flies and urine stagnation on the floor. As well, 35% strongly agreed and 45% agreed that the status of latrine slabs facilitated easy pit soiling especially when the drop hole was narrow. Members would therefore avoid using such toilets characterized by faeces on the floor. Besides, most of the residents (59%) strongly disagreed that they could use toilets with tattered walls as they desired maximum privacy when using toilets and it was a taboo to be seen by men and children when inside the toilets. Further, slightly more than 80% of respondents argued that

the type of material used for latrine construction affected latrine durability. Thus, improving the status of sanitation facilities in terms of maintenance, privacy and slab status would facilitate toilet acceptability and usability.

5.3 Conclusion

Owing to the presence of unimproved toilets mostly adopted in Nzaui Sub-County, the study concludes that the area's sanitation status is generally poor. Lack of appreciation of the role of improved latrines in preventing the spread of sanitation-related diseases can hinder progression in the sanitation ladder. Some members in rural areas could avoid using sanitation facilities even in their presence.

From the findings of this study, it can be concluded that social factors such as knowledge influenced adoption of sanitation practices. However, knowledge alone may not trigger adoption of positive sanitation practices. In addition, latrine construction skills, location in relation to toilet safety, and absence of toilets within the households played a significant role in influencing adoption of sanitation practices in the area.

It can also be concluded that due to the influence of gender roles where men are the primary decision makers on household sanitation matters, the sanitation needs for women and children are mostly overlooked in rural areas. Inadequate women involvement in sanitation decision-making exacerbated women stresses of accessing unacceptable latrines which were abandoned for open defecation. Besides, it can be deduced from the findings that although many traditions discourage improved sanitation status, there exist some healthy traditions in rural areas that can discourage poor sanitation practices such as open defecation.

The study also concluded that access to unfriendly latrines such as those that did not maintain the privacy of users, those that were not well maintained, latrines with poor materials and slabs triggered a negative attitude towards the use of the available latrines.

5.4 Recommendations

Based on the findings of this study, the following recommendations were arrived at:

Community Led Total Sanitation (CLTS) strategy in the public and community health practice should incorporate triggering exercises that not only targets open defecation but also enlightens residents on the dangers of adopting unimproved latrines. This could encourage residents to adopt properly constructed toilets in acceptable designs.

The Government of Kenya through the Ministry of Health should incorporate active surveillance systems at the household level tailored towards training members to increase awareness on the best toilet designs and the management of children excreta. This calls for a review of sanitation policies in a way that they not only address adult excreta but also emphasize on the management of children faeces in rural areas.

Given the findings that men took charge of household decision-making, the study recommended inclusion of women in household sanitation matters to ensure adoption of women and children friendly household sanitation facilities. As well, the study recommended the need for sanitation policies to embrace gender empowerment in order to reduce gender-based sanitation inequalities in rural areas. Innovative approaches of planning based on cultural contexts and communities' conditions are essential for a faster sanitation progress in rural areas. These approaches should not only involve local actors but also engage religious communities for behaviour change communication to increase awareness on safe sanitation in gatherings.

In addition, to progress up the sanitation ladder through adoption of acceptable improved latrines, residents need to adopt a community-driven support system where members come together in groups as they would do in a merry-go round, educate one another on the need for good toilets, suggest the best preferred latrines and assist each other to build good toilets. The approach would also boost latrine ownership and acceptability thus use.

The Ministry of Health through the Public Health Officers should popularize approved toilet designs for use in the communities through training of masons on construction of proper toilets using locally available materials.

5.5 Suggestion for Future Research

The study established that social factors, cultural factors and latrine status influenced adoption of sanitation practices such as abandonment of available toilets, open defecation and construction of unimproved sanitation facilities. However, there could be other numerous factors not considered in this study that could influence adoption of sanitation practices in the rural areas. As such, future studies should target to find out the influence of psychosocial factors, demographic factors and economic factors on adoption of sanitation practices in rural areas. Studying other factors would increase the scope of identifying the causative factors of sanitation practices in rural areas.

Given that this study concentrated on sanitation for rural areas, the study presumed that the sampled population yielded adequate information which translated to reliable results. However, the findings may not be generalizable to all other rural areas as social cultural aspects could differ from region to region. This study therefore recommends an exploration of social cultural factors influencing sanitation practices in other low-income rural areas. In addition, Nzaui Sub-County is a dry and water-stressed region, future studies should also

seek to establish whether environmental factors have an influence on adoption of sanitation practices especially in water-stressed rural settings.

5.6 Publication

A journal article was prepared and submitted to the African Journal of Science, Technology and Social Sciences. The article published was on the 'Influence of cultural factors on adoption of sanitation practices in rural areas: A case of Nzaui Sub-County, Makueni County, Kenya' referenced as 'Eliud, G.K., Kirimi, L.M., Mburugu, K.N., & Kiogora, D. (2022). In the cultural mirror: Influence of cultural factors on adoption of sanitation practices in rural areas: A case of Nzaui Sub-County, Makueni County, Kenya. *African Journal of Science, Technology and Social Sciences 2 (2) 174-183.*

The publication is provided as appendix VII.

