RISKS AND PERCEPTIONS ON HUMAN EXCRETA DISPOSAL PRACTICES AMONG RICE FARMERS IN MWEA KIRINYAGA COUNTY, KENYA.

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A Research Project Submitted in Partial Fulfillment of Requirements for the Award of Degree of Masters in Environmental Studies and Community Development in the School of School of Agriculture and Environmental Sciences of Kenyatta University.

APRIL 2023

DECLARATION

This is my original work and has not been presented for a degree or award in at any other University

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DEDICATION

To the one who encouraged to pursue learning even under unfavorable conditions and environment during my studies and offering conducive atmosphere to keep me going throughout my studies by giving support both morally and emotionally, my beloved husband, Manasseh Wachira.

ACKNOWLEDGEMENT

My supervisor Dr. Simon Mburu deserves special recognition for his unwavering support, direction, dedication, encouragement, and critical appraisal of my work. His attentive monitoring and mentoring during the writing of this paper should not be overlooked. I also appreciate the numerous offers of help and cooperation from my family members. I thank the Lord for my excellent health and the opportunity to further my study in environmental studies.

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LIST OF ACRONYMS AND ABBREVIATIONS

GoK	Government of Kenya
JICA	Japan International Corporation Agency
KEMRI	Kenya Medical Research Institute
NTD	Neglected Tropical Diseases
SDG	Sustainable Development Goals
STH	Soil Transmitted Helminths
UN	United Nations
UNDP	United Nation Development Program
UNICEF	United Nations International Children Education Fund
WASH	Water Sanitation and Hygiene
WHA	World Health Assembly
WHO	World Health Organization
WSP	Water and Sanitation Program
JMP	Joint Monitoring Report
KIRWASCO	Kirinyaga Water and Sanitation Company

ABSTRACT

Accessibility to sanitation facilities is an important human right for everyone as well as the basic sign of attaining sustainable development. In Mwea rice irrigation scheme there is presence of Schistosoma mansoni, which is linked to poor human excreta disposal. Since parasite eggs are contained in fecal matter in the intestines, improper excreta disposal causes new infections in the environment. Regulating the infection's propagation depend on social economic status and community knowledge. The objective of this research aimed to investigate risks and perceptions on human excreta disposal practices among rice farmers in Mwea. The specific objectives were: to assess human waste disposal practices among rice farmers in Mwea, to identify the health and environmental risks associated with rice cultivation practices among people employed in rice paddies, and to determine the extent to which the group is conscious of the health hazards associated with excreta disposal activities in rice cultivation paddies. A structured questionnaire was used to assess the human excreta disposal habits, attitudes, and community knowledge of transmission risks. The observation approach was used to determine latrine coverage. This was a cross-sectional analysis that was used convergent mixed - method designs to collect quantitative and qualitative data for future studies. The data were fed into a computer and analyzed with the SSPS program, which enables fast analysis and quantitative data computation. The study provided information on the current state of understanding about the prevention and control of diseases linked to poor human excreta disposal, as well as the measures that would be implemented to address the problem. From the findings it was concluded that farmers from Mwea paddies do not have toilet hence these forces them to dispose their waste within the paddies. The fact that they do not wash their hand regularly after visiting the toilet increases chances of contracting diseases. Most of health workers regularly visit the community for health trainings however there are other many areas that they have not accessed. It was also recommended that they also make sure that strict toilet building and usage guidelines are observed and that every resident uses the rest rooms, whether at home or in pit latrines. The neighborhood's few existing toilets need to be made cleaner in order to decrease the incidence of disease infections. All county residents and farmers need to be made aware of the risks associated with consuming and utilizing untreated water from open water sources. Wells must be well-guarded against contamination, and water taken from open sources like rivers and canals must be thoroughly purified or boiled before use.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Over 1 billion individuals are compelled to defecate in the open because 15% of the global population lacks exposure to usable latrines. In 2013, global lavatory penetration was reported to be 64%, suggesting that unless current trends persisted, the world will meet the Sustainable Development Goals (SDG) target of 75% for water and sanitation, as well as the SDG target by more than a billion people (WHO, 2016).

About 30 percent of population in Africa have been using improved latrines, as well as approximate twenty six percent used open defecation as a result of shortage of toilet (UNICEF and WHO, 2013), and cumulative water, sanitation, and hygiene coverage for 25 Sub-Saharan African countries had a long way to go, as per regional statistics. According to Davison (2019), Sanitation is UN-recognized human right, and many people would suffer negative health, dignity, economic, and educational consequences if they do not have accessibility to it (WHO, 2013). The shortage of latrines primarily affects poor, rural, and vulnerable communities to accessing basic sanitation services. In comparison, Sub-Saharan Africa has lagged the most in terms of developing access to better latrine facilities (UN, 2013).

Excreta disposal is generally accepted as having a lower priority in times of crisis than other humanitarian initiatives like health care, food, and water supply (WHO, 2013). The lack of sanitation facilities, bad hygiene practices, and behaviors are the primary causes of disease in Mwea. The lack of sanitation, the challenge of building latrines, and the upkeep of those that already exist all lead to the spread of infections. Failure to maintain effective excreta disposal practices in order to minimize faecal transmission risks, as well as a change in attitudes among rice-growing communities, have hindered this.

In 2016, 69% of schools globally had access to adequate sanitation facilities, 66 percent have basic sanitation services, and only 53% had proper sanitary facilities, and according to 2018 global baseline report (WHO/UNICEF, 2019). The first Joint Monitoring Report (JMP) report on Water Acess, sanitation and Hygiene in medical facilities, the 2019 global baseline review, implemented new service ladders for basic

services and developed national, regional, and global baselines that enable global tracking of SDG target. WASH 6.1 and 6.2 are available to all (WHO, 2019).

Kenya is now on course to meet its SDG 6 goal for proper hygiene by 2030, with only 29% of the population using improved latrines and 14% using open defecation, with open defecation rates in rural areas higher (17%) than in city centers (3%). Over 5 million Kenyans lack access to adequate lavatories and should rely on public defecation, raising the risk of sewage-related diseases such as diarrhea (WHO, 2013). Kenya was listed as among the African countries that's not on track to meet the SDG targets for surveillance in a joint report released in 2013; however, with renewed and strong government engagement, Kenya is on target to finish the SDG goals for sanitation, If the world is to meet its SDG goals, there is a strong need to improve the situation in order to achieve SDG targets with the current trend (0.75 percent) of increasing sanitation access.

Despite this achievement, Schistosomiasis and soil-transmitted helminths have increased significantly within the Mwea rice-growing population as a result of human excreta disposal activities and attitudes (Tantoh, 2021).. In the rice-growing region, infection causes stemming from contamination of groundwater sources, that provide breeding places for flies and mosquitoes, are also factors. Furthermore, as a consequence of bad hygiene standards, there are outbreaks of excreta-related diseases through fecal-oral or skin paths. High-risk groups, like those working in rice paddies and whose views are conditioned by sociopolitical and sociocultural factors, are also impacted. As a result, the study will look into human excreta disposal practices, the associated health and environmental risk factors, and attitudes in the rice-growing region, as well as the community's level of knowledge about health issues related to human excreta disposal practices.

1.2 Problem Statement

The WHO reports that not everyone who is contaminated becomes ill (Saleem, Burdett, & Heaslip, 2019). At times, people can have disease without showing any symptoms. Asymptomatic carriers are those that do not exhibit any symptoms. The germs will accumulate in the carrier and then spread through the excreta, infecting additional people. Excreta from both symptomatic and asymptomatic infected people will spread the disease, so proper excreta disposal is necessary for all (WHO, 2013).

Everyone has to defecate, therefore getting acess to excreta disposal facilities is necessary.

According to World Health Organization, roughly 2.4 million people lack adequate hygiene, allowing for extrajudicial excreta disposal and pollution of the setting. This may contribute to the spread of faecal-oral disease, the country's biggest infectious diseases at the moment. The World Health Organization conducted a survey in 2013.

The rising incidence and increased risks associated with environmental factors suggest that anthelmintic medication alone might not be enough to stop STH transmissions, as conditions are suitable for mixed control measures. As a result, hurricanes, heavy rain, and floods have been discovered to frequently impact latrines, posing additional risks in terms of socio-cultural obstacles, desirability, and recycling of waste materials as a means for households who revert to open defecation once lavatories are damaged.

Most Kenyan schemes, however, fall short of WHO recommendations, with a substantial portion of the population defecating in the open. WASH initiatives are a major health concern in global health as well as a regional target for long-term development. In Mwea rice growing paddies, improper human excreta disposal activities and perceptions continue to pose major health and environmental risks to the population. According to estimates, the area alone has 11% latrine coverage, and the region loses millions of shillings per year due to diseases due to poor sanitation (Gichuki *et al.*, 2019).

Open defecation mitigation and waste management should be initiated to prevent spread of disease. To stop diseases from spreading, immediate solutions are needed. Besides personal hygiene, supply of water is a quick way to reduce the health risks associated with poor personal hygiene. However, it is essential to note that the literature review has not captured the risks and perceptions on human excreta disposal practices among rice farmers. Thus, this is a knowledge gap for research to be carried out on the risks and perceptions on human excreta disposal practices among rice farmers. Other health issues posed by human excreta disposal practices such as disease transmission diarrhea among others. Also, research needs to be carried out on the effect of human excreta disposal practices. This study therefore, seeks to

investigate risks and perceptions on human excreta disposal practices among rice farmers in Mwea Irrigation Scheme.

1.3 Research Questions

1. How do rice farmers in Mwea practice human waste disposal?
2. What is the health and environmental risks associated with excreta disposal activities and attitudes of people employed in rice-growing paddies?
3. How well-informed is the population about the health risks associated with human excreta disposal activities in rice fields?

1.4 Research Objectives

The overall objective was to investigate the risk and perceptions on human excreta disposal practices among the rice farmers in Mwea community. Specifically, this was addressed by the following objectives:

1. To assess human waste disposal practices among rice farmers in Mwea
2. To identify the health and environmental risks associated with rice cultivation practices among rice farmers in rice paddies.
3. To determine the extent to which the rice farmers are conscious of the health hazards associated with excreta disposal activities in rice cultivation paddies.

1.5 Research Premises

H1: There are human waste disposal practices among rice farmers in Mwea

H1: There are health and environmental risks associated with rice cultivation practices among people employed in rice paddies.

H1: The group is conscious of the health hazards associated with excreta disposal activities in rice cultivation paddies to a greater extent.

1.6 Significance of the Study

This study informed the rice farmers on the best practices on how to dispose their human excreta in their rice farms, so has to improve on the sanitation and hygiene conditions around their rice farmers. The study also gave incites on the health parameters to be considered by the rice farmers while farming in their rice farmers. Besides the study also provides substantial evidence to inform on policy briefs to help

in curbing the health and environmental risks associated to poor human extra disposal among the rice farmers.