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APPENDICES

Appendix I: Informed Consent

This study is aimed at establishing the influence of social cultural factors and latrine status on adoption of sanitation practices among the residents of NZaui Sub-County of Makueni County. The data gathered will only be used for academic purposes and will not be accessed by any third party. The aim is to yield insight into adoption of sustainable and acceptable sanitation solutions. The researcher only wants to learn your views on sanitation to expand the existing knowledge about sanitation practices. Note that participation in this study is voluntary, you may agree or decline taking part in the study. If you agree to participate in the exercise, your honest response to questions will be required. Note that there will be no right or wrong argument. Participants will be permitted, if they wish to, to decline participation even when the survey is mid-way. You will be engaged for the survey or interview for 30 to 40 minutes.

Kindly indicate your stand in participating in this study by signing this consent form:

I agree to take part in this exercise (tick where appropriate) **Yes ( ) No ( )**

Name: …… Ward:……..

Signature……..

Appendix II: Household Questionnaire

SECTION ONE: QUESTIONNAIRE ***(To be filled by respondents)***

INTRODUCTION

The aim of this study is to provide information on the influence of social cultural factors and latrine status on adoption of Sanitation Practices in Rural Area, a Case of Nzaui Sub-County. The research is purely for academic purposes. Any information shared will be treated with strict confidentiality. Your time and honest responses will highly be appreciated.

SECTION A: DEMOGRAPHIC INFORMATION

Instructions: Please tick (√) where applicable in the spaces provided

1. Gender of respondent	Male ☐ Female ☐
2. Age of respondent	18-33 { } 34-49 { } 50 and above { }
3. Level of education	No formal education { } Primary { } Secondary { } Post-secondary level { }
4. Religion	Muslim ☐ Hindu ☐ Christianity ☐ Any other (Specify…….)
5. Occupation of male head of household	Salaried employee { } Casual labourer { } Self-employed { } No work at all { }
6. Household size (number of people including parents and children in this household)	Less than 2 members { } Between 2 to 5 members { } Between 6 to 10 members { } Over 10 members { }

SECTION B: ADOPTION OF SANITATION PRACTICES

In this section, the researcher seeks to understand the sanitation practices evident in the study area. **Kindly fill where appropriate by indicating a tick (√).**

i. Latrine use

What kind of toilet facility do your household members use?

1. Flush toilets ☐
2. Ordinary (traditional) pit latrines ☐
3. Ventilated improved pit latrines (with vent pipe) ☐
4. Composting toilet ☐
5. Bucket latrines ☐
6. No facility, defecation done in the open ☐

Read through the statements in each row and indicate by ticking (√) only once for every row to show your level of agreement with the following statements.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Males use latrines only for long calls (defecation) as opposed to short calls (urination)					
Females use latrines only for long calls (defecation) as opposed to short calls (urination)					
Young children do not use toilets for defecation					
Latrines located in lonely places are mostly not used at night					
Latrines located in lonely places are mostly not used at day time					

ii. Open Defecation

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Open defecation is a normal practice in this area					
Members defecate in the open when the household lack a functional toilet					
People defecate in the open while away from home					
People defecate in bushes when available toilets are smelly and inhabited by flies and maggots					

iii. Abandonment of available latrines

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Members of this household do not use the available latrines					
Latrines with holes around the walls are avoided					
Toilets that have urine or faeces stagnating on the floor are avoided					
Unroofed toilets are abandoned in rainy weather					
I relieve myself in bushes when it comes to sharing the available toilet with children					

iv. Improved status of toilets

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The toilet(s) in this household are smelly and attract many flies					
Latrine pits in this region reach the underground water level					
The toilet(s) provided is not easily cleaned					

Masons who construct toilets in this region are not trained					

SECTION C: SOCIAL ASPECTS

Instructions: Please indicate your level of agreement to the following statements by ticking (√) where applicable

i. Presence or absence of toilets

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Presence of toilets in the household encourage its use					
Lack of toilets influence defecation in the open places					
Insufficient toilets shared among various households discourage their use					
People defecate in the open even when toilets are provided					

ii. Knowledge

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Open defecation puts children at risk of diseases					
Lack of caregiver awareness on management of children stool facilitates disposal of children faeces in the open.					
Information sharing through public health campaigns influence use of toilets					
Children faeces is not as harmful as adult facaces					
Unimproved toilets habour flies which transmit diarrheal diseases					
Urinating in the open result in diseases					

iii. Availability of space

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
People do not construct latrines when they are near bushes					
People defecate in the open when in the bushes					
People defecate in the open spaces around the household especially at night					
Toilets are widely constructed in the open spaces around the household					
Strained spaces in the household discourage toilet construction					

iv. Skills

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Masons (latrine builders) with skills of latrine construction are available when needed					
Masons with latrine construction skills construct improved toilets					
The person who dictates the design for latrines is the household head and not the mason					
Untrained latrine builders construct high quality latrines					
Training of masons is a waste of resources (money)					

v. Toilet Location and safety

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
People get harassed while visiting the toilets situated away from the household					
Toilets located far from the households are unsafe for women and children					

Location of latrines near the household exposes members to flies and odor nuisances					
Siting latrines far from households encourage the practice of open defecation					
Siting latrines near the household encourage open defecation					

SECTION C: CULTURAL FACTORS

Instructions: Please tick in the appropriate box to indicate the extent to which you agree with the following statements

i. Gender roles

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Males are the primary decision makers on sanitation matter (toilet construction) in this region					
Females are the primary decision makers on sanitation matters (toilet construction) in this region					
Male roles influence open defecation					
Female roles influence open defecation					
Separation of toilets by gender influence their use					

ii. Religion and Beliefs

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Diarrhea is caused by demons					
Pit latrines habour evil spirits					
Religious leaders talk about sanitation matters in church (encourage people to use toilets)					