1.7 Justification of the Study

Intestinal infections, helminth infestations, and contagious diseases caused by excreta all can be harmful minimized if good excreta disposal activities and behaviors are enforced (WHO, 2013). Owing to a weakened immune system and anemia, people living in high-risk populations are more likely to contract communicable diseases. The level of involvement in contact with feces should be kept to a bare minimum and safely contained through effective excreta disposal measures that understand sociocultural and sociopolitical factors, financial restrictions, ground conditions, available space and materials, latrine management, and facility user friendliness (Njuguna, 2019).

Human excreta disposal activities and beliefs in the Mwea rice growing cultivation region promote open defecation. The achievement of wider health, social, and development results will be much more effective and sustainable as a result of massive use of improved latrine facilities (WHO, 2019). Increasing latrine use and proper human excreta procedures, despite their significance, has proven difficult. As a result, it's important to comprehend and record the fundamental environmental risks and human excreta-related risks associated with disposal activities and expectations in Mwea irrigation scheme. The study's results will be of interest to health practitioners in the Mwea community who work in the fields of disposal practices and behaviors, relevant risk factors, and environmental factors, with the intention of providing new information about Schistosomiasis and other infections linked to the target population's unsanitary disposal practices, in addition to improving the overall quality of care, contribute new information about the control, intervention, and management of these dangerous diseases in Kenya.

1.8 Conceptual Framework

Excreta disposal practices play key role in preventing transmission of excreta related diseases. The proper management of excreta acts as a primary to prevent pathogens in the environment. Thus, the directly impacts in disease transmission is through person-to-person contact, water and contaminated environments. The public health status should assess the environmental exposure whereby the health targets set assessment of the risks and management through the acceptable risks. Current condition of the

affected population as well as dangers of unregulated excreta disposal, which may lead to disease outbreaks from polluted areas should be raise to the community awareness informing them the associated risks on health and environment.

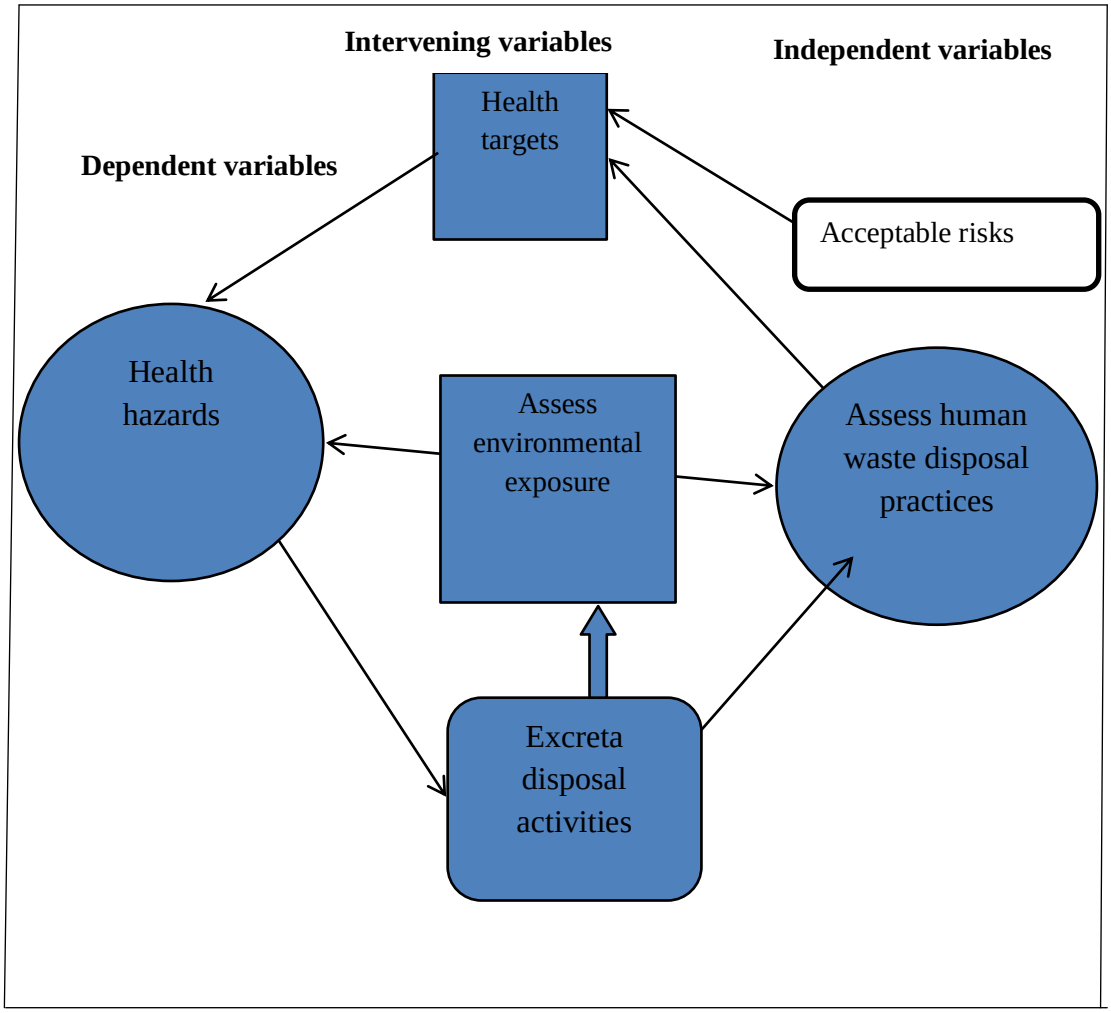

Figure 1.1: *Conceptual Framework (Adopted from Fewtrell & Bartram, 2001).*

Excreta-related infections and the role of sanitation in the control of transmission. *Source:* WHO water quality, guidelines, standards and health (Fewtrell & Bartram, 2001).

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The literature for this study is divided into three parts in this chapter: sociopolitical and socio-cultural effects on human excreta disposal systems and expectations, Mwea population level of understanding of health hazards associated with human excreta behaviors, as well as relevant environmental and health clinical signs linked to excreta disposal systems and expectations.

2.2 Excreta disposal activities are influenced by sociocultural factors

Data from Cochrane Central Register of Controlled Trials indicates that methods to improve excreta disposal are useful in avoiding diarrhea disease, and as per the journal on Cochrane infectious disease population specialist registry (Othoo, Dulo, Olago, & Ayah, 2020). The primary goal in low-income countries is to establish or improve latrines and other facilities for the 39 percent for the global population who do not have adequate hygiene (WHO, 2015).

People defecate in the paddies because they are close to homesteads and there are no latrines in the paddies, raising the risk of transmission to the environment and exposing the community to infection. The shortage of sanitation facilities around the world poses a significant health risk because it causes people to practice open defecation, which increases disease infection and transmission risks (Wangari, 2022).

2.2.1 Excreta disposal activities are related to social-political factors

Long-term measures are permitted gradually because the impacted population believes they wouldn't be able to live in the affected area indefinitely, which is usually untrue; however, officials build temporary facilities, which the group defaces or just never utilizes (WHO, 2014). The National Environmental Sanitation and Hygiene Policy of Kenya guides sanitation planning and implementation in the country. The policy's goal is to enable Kenyans improve their hygiene, behavior and sanitation facilities (Looser, 2014).

Many advances have been made in the field of human waste disposal in recent years, and many books were written on the topic, but the most of these books focus rather entirely on sewerage and sewerage disposal in large cities and communities. In almost

every case, a study of related publications and the few books on rural sanitation exposes significant flaws. As advocated by the Kenya Health Policy, they restrict them to a study of one or a limited number of particular sanitation issues, such as latrines or specific methods of waste disposal appropriate for small communities. Studies look at the logistics of properly constructing and maintaining sanitary excreta disposal facilities, as well as the risks that come with it (Othoo, Dulo, Olago, & Ayah, 2020). Excreta disposal may be a difficult topic to broach in a group setting. Sanitation facilities improve health in more ways than one; however, if the quality of service doesn't quite meet the social and cultural needs of community members in a timely manner, such facilities may be closed. This technique has the advantage of allowing households to improve the sanitation services in a community over time (Njuguna, 2016).

Lavatories are most likely to be used by people familiar with the design (WHO, 2015). According to Kenya's current constitution, everyone, including minority and deprived groups, has the obligation to the best possible health, which requires access to healthcare and adequate, equitable sanitation. As stated in Chapter 43, Section 211b of the Kenyan Constitution, everyone, including the marginalized and people who are vulnerable have rights to the hygiene level that provides ability of medical facilities and the access to adequate, appropriate, and reasonable hygiene. Since March 2013, Kenya is now implementing a modern devolved governing system in which one of key components has been shifted to county councils, and all county bodies have been given permission to ensure that people have access to appropriate sanitation facilities (Tantoh, 2021).

Excreta disposal practices are influenced by the community's social and economic standing. There is a direct link between improper excreta disposal and poor health. As a result, proper sanitation and perceptions, as well as human excreta disposal, are critical in establishing effective control measures (WHO, 2013). However, there is a lack of data on disposal practices and population perceptions of excreta disposal in endemic areas of Kenya. Paucity of sanitation facilities, individuals are compelled to practice open defecation, which increases risk of spreading infection and leads to increase in morbidity and mortality coupled with low hygiene (WSP, 2014). When doing any evaluation, health and hygiene issues should be given special attention as a result, intervention goals. As a result, healthcare advocates an important role in

deciding facilities effectively such as hygiene behavior and cultural practices, and other protective factor like age, gender, and prior illness.

The 2030 SDG aim was to encourage greater knowledge regarding the importance of improved environmental health by better safety hygiene standards (Azage, & Haile, 2015): 90% of households with access to sanitary, cost-effective, and cost-effective sanitation and hand-washing services (Pickford, 2017).

Stunting in children has been associated to poor sanitation, especially open defecation, in a series of studies which has an effect on both educational and long-term productivity outcomes (Azage, & Haile, 2015). Typhoid and paratyphoid outbreaks have been attributed to the effects of sanitary excreta disposal as part of environmental sanitation, according to Wangari (2022), improvements in sanitation foster population well-being, beneficial to social progress.

2.3 Health risks for health and the environment associated with excreta disposal activities and attitudes

Excreta-based infections have a higher risk than in other areas of the world, which is due to proper sanitary services and accessibility to them, as well as environmental risk factors (Anderson *et al.*, 2013). The primary obstacle to excreta-related communicable diseases is human excreta containment and safe disposal, so excreta disposal practices and requirements are definitely key components of any management plan (WHO, 2013). Faecal contamination is a great concerning issue in Africa, as per the World Health Organization, especially amongst populations, and is associated to fatal consequences, particularly in diarrhea disease, which can be produced by bacteria, viruses, or parasites, and latrines might be a major source of bacteria (WHO, 2013).