Children faeces is not harmful therefore can be left in the open to be food or dogs					

iii. Traditions

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Some traditions upheld in this locality discourage people from constructing toilets					
Some traditions upheld in this community encourage people to construct toilets					
Traditions upheld in this locality influence open defecation practices					

SECTION D: LATRINE STATUS

In this section, the researcher desires to understand how status of latrines influence doption of sanitation practices. ***(Please tick in the appropriate box to indicate the extent to which you agree with the following statements)***

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
People ignore using unclean toilets and opt for open defecation when latrines are not clean.					
Poor status of the slabs facilitates easy soiling of pits and urine stagnation on floors.					
I can use a latrine with tattered walls (walls with holes that you can be seen from outside)					
The type of material used for latrine construction affect durability of toilets.					

Appendix III: Observation Checklist

SECTION 2: ***To be filled by the enumerator***

Introduction

This checklist is designed to gather data on sanitation facilities at the household level. Note that permission to observe sanitation facilities should be first sought from the respondents before recording observations to ensure that they are at ease of the intrusion. You are required to make observations on the following features at the households you visit and record by indicating a tick (√) where appropriate.

1. Presence of toilet Yes ☐ No ☐

2. Is there evidence of open defecation? Yes ☐ No ☐

3. Is the toilet clean / well maintained? Yes ☐ No ☐

4. Is there a roof provided for the toilet Yes ☐ No ☐

5. Does the toilet contain a slab? Yes ☐ No ☐

6. a) Does the toilet have a privacy structure (wall)? Yes ☐ No ☐

b) If yes, is it in good condition (not tattered)? Yes ☐ No ☐ (*please skip this question if the answer in 'a' above is 'no')*

7. Does the toilet have bad odour? Yes ☐ No ☐

8. Are there flies or maggots in the toilet? Yes ☐ No ☐

Appendix IV: Interview Guide for Focus Group Discussions

Introduction

My name is Grace Kasiva Eliud, a researcher seeking to gain an in depth understanding on the influence of social cultural factors and latrine status on adoption of sanitation practices in this area to shed light to rural areas and the County Government of Makueni on the approach to implementation of acceptable and improved sanitation. This study is based on voluntary participation and respondents have a right to leave at will. You will be required to sign a consent form before participation to ascertain your willingness to take part in this discussion. Your honest feedback will highly be valued.

NB: Information shared during this discussion will be treated with utmost confidentiality.

1. Do members of this region abandon the available toilets for open defecation? Why would this happen?.....

.....

.....

2. Are there cases of people who fail to use toilets even when provided? What do you think contributes to the situation?

.....

.....

.....

3. Are there cases of open defecation (people going to bushes) in this region? What could be facilitating it?

……

……

……

4. Where do people (men and women) go when they need to go for short calls?

……

……

5. Is there anyone who teaches people on toilet adoption and use? Who teaches them and has it helped them to change toilet use behaviours?

……

……

……

6. Are there people who are trained for toilet construction in this region? What is your view on mason training with regard to construction of improved toilets?

……

……

7. Is it the mason or the owners of households who dictate the toilet designs to be adopted? How has it influenced toilet designs?

……

……

8. How are toilets perceived in this region? Are there beliefs and traditions tied to toilet use?

……

……

9. How are children faeces disposed?

……

……

10. How are children faeces perceived in this locality?

……

……

11. Which gender has the primary role of toilet construction in this region? Are the resulting toilets acceptable to all genders?

……

……

12. Who normally maintains cleans toilets in this community? Why would toilets remain unclean?

……

……

13. Is the climatic situation in this area connected in any way to presence of poor toilets

……

……

14. Do you think residents of this area have the power to change the sanitation situation in this area? If yes, how? If no, why?

……

……

…….

15. What recommendations would you give to improve sanitation practices in the rural areas?

……

……

……

Appendix V: Distribution of Themes from the Focus Group Discussion

Themes	Number of participants contributing to the theme	Percentage contributing to the theme	Number of codes
Roles by gender	7	77.8%	15
Religion	5	55.6%	17
Resources	8	88.9%	20
Space	6	66.7%	13
Traditions	6	66.7%	24
Latrine condition	9	100%	26
Awareness	5	55.6%	15

Total themes= 7

Participants (N)= 9

Appendix VI: Research Permit

MERU UNIVERSITY INSTITUTIONAL RESEARCH & ETHICS REVIEW COMMITTEE
(MIRERC)

TO: Eliud Grace Kasiva
Through: Dean, School of Engineering and Architecture
FROM: Chairman MIRERC
REF: MU/1/39/28 Vol.2 (32)
SUBJECT: MIRERC clearance and approval of Research
DATE: 17th February 2022

I hereby forward Ethical clearance and approval of your research proposal; *Influence oh Sociocultural Factors on Adoption of Sanitation practices for Rural Areas: A Case Study of Nzaui Sub-County, Makueni County, Kenya* for implementation: Note that the implementation of the project should strictly adhere to and follow expected attributes of Justice, Respect, Beneficence and Non-maleficence to the study subjects.
The committee expects to be informed on the progress of the project from time to time and any amendments that may be instituted or incorporated into the proposal during its implementation to be pointed out.