2.3.1 Pathogen Risk Factors

On global scale, misinformation about the relation amid hygienic systemic and policies failures, poor infrastructural development, lack of knowledge, as well as social aspects all contribute to more constraints. About 2.2 million people get diarrhea per year, and 10% of developed world is contaminated with intestinal worms as result of insufficient waste and excreta management (World Health Organization, 2013). Viruses can be transmitted through the mouth (via contaminated water or the contamination vegetables/food, in the case of hookworms and Schistosomiasis or

through the skin (in the case of hookworms and Schistosomiasis) however, good personal and household hygiene will also help to avoid such transmissions (Saleem, Burdett, &Heaslip, 2019). Policymakers' low priority for sanitation, limited funds in hygiene sectors, hazardous situations, floods in flat regions, and other factors were cited as major roadblocks to rising latrine use in Kenya (Pickford, 2017).

According to the World Health Organization, about 1.8 million people in middle-income and low countries are affected by severe trachoma (WHO, 2013), who's its root which causes visual impairment and is transmitted by flies that thrive on human excreta and spread through infected people's eyes' discharge (Ntaro *et al.*, 2022). Similarly, more than 200 million individuals worldwide are infected with schistosomiasis which is also known as snail fever, a chronic parasitic disease transferred through human feces to freshwater snails, and the infection spreads in humans especially when skin comes into contact with infestation transporting snails or intake of contaminated water and modulates their immune systems (Uljanovas *et al.* (2021).

Currently, almost 2 billion people use pit latrines, predominantly in Africa (Graham & Polizzotto, 2013), but nearly half as many (approximately 900 million) do not have access to a toilet and must defecate in the open (Graham & Polizzotto, 2013). (UNICEF & WHO, 2017). A pit latrine is a low-cost facility that provides for safe waste storage and contributes to better family and community sanitation.

Open defecation affects everyone, but women are more likely to face abuse and have additional health concerns (Corburn *et al.*, 2015). According to Strunz *et al.* (2014), women with poor sanitation facilities are more prone to hookworm infestation, which results in maternal anemia, which is directly related to unfavorable pregnancy outcomes. Many women are also compelled to wait until morning or night to fulfill their basic need of defecating due to privacy concerns, cultural conventions, or religious rituals (Ntaro *et al.*, 2022).

2.3.2 Public Knowledge of Pollution

A quick look at sanitary conditions around the world reveals the scale of the problem with human excreta disposal activities. As long as a community lacks sanitary toilets, the threat of inadequate excreta disposal exists. As much work remains to be done in this region, countries like UK, France, and US consider global standards of prosperity

and health (Sugihara, 2020). While there are many programs geared at educating the public about causal linkages among air pollution and health, there is no scope for lengthy assessment.

This would permit it to be assessed if the interventions are helping to minimize the cost of environmentally related health issues (Kihara *et al*., 2014). As a result, waste management research and development should seek to enhance lengthy waste management safety data, models, and principles. Excreta disposal practices and behaviors are important facets of the environment, according to the World Health Organization's committee on environmental sanitation. The availability of adequate supply of safe drinking water, as well as control of insects and animal vectors of disease, will be the first vital factors in ensuring a clean environment. This is especially in poor areas and low villages in areas where this importance is thus in wide areas of the world, and also in parts of every region.

There are provision of adequate supply of safe drinking water and control of insects and animal vectors of disease (Kiptum, & Moraa, 2021). Improvements in sanitation as well as hygiene leads to socioeconomic gains in terms of an improved life environment and a demonstration of concern for citizens' integrity, particularly women and children (World Health Organization, 2015).

2.3.3 Sustainable Development Goal 6

The world has dedicated to reducing percentage of people with access to basic sanitation by 2030, but for many nations, this remains a pipe dream. Kenya has been one of African countries that has failed to meet the Sustainable Development Goals sanitation targets (Guppy, Mehta, & Qadir, 2019). Kenya's sanitation situation has worsened, raising major challenges in providing long-term sanitation for the country's rapidly rising population. Inadequate sanitation, inadequate personal hygiene, excreta disposal practices, and behaviors, however, contribute to large portion of the existence of sanitation-related diseases in Kenya, is a product of the country's disease burden (United Nations Development Programme, 2013).

Open defecation mitigation and waste management should be initiated to prevent spread of disease. To stop diseases from spreading, immediate solutions are needed, such as facility availability, soap and water washing stations, service and maintenance schedules, and community education to raise awareness (Kihara *et al.,* 2013). As part

of a systematic parasite intervention, a positive link between high infection rates, a weak or non-accessible latrine, and poor sanitation in the community must be established and a community-based latrine development program must be implemented. The latrines in Mwea are never too deep, and they don't last long till they overfill, resulting in lavatories being abandoned and flesh latrines being dug to cover the filled-up ones during wet months (Gichuki *et al.*, 2019)

2.3.4 Personal Hygiene

Providing defecation areas where excreta cannot pollute the food web or supply of water is a quick way to reduce the health risks associated with poor personal hygiene. To ensure the wellbeing and convenience of the waste disposal system, users should be encouraged to cover their feces, which can be achieved by rebuilding existing infrastructure and building portable public lavatories that can be semi-permanent or circulated throughout the group (Apate, & Kamble, 2019). Since the most important barrier to preventing excreted bacteria from entering the atmosphere is proper excreta disposal and management, as well as sufficient personal and domestic hygiene standards, are essential for public health protection.

The notion that a rural sanitation program, of which sanitation facilities excreta disposal is an integral component, cannot be effective without the involvement of the local community is supported by data from around the world. Any robust healthcare sector must provide personal hygiene, and it needs public knowledge, support, and active participation. Simple environmental change without public hygiene and sanitation education focused on local norms, customs, and values has repeatedly proven ineffective (WSP, 2013). More than 80% of the population in some regions lives in rural areas and small low-income communities, where small elements of rural sanitation are either missing or applied indiscriminately. Human excrement pollution is common, and the threat of insufficient excreta disposal persists as long as the society lacks public toilets (Khalid, 2018).

Few books cover the mechanics of building and properly using sanitary excreta disposal facilities, as well as the factors that play a role in the process. The compilation of technical data on particular rural excreta disposal facilities, as well as knowledge on what is perceived to be done on expectations and procedures, is vital to the success of rural excreta disposal programs. The Department of Health's impact is

that there is a need to ensure active community and family involvement, program preparation and training of appropriate personnel, as well as the most recent agreed ultimate disposal and perceptions in human excreta disposal for rural areas, should all be covered (WSP, 2013).

The waste created by illegal waste disposal has major negative consequences for public health and safety because local communities are the main consumers of waste disposal facilities (WSP, 2013). Multiple concerns occur as a result of a range of variables, including neighborhood residents' positions, perceptions, waste management strategies, and connections with other waste system actors.

A household waste management approach has been linked in several research studies to either at-home safety knowledge or awareness of waste-related negative consequences. On the one hand, it is important to maintain a healthy lifestyle in order to prevent direct infection, illness, and health risks associated with household waste; on the other hand, raising public awareness would encourage healthy attitudes and create sustainable practices.

An article on this subject was published in the American Journal of Public Health in 2016. In many societies, according to Sikdar, Mazumder, & Mukherjee, (2022), study, improper solid waste disposal, especially human excreta, is one of the most pressing issues. In developing countries, where formal and informal community environmental education awareness initiatives are lacking, waste management has recently become a hot subject. This program development research is critical for rapidly educating the public and encouraging the development of environmentally sustainable community waste actions.

The circumstance in Mwea according to research is that excreta disposal is dangerous to the health and the environment as the pollution interfaces stemming from rice irrigation operations, which is required to involves action, and there is a shortage of local knowledge, which the survey aims to fix.

2.4 The Level of Public Concern about the Health Risks Related to Human Excreta Practices in the Community

The role of health department, value of active group and family participation, program planning, and staff training, as well as the most recent agreed-upon procedures in

human excreta disposal for rural areas, should all be discussed (Lam *et al*., 2015. This research also serves as a guideline for community-level assessments of soil-transmitted helminths and Schistosomiasis, which took place in Geneva, Moreover, given the dangers to one's wellbeing, associated with improper excreta disposal, numerous organizations and governments around the world have launched a number of initiatives to raise public awareness about the hazards of improper excreta disposal and potentially so as to improve on the excreta disposal in developing countries.

People's awareness of the risks of dangerous disposal activities, as well as their expectations of those dangers, can be influenced (Apate, & Kamble, 2019). In Kenya, a number of medical campaigns were planned and introduced to encourage desired action, but methods for evaluating excreta disposal practices remain important for educating public health risks associated with sanitation efforts in developing countries (Sugihara, 2020). The numerous projects aim to discourage people from disposing of excreta carelessly, with the key community initiatives focusing on educating rural residents about healthy excreta disposal practices and improving their perceptions through improved practices.

Every campaign evaluation includes a monitoring measure that emphasizes the importance of public education about the dangers of indiscriminate waste disposal activities like feces and other household waste, which pose serious health risks. (Nwike *et al.*, 2011). She claimed that the best way to initiate the process of lifestyle changes is to raise positive awareness, and that connectivity is an integral part of healthcare delivery.

Many Kenyan people defecate openly, and pathogens while pathogens like diarrhea, amoeba, typhoid, and cholera will continue spreading unless actions are taken to raise knowledge and acceptance of proper human excreta waste disposal, reform attitudes toward the use of latrines, and encourage local implementation of efficient latrine hygiene (Anteneh & Kumie, 2010). According to the sanitation obligation, everyone has the right to use open, high-quality sanitation facilities for personal use (Sikdar, Mazumder, & Mukherjee, 2022). This should be achieved through Kenya's National Sanitation Policies and Kenya's Social Strategy pillar, which intends to make all community action, including sanitation, accessible and available to all Kenyans as

specified by UN and enacted in the country's constitution's bill of rights (Azage, & Haile, 2015).

The existence of a latrine facility does not mean that it will have medical benefits; it will only do so if it is used correctly (Anteneh & Kumie, 2010). Nonetheless, a number of variables, including behavioral, demographic, spatial, climate, and economic factors, have been shown to support latrine use. In the Mwea rice-growing sector, unimproved sanitation facilities, as well as open defecation practices and perceptions, are common causes of excreta-related infections. Diseases can be easily managed if everyone adopts a new mindset and uses the properly built and improved latrine system on a on a daily basis, and dispose of in the correct manner (Masaku *et al.,* 2017).

In the population, some research has been done to establish the factors that cause infections and re-infections. Intestinal Schistosomiasis, also described as bilharzia, is triggered by parasitic worm parasites that reside in the veins of the intestine and liver and is spread by feces (Masaku *et al.,* 2015). Parasite larvae must also enter polluted water sources, where they hatch, pass via an aquatic snail stage, and then develop into free-swimming infective larvae, infecting through body fluids (wading, swimming) (World Health Organization, & UNICEF, 2013).