The committee also expects this research project implementer(s) will not at any time risk the study subjects/data in terms of unfair disclosure of information that may come to their knowledge by way of this project or subject the study subjects/data to any bias or consequences whatsoever if or not a study subject withdraws from the project or access to data is denied.

The committee and study subjects will expect to be considered favorably for any benefits that arise from this study. The university would be grateful to act as repository for the data that your project will generate.

The MIRERC committee therefore accords the clearance and approval for this project to be implemented by the investigator(s) during the period specified by the project.

Thank you.
Yours Sincerely,

Prof. Eric Muchiri Ph. D
Chairman, MIRERC
Cc: Director, RDE

M.U.S.T IS ISO 9001:2015 CERTIFIED

Appendix VII: Journal Article Publication

AFRICAN JOURNAL OF SCIENCE, TECHNOLOGY AND SOCIAL SCIENCES

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

A Publication of Meru University of Science and Technology

In the Cultural Mirror: influence of cultural factors on adoption of sanitation practices in rural areas—a case of Nzaui Sub-County, Makueni County, Kenya

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ABSTRACT

Provision of adequate sanitation is among the common approaches of preventing sanitation-related diseases. However, provision of sanitation facilities may not be a sustainable sanitation solution unless the population's behavior changes and a positive perception is embraced. This paper examined the influence of cultural factors on adoption of sanitation practices in rural areas. The article was based on field research that employed convergent research design where both qualitative and quantitative data was gathered simultaneously. Quantitative data was gathered using structured questionnaires from 100 household heads selected using stratified and proportionate simple random sampling techniques. Qualitative data was collected using an interview guide from a purposively selected focus group consisting of 9 participants. The findings were organized into themes and presented in narratives. Quantitative data was analyzed using the Statistical Package for Social Sciences (SPSS) version 25 which generated descriptive and inferential statistics to unveil the relationship between variables. From the findings, adoption of unimproved toilets was the main form of sanitation practices covering a mean of 3.3094. A unit increase in gender roles led to a 0.147 increase in adoption of sanitation practices (p-value=0.000) and a unit increase in traditions led to a 0.032 decrease in adoption of sanitation practices (p-value=0.014) in the area. Some denominations associated diarrhea with demons other than poor sanitation which was seen to facilitate poor sanitation practices. Residents believed that faeces left in the open could be used for witchcraft purposes, a tradition which had a positive impact on eradicating open defecation. Gender roles like fetching water, collecting firewood and livestock rearing in lonely places facilitated open defecation. The study recommended women inclusion in household sanitation matters and incorporation of religious leaders as advocates of sanitation behavior change. The study also recommended the need for future studies to examine adoption of sanitation practices alongside environmental, demographic and economic factors.

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Introduction

The Sustainable Development Goal agenda 6.2 targets to achieve universal basic sanitation and hygiene and an end of open defecation by 2030 (United Nations, 2018). Provision of adequate sanitation has been pointed out as one of the common strategies of preventing sanitation-related diseases such as diarrhea (Busienei et al., 2019). However, according to Novotný et al. (2017), sanitation projects fail after few years due to acceptability and sustainability issues. Efforts by governments to improve sanitation services have unexpectedly yielded poor outcomes as even where toilets are available, people still practice open defecation (Busienei et al., 2019). In rural areas, sanitation is surrounded by cultural issues (Wasonga et al., 2016) which should be addressed before providing sanitation solutions else such solutions be unacceptable. Thus, provision of latrines alone may not be a sustainable sanitation solution unless the population's behavior changes and positive perception embraced. The study was designed to explore the influence of cultural factors on adoption of sanitation practices in rural areas.

Maximizing access and use of safely managed sanitation facilities reduces the risk of human contact with excreta (Wasonga et al., 2016). Contact with excreta from unsafe sanitation facilities could result in diarrheal incidences responsible for 88% of children deaths in Sub-Saharan Africa (Demissie et al., 2021). When sanitation facilities are safe, adequate and are utilized by both rural and urban population, health facilities would receive fewer sick residents. Although the importance of safe sanitation facilities is acknowledged, reports by WHO/UNICEF (2021) show that 3.6 billion people globally access unsafe sanitation facilities where 14% defecate in the open with the majority from developing countries. In developing countries like Kenya, only 33% of the population use sanitation facilities which separate them from contact with excreta and 9% still practice open defecation (WHO/ UNICEF, 2021). Inadequate adoption and use of sanitation facilities could be associated with cultural factors. Adoption and use of sanitation facilities is thus likely to be more successful when the communities' cultural perspectives are considered which was the focus of the study.

The role of gender in sanitation programming has been reported to constrain access to suitable sanitation facilities specifically for females (Caruso et al., 2017; O'Reilly, 2016; Khanna & Das, 20s16). While exploring the sanitation practices among 69 participants in India, a study by Caruso et al. (2017) found that men had the primary role of constructing toilets while women participated in household chores. The study reported that when men took charge of toilet construction, the facilities were located far from the households such that women feared visiting or taking their children to the toilets. A similar study in India by Routray et al. (2017) found out that in 80% of the households, power dynamics were limited to one gender. When involvement is skewed in sanitation matters, facilities established may be insecure and unacceptable to the users. In Odisha, a study by Sahoo et al. (2015) on sanitation stressors for women established that when men were the primary decision makers, the available toilets were unsafe for use and did not accommodate menstrual hygiene needs. The study showed that women struggled to cross high fences and walls to identify safer defecation sites and alternative solutions to dispose used sanitary materials with less anxiety. Unless sanitation policies embrace gender empowerment, gender-based sanitation inequalities could continue being rampant. Given that gender roles may vary with communities, it was necessary to examine its influence on adoption of sanitation practices in the study area.

The presence of toilets and their use is rooted in traditions and beliefs (Stopnitzky, 2017; Wasonga et al., 2016). In India, Stopnitzky (2017) established that construction of latrines was mandatory for males' households who wished to acquire a bride. The study showed that men could not marry without first constructing a latrine, a practice which saw an increase in adoption of toilet use by 21%. Adoption and use of toilet facilities could eliminate exposure of people to sanitation-related infections. Although traditions in India spearheaded construction of sanitation facilities, the situation in Kenya was different. A study by Wasonga et al. (2016) in Kenya found out that latrines were set apart for men and women and that each household was required to have a separate toilet for in-laws. Mixing of faeces for in-laws in a single toilet was a taboo. Separation of toilets for family members could however be quite expensive for the families. The study further established that when toilet facilities were not readily available, respondents defecated in holes around the households especially at night. Improperly disposed human faeces could be breading sites for diarrheal pathogens which are ferried to the rivers during rainy seasons causing water contamination. Consumption of such contaminated water could result in water-borne diseases such as dysentery. Although such findings were reported in Kenya, different communities could have different traditions which affect toilet use. The study explored the beliefs and traditions surrounding sanitation practices among communities within the study area.

Concepts of purity and pollution are well recognized values for different religions (Dwipayanti et al.,

2019. Although the influence of religion on sanitation practices is conceptualized as less obvious, some values could interfere with toilet adoption and use for people who deeply embrace them. In Indonesia, a study by Dwipayanti et al. (2019) that explored the local values related to sanitation uptake established that latrine construction near households could cause misfortunes. Such misfortunes were associated with certain spirits believed to reside near homes. The study also found out that traditional healers associated the cause of diarrheal diseases to unseen supernatural beings. Although religious values should be respected, some could encourage ignorance of responsibilities in sanitation and promote poor excreta management. In South Africa, Vyas and Spears (2018) found out that Hindus defecated in the open due to the rituals of purity which considered latrine construction near homes as a source of pollution. Failure to accept and make use of the available toilets may result in inefficient excreta management which could facilitate serious public health and environmental consequences.

Existing studies for instance by Routray et al. (2017), Wasonga et al. (2016), Busienei et al. (2019) and Angoua et al. (2018) examined sanitation issues in culturally different areas concentrating on urban, peri-urban and informal settlements. Given that cultural issues differ from region to region (Wasonga et al., 2016), there exists insufficient documentation on the influence of cultural factors on adoption of sanitation practices in rural areas which was the focus of the study.

Problem statement

The need for universal access to safe sanitation has been underscored in the Kenya vision 2030 agenda on sanitation as a fundamental facet towards eradication of diarrheal morbidities, poverty and possible mortalities (United Nations, 2018). Universal access to sanitation can only be attained through adoption and active use of improved sanitation facilities to ensure complete separation of human contact from excreta (WHO/UNICEF, 2021). However, the types of latrines adopted in developing countries, Kenya included, are sometimes rudimental and residents lag behind in attaining the expected sanitation behaviors.

Approaches instituted by the government to promote improved sanitation such as community-led total sanitation and creation of awareness have not shown complete effectiveness in triggering a sustainable sanitation behavior change. Although toilets may be provided, some communities continue to defecate in the open. Provision of toilets while ignoring the influence of cultural factors on adoption of sanitation practices could result in adoption of unacceptable toilets which are not used, which may continue keeping communities down the sanitation ladder. This may make them miss the target of attaining the expected sanitation standards. With the existence of a paucity in research on the influence of cultural factors on adoption of sanitation practices, it was necessary to explore the issue.

Objective

The objective of the study was to examine the influence of cultural factors on adoption of sanitation practices in rural areas.

Methodology

Study design

In this study, the researchers adopted a convergent mixed methods research design which enabled simultaneous gathering of both quantitative and qualitative data.

Study site

This study was carried out in Nzaui Sub-County, a region in Makueni County. It is a water-stressed region predominantly inhabited by the Kamba tribe, who live in homesteads containing male household heads, their wives, children, and sometimes their children's families. The area also experiences prolonged episodes of drought. Previous reports confirmed that the region has almost half of its inhabitants possessing unimproved sanitation facilities and that the annual expenditure of the County government in dealing with the impacts of poor sanitation surpasses $6.38 million (World Bank, 2019).

Target population

This study targeted household heads aged above 18 years from households within Nzaui Sub-County. The total number of households is 30806 (KNBS, 2019). Households were targeted because members of the same household share a single toilet block (Mwirigi et al. 2019). Household heads were considered because it was believed that they comprehensively understood matters on their households and could give accurate information concerning sanitation matters for their homes. The study also targeted Community Health Volunteers, Public Health Officers, masons and a chief. Researchers in this study believed that the group possessed in-depth information and knowledge on matters of sanitation at the household and community level.