The London Declaration supporting the battle against neglected tropical diseases was apparent in a study on the prevalence of parasitic infections helminthiasis and Schistosomiasis in schoolchildren in Mwea Division, Kirinyaga south district, Kirinyaga County, and their possible impact on cognitive growth (Kihara *et al.*, 2017). All of the aforementioned infections are particularly dangerous to children, especially when they are stressed by disasters, high-density camp living, and malnutrition (Pickford, 2017). Optimized latrines have been the most straightforward and cost-effective way of improving sanitation, and the facilities are often thought to build barriers among humans and excreta; however, if the excreta is ineffectively contained or poorly disposed of, this may not be the case, and therefore routes of environmental pollution from human excreta are recognized.

In Mwea, a test deficiency on hand washing health education program was implemented in schools, but it did not work well in the region, necessitating more research in the near future, with the community as major stakeholders. Waste

management that is unequal is a major source of contamination that has been connected to health problems (Masaku *et al.*, 2013). Dissemination of environmental awareness, public education, and the adoption of disease health prevention social action initiatives would increase the community's environmental friendliness and safety.

Humanity, including developing countries, strives to create and manufacture cutting-edge goods to satisfy the most basic requirements. Landfilling, composting, incineration, and pyrolysis, as well as the safe handling and recycling of household waste, are all examples of waste disposal practices. Residents of Mwea are struggling with waste concerns (Gichuki *et al.*, 2019).

2.5 Summary of Literature Review

The literature for this study is divided into three parts in this chapter: sociopolitical and sociocultural effects on human excreta disposal systems and expectations, Mwea population level of understanding of health hazards associated with human excreta behaviors, as well as relevant environmental and health clinical signs linked to excreta disposal systems and expectations. Excreta disposal activities are influenced by sociocultural factors and in this case therefore, people defecate in the paddies because they are close to homesteads and there are no latrines in the paddies, raising the risk of transmission to the environment and exposing the community to infection. Excreta disposal activities are related to social-political factors.

Long-term measures are permitted gradually because the impacted population believes they wouldn't be able to reside there. Association with excreta disposal activities and attitudes is a health issue. Excreta-based infections have a higher risk than in other areas of the world, which is due to proper sanitary services and accessibility to them, as well as environmental risk factors.

Pathogen Risk Factorssuch as viruses can be transmitted through the mouth (via contaminated water or the contamination vegetables/food, in the case of hookworms and Schistosomiasis or through the skin (in the case of hookworms and Schistosomiasis) however, good personal and household hygiene will also help to avoid such transmissions. Public Knowledge of Pollution is important. A quick look at sanitary conditions around the world reveals the scale of the problem with human

excreta disposal activities. As long as a community lacks sanitary toilets, the threat of inadequate excreta disposal exists.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Study Area

The study took place in Mwea rice-growing areas in Kirinyaga County, central Kenya. The town is located 98 km North-East of Nairobi which is the capital city of Kenya, and with a population of 237,368 inhabitants (Kenya Population Census, 2019). The Mwea rice farms region is often flat land, with 22,000-acre irrigated areas and about 4,000 acres of low land (irrigation area) used in the rice production on soft cotton clay soil.

Drainage from the Thiba and Nyamindi rivers is directed to the rice fields through network of canals, and households in irrigation areas grouped into villages clusters. Particularly, Schistosomiasis is prevalent in Mwea West counties; furthermore, there is a shortage of data on public access to good basic sanitation. On the diagram below, the research design is portrayed.