Sample size determination

The number of participants required for the study was calculated using Yamane's (1967) formula. Yamane (1967) recommended a 5% margin of error in sampling. However, Adam (2021) proposed a remodeling to the sampling error to be up to 10% at all confidence levels which has also been successfully used by other researchers in their studies (Ali et al. 2021; Mugenda & Mugenda, 2012; Islam, 2018). The sample size was thus calculated as shown:

n=N/(1+N(e2)

Whereby, n represented the desired sample, N was the total target population size, and e was the sampling error (considered to be ±10%)

=30, 806 / (1+30, 806 (0.12) = 100 respondents.

Sampling technique

The researchers employed stratified sampling technique to categorize Nzaui Sub-County into five strata of its respective Wards namely; Mulala, Kalamba, Mbitini, Matiliku, and Nguu (KNBS, 2019). Researchers then considered proportionate simple random sampling technique to select household heads within households in the strata. Proportionate simple random technique was effective as it ensured that subjects, although from a population that was unevenly distributed, had an equal chance of being selected for participation (Creswel, 2013). To get the number of participants per stratum (ward), the total number of households per stratum was divided by the total households in the area then multiplied by the calculated sample size as shown in Table 1.

Ward		Number of Households per stratum or Ward (N_s)	Sample targeted per Ward (n_s) = (Ns/N) ×n
1.	Kalamba	4635	15
1.	Matiliku	4884	16
1.	Mbitini	6867	22
1.	Mulala	8051	26
1.	Nguu	6369	21
Total		Total households (N) = 30806	Desired sample size (n)=100

Table 1: *Distribution of samples in Nzaui Sub-County*

On the other hand, participants for the focus group discussion were selected using purposive sampling technique.

Data collection and analysis

Quantitative data was collected from 100 households using structured questionnaires which were self-administered. Open-ended interview guides aided in the collection of qualitative data from a focus group which consisted of 9 participants who included: 2 Community Health Volunteers, 1 area Chief, 2 Public Health Officers, 2 masons, and 2 household heads. The Statistical Package for Social Sciences (SPSS) version 25 was used in the analysis of quantitative data to generate both descriptive statistics and inferential results which illustrated the relationship between variables. Qualitative data was organized into themes guided by the objectives and was presented in narratives.

Ethical consideration

Ethical approval for carrying out this study was sought from the Meru University Institutional Research Ethics Review Committee (MIRERC). Participants gave informed consent before participating in the study and were assured of the safety of their information. To ensure safety of the information gathered, data in hardcopies was locked in a private box and soft copy data was password-protected and stored in a zipped file to avoid access by a third party.

Results and Discussion

Demographics

Results showed that more males (57%) than females (43%) participated in the study and that only 2% of the participants had not attained formal education. Christianity was the predominant religion taking 98% of the sampled population.

The findings suggested that men mostly took overall charge of household matters and women took lesser roles in making decisions. The fact that Christianity was the most common religion implied that there mostly existed no sanitation barriers tied to religion in the area. Almost all the residents were literate meaning that they understood the negative effects of poor sanitation.

Sanitation practices

Results yielded that 75% of residents used traditional pit latrines, 23% used ventilated improved pit latrines, 1% flush toilets and 1% did not possess a latrine. Adoption of unimproved toilets was the main form of sanitation practices and took a mean of 3.3094. Issues of latrine use including abandonment of available latrines had a mean of 2.6757 and open defecation was the least common form of sanitation practices with a mean of 2.5970.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.Gender/gender roles and sanitation practices					
Males are the primary decision makers	1%	2%	9%	39%	49%
Male roles influence open defecation	15%	41%	21%	21%	2%
Female roles influence open defecation	7%	27%	31%	31%	4%
Toilet separation by gender influence toilet use	14%	39%	35%	9%	3%
2. Religion and beliefs and sanitation practices					
Association of diarrhea with demons	57%	39%	0%	3%	1%
Pit latrines harbour evil spirits	46%	48%	6%	0%	0%
Children faeces are not harmful	45%	36%	11%	6%	2%
Sanitation matters are prioritized in churches	62%	30%	0%	7%	1%
3.Traditions and sanitation practices					
Traditions held discouraging toilet construction	22%	69%	9%	0%	0%
Traditions encouraging open defecation	27%	71%	2%	0%	0%
Traditions held encourage toilet construction	6%	8%	6%	42%	38%

Table 2: *Influence of cultural factors on adoption of sanitation practices*

Traditional pit latrines are mostly unimproved sanitation options, and therefore the findings suggested that most of the toilets adopted exposed residents to the risks of poor sanitation through direct or indirect interaction with excreta. Results also showed that some residents felt uncomfortable with using the available sanitation options and responded by ignoring them.

Influence of cultural factors on adoption of sanitation practices

The degree of participants' agreement to various statements given in a 5-point Likert scale ranging from: 1-Strongly disagree, 2-Disagree, 3-Neutral, 4-Agree and 5-Strongly agree was examined to reveal whether gender, religion, beliefs and traditions influenced adoption of sanitation practices. The results were as summarized in Table 2. Response was also sought from focus group discussion to and was presented in a narrative way.

Gender roles and adoption of sanitation practices

Response on the gender with the primary decision-making role was sought. From the results, 49% of the respondents strongly agreed that males were the decision makers on toilet construction, 39% agreed with the statement, 1% strongly disagreed and 2% disagreed. Regarding male roles, 15% of the participants strongly disagreed that male roles influenced open defecation, 41% disagreed while 21% agreed and only 2% strongly agreed that roles taken by men influenced defecation in the open. It is also evident in Table 2 that 4% of the respondents strongly agreed that female roles influenced open defecation, 31% agreed, 27% disagreed and 7% strongly disagreed. When asked whether toilet separation by gender influenced toilet use, 14% strongly disagreed that it influenced toilet use, 39% disagreed, 9% agreed and only 3% strongly agreed.

The findings suggested that men were the primary decision-makers on sanitation matters at the household level, a situation attributable to the cultural values in the area that men took control of household matters. This was confirmed in the focus group discussion where a male respondent said:

"Like in my home, I am the one who decides on every household matter, but when I am away, my wife can do that."

When men dominate household sanitation matters, the type of toilets proposed could overlook the menstrual and security needs of women in toilets and it might be less impossible for them to be convinced that good latrines are good investments. The fact that decision-making on toilet construction by men influence adoption of sanitation practices was echoed by Caruso et al. (2017) where the sanitation facilities established by men in rural Odisha were insecure such that women looked for alternative sites for defecation.

The roles played by females to a greater extent influenced open defecation compared to those of men. The fact that females were mostly engaged in household chores such as looking after children who have the tendency of defecating in the open, fetching water and collecting firewood in bushes where there were no toilets facilitated open defecation practices as revealed in the focus group discussion where female respondents said:

"In the evening I have to go to the forest to look for firewood and even sometimes rivers are far away. When we are there, we have no other option than using the bush."

"My children use diapers and sometimes they hide to defecate behind the house. You know you cannot know where the faeces are unless you follow keenly."

Some male roles included livestock rearing in lonely places with absence of toilets which facilitated defecation in the open.

"When you walk around the forests you will meet faeces for the boys who look after cows and goats."

The fact that gender roles influence sanitation practices was also confirmed by Routray et al. (2017) and O'Reilly (2016) in India.

The findings also showed that having separate toilets for males and females did not encourage their use. Findings from the few who agreed that separation of toilets by gender influenced toilet use could be attributed to the fact that males and females desired privacy and each gender would feel comfortable while using separate toilets. Similar conclusions were made in India by O'Reilly (2016) where sharing of toilets was a form of toilet insecurity especially for girls and women.

Religion and beliefs and adoption of sanitation practices

Aiming at establishing the influence of religion and beliefs on adoption of sanitation practices, respondents were asked to indicate whether diarrhea was associated with demons. Many respondents (57%) strongly disagreed, 39% disagreed, 3% agreed and 1% strongly agreed. Intending to establish their perception on pit latrines, respondents were required to indicate whether toilet pits haboured evil spirits. Of the participants, 46% strongly disagreed and 48% disagreed with the statement. Besides, 45% of the sampled population strongly disagreed that children's faeces were not harmful, 36% disagreed, 6% agreed and 2% strongly agreed with the opinion. About prioritization of sanitation matters in churches, 62% strongly disagreed that it happened, 30% disagreed, 7% agreed and only 1% strongly agreed.

It can be deduced from the findings that beliefs that would make people fear visiting toilets were not held in the area. Residents were aware of the real causes of diarrhea including poor sanitation. Some people showed support to the statement that diarrhea was caused by demons because there existed religions which held a strong belief on the role of demons in facilitating diseases. A respondent in the focus group discussion said:

"The people at risk of acquiring diarrhea are those who do not use toilets and leave their faeces in the open. Faeces left in open is carried to the rivers where people get diarrhea on consuming the water. It is good to appreciate each other's religion; I only know that some 'Kavonokyas' associate diseases with demons."

When people do not appreciate the real causes of sanitation-related diseases, they are likely to engage in negative practices such as toilet non-adoption and open defecation which expose members to the risks of contracting diseases. The role of religion and beliefs in facilitating sanitation practices was confirmed by Vyas and Spears (2018) in South Africa and Dwipayanti et al. (2019) in Bangladesh.

Findings also indicated that majority of the residents were aware that children's faeces was dangerous and could cause diseases. The widespread awareness could be ascribable to the high literacy levels in the region as people had attended school and understood the negative implications of poor sanitation. The study further showed that sanitation matters were rarely prioritized in religious gatherings such as churches.

Traditions and adoption of sanitation practices

Researchers also desired to find out whether there existed traditions which promoted adoption of sanitation practices in the region. Findings from Table 2 show that 22% of the respondents strongly disagreed that there existed traditions which discouraged toilet construction in Nzaui Sub-County, 69% disagreed

while there were no participants supporting the case. When asked whether there existed traditions encouraging open defecation in the community, 27% of the participants strongly disagreed, 71% disagreed, and none of the respondents supported the statement. Further, it was enquired of the participants whether there were then traditions that encouraged toilet construction in the Sub-County. From the report, 38% strongly agreed on the existence of such traditions, 42% agreed, 6% strongly disagreed and 8% disagreed.

The findings signaled that the traditions which existed in the area encouraged positive sanitation practices. These findings were supported by the results obtained from discussions in the focus group which revealed the practice of witchcraft on faeces left in the open as uttered by a respondent:

"People fear leaving their faeces in the open as they might be taken for witchcraft purposes. You know when you leave your faeces in the open, a witch will carry your faeces, pour ash on it and make you develop rashes around the anal parts."

Similar findings on the positive influence of traditions on sanitation were also reported by Stopnitzky (2017) in India where the traditions held there encouraged toilet construction. Traditions of this sort could encourage people to actively adopt, and make use of, sanitation facilities.

Correlation analysis

Correlation analysis was done using Pearson's Product Moment technique to establish the link between indicators of cultural factors such as gender and gender roles, religion and beliefs, and traditions, and adoption of sanitation practices. The correlation between variables was significant when the significance (P) value was below 0.05. The outcomes illustrated in Table 3 show the existence of significant correlation between cultural indicators and adoption of most various forms of sanitation practices.

Results from Table 3 show that the correlation between gender roles and latrine use was significant (r=0.324, p-value=0.001<0.05). Gender roles and open defecation also recorded a positive and significant relationship (r=0.477, p-value=0.000<0.05). There was no significant relationship between gender roles and improved toilets given a p-value greater than 0.05. The correlation between religion and beliefs and latrine use was negative and significant (r= -0.287, p-value=0.004<0,05). The correlation between religion and beliefs with open defecation and with improved toilets was non-significant. Further, the correlation between traditions and open defecation was -0.259 and also significant with a p-value of 0.009<0.05.

These findings suggested that latrine use issues increased with gender roles and that gender roles facilitated increased open defecation practices. On the other hand, the negative relationship between religion and beliefs and latrine use suggested that religion and beliefs in the area minimized chances of latrine use. Further, results on the negative relationship recorded between traditions and open defecation suggested that the traditions held in the area reduced chances of open defecation.

Regression analysis

This study targeted to examine the influence of cultural factors on adoption of sanitation practices. It had been evidenced in the literature that cultural factors could facilitate adoption of sanitation practices. The dependent variable (adoption of sanitation practices) was measured against cultural factors to show the variables' extent of relationship. Results were as illustrated in Table 4.

From the findings, r=0.411, a suggestion that cultural factors had a moderately strong association with adoption of sanitation practices. All the cultural fac-

		Latrine use	Open defecation	Improved toilets
Gender roles	Pearson Correlation	.324	.477	.041
	Sig. (2-tailed)	.001	.000	.085
Religion and beliefs	Pearson Correlation	-.287	.095	.138
	Sig. (2-tailed)	.004	.056	.068
Traditions	Pearson Correlation	.065	-.259	.055
	Sig. (2-tailed)	.518	.009	.587

Correlation is significant at the 0.05 level (2-tailed)

Table 3: *Correlation between cultural factors and various forms of sanitation practices*

Table 4: Regression results on the influence of cultural factors on adoption of sanitation practices

Model	Unstandardized Coefficients		Standardized Coefficients	p-value
	B	Std. Error	Beta	
(Constant)	2.448	.168		.000
Gender/gender roles	.147	.038	.378	.000
Religion & beliefs	.042	.041	-.098	.305
Traditions	-.032	.032	.098	.014
Predictors-Gender/gender roles, religion & beliefs and traditions Dependent variable- adoption of sanitation practices R=0.411 R-Square=0.169 F (2.6802) = 6.579 at p=0.000<0.05				

Table 4: *Regression results on the influence of cultural factors on adoption of sanitation practices*

tors studied here explained 16.9% of the variation in adoption of sanitation practices in the study area. Thus, 83.1% of the sanitation practices in Nzaui Sub-County were attributable to numerous other factors not studied in this study. Cultural factors like gender roles (β=0.147, p=0.000<0.05) and traditions (β= -0.032, p=0.014<0.05) were statistically significant. However, the relationship between religion and beliefs and adoption of sanitation practices was non-significant (β=0.042, p=0.305>0.05). These findings signified that when all other variables are held constant at zero, a unit increase in gender roles led to 14.7% increase in adoption of sanitation practices; a unit increase in traditions lowered adoption of sanitation practices by 3.2% while a unit increase in religion and beliefs, though non-significant, led to 4.2% increase in adoption of sanitation practices.

The calculated F value at 5% significance level was 6.579 which was more than the F critical value (2.6802), an indication that the relationship between the cultural factors considered in this study and adoption of sanitation practices was statistically significant.

The regression findings can be summarized in a regression model as follows:

Y= 0.147X1+0.042X2-0.032X3

whereby, Y represented adoption of sanitation practices

X1= gender roles, X2= religion and beliefs, and X3= traditions.

Conclusion

It can be concluded that access to improved sanitation is still a challenge in rural areas somewhat due to the influence of cultural factors like gender roles, religion and beliefs. De-mystifying beliefs that could facilitate adoption of poor sanitation can go a long way into promoting safe sanitation. This study also concluded that women experience sanitation stressors at the household level because they are rarely consulted on decisions regarding sanitation matters.

Recommendations and future research

Given the findings that men took charge of household decision-making, this study recommends women inclusion in household sanitation matters to ensure that the sanitation facilities adopted at the household level are friendly and acceptable to women and children. As well, there is need for sanitation policies to embrace gender empowerment in order to reduce gender-based sanitation inequalities in rural areas.

Innovative approaches of planning based on cultural contexts and communities' conditions are essential for a faster sanitation progress in rural areas. These approaches should not only involve local actors but also engage religious communities for behavior change communication to increase awareness on safe sanitation in gatherings.

The findings showed that all the cultural factors examined in this study only explained 16.9% of the variation in adoption of sanitation practices in the study area. This is was an indication that 83.1% of the sanitation practices are attributable to other various factors not studied here. There is need for future studies to examine adoption of sanitation practices alongside environmental, demographic and economic factors.

Competing interests

The authors declare that there are no competing interests.

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