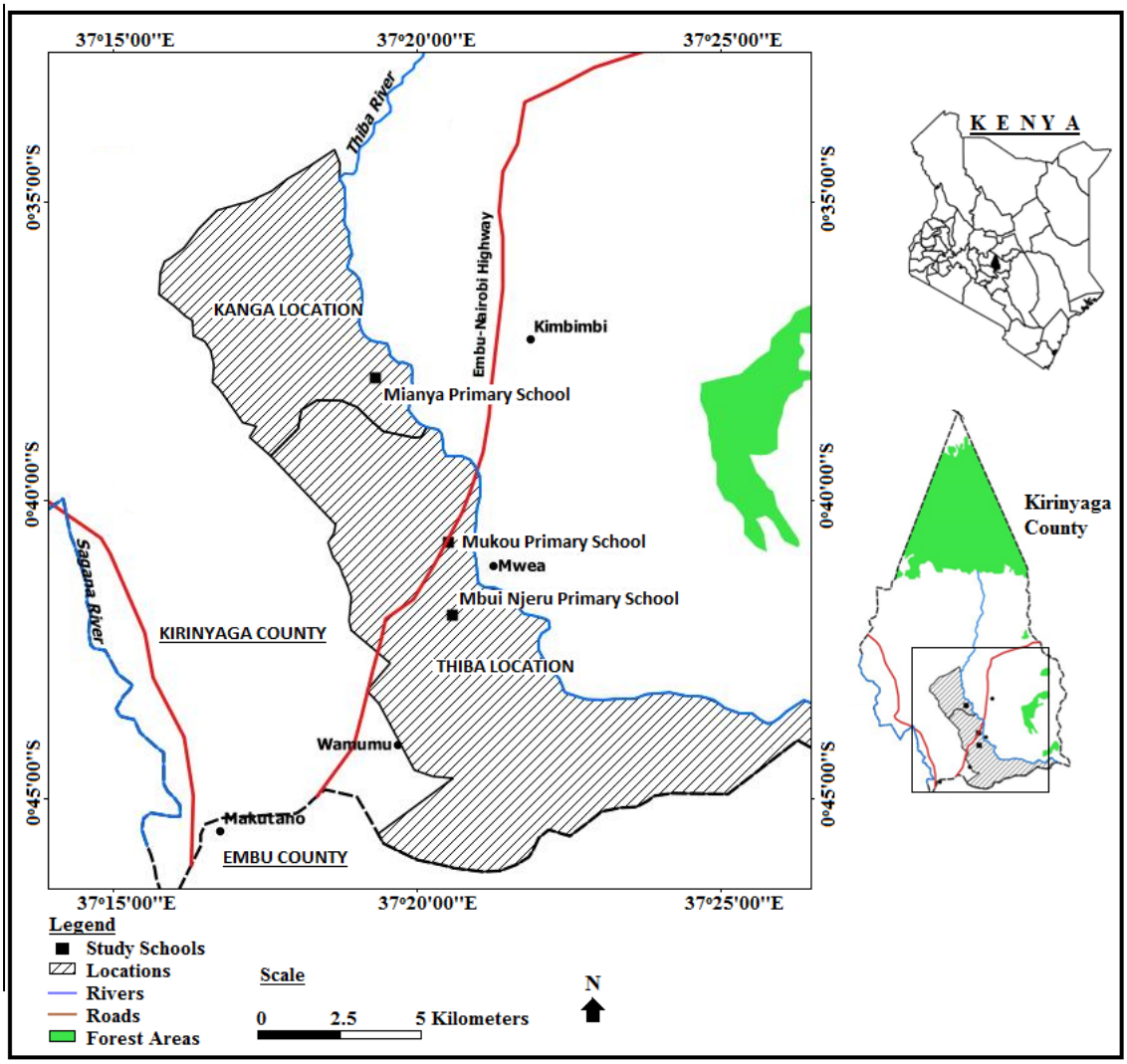

Figure *3.1: Location of the Study Area in Kirinyaga County (GIS Expert)*

3.2 Research Design

The study uses a combined research design. It used both the descriptive research design and cross-sectional study design. The Descriptive research design was critical in giving identities or characteristics of the target population while the cross sectional was essential in aiding the study with appropriateness to sample of the key informants of the study.

3.3 Target Population

The target population for the were the rice farmers in the rice paddies in Mwea rice irrigation scheme in Kirinyaga County, Central Kenya. Therefore, the study targeted the rice farm owners or farmers, those working in the rice farms as manual laborers.

3.4 Sample Size and sampling procedure

Since the population was so wide (125620), the sampling was done by using the Fisher *et al.* (2014) formula for selecting a representative sample size for the study as provided in the formula below;

$$\text{Sample size} = 1 + \frac{Z^2 \text{ X } p\ (1\text{-}p)}{e^2\ N}$$

Where;

N= Population Size

e = Margin of error

z = z score

p = Standard deviation

Where:		**Expressed as**
Z Score (of 95% CI)	95% CI	1.96
P-prevalence (%)	50	0.5
E-error Margin (%)	5	0.05
N-population size	125620	125620

Therefore, sample size is 383

3.5 Sampling Procedure

In order to gather both primary and secondary data, the study used purposive selection method to sample views by asking specific groups set questions in the context of a structured questionnaire. Permission was obtained from those who operate in the rice paddies on a specific basis.

3.6 Data Collection procedures

The data were collected with the aid of a structured questionnaire by the research assistant. The respondents were asked questions in the local language and their responses were filled by the research assistant. Key informants (leaders) and focus group discussions with community members were involved to provide detailed

information on activities and attitudes. A standardized questionnaire as well as consent forms was also given to participants.

3.7 Data Analysis

The information collected from the survey were entered into an excel spreadsheet, and exported into SPSS software version 21 for analysis. Descriptive statistics were used for excreta disposal methods used by respondents and reported faecal-oral diseases suffered by members of the community. Data is presented in form of frequency distribution tables, figures, charts and plates. Chi square test was used to determine association between excreta disposal methods and the occurrence of faecal-oral diseases or infections. P-value less than or equal to 0.05 was considered statistically significant.

3.8 Ethical Consideration

Ethical endorsements from Graduate School of Kenyatta University, as well as Kirinyaga County Health Management Team was obtained prior to the report's execution. Both research participants executed a signed informed consent form, and those who were unable to read or needed assistance of an impartial witness to ensure that the procedure was clearly communicated to them and that they are directed to sign or finger print on the consent form.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter presented the results of data analysis, and interpretations as well as presentation. The descriptive statistics, in addition to discussions of such data, are the chapter's key contents. The descriptive data include results on the three objectives in chapter 1 as they appear in chapter one of this report.

4.2 The Socio-Economic and Demographic Characteristics of the respondents

From the findings, the minority were those with less than 20 years were 0.8% (3), between 21-30 years were 19.6% (75), between 31-40 years were 34.5% (132), between 41-50 years were 20.6% (79), between 51-60 years were 13.3% (51), between 61-70 years were 5.2% (20), between 71-80 years were 2.9% (11), between 81-90 years were 2.9% (11) and above 90 years were 0.3 % (1).

This is shown in Table 4.1 below. In this case, it is apparent that the survey was carried out among respondents who were mature enough to deal with questions and replies with minimal supervision. In addition, the demographic in the research region was investigated to gain an understanding of the social norms.

According to the study by Kinzig *et al.* (2013), norms provide social standards for suitable and incorrect behavior, governing what is acceptable and what is not acceptable in interpersonal relationships. As indicated in Figure 4.1 below, the findings show that the majority of the respondents were female, with 61% (234), while the male was 39% (149).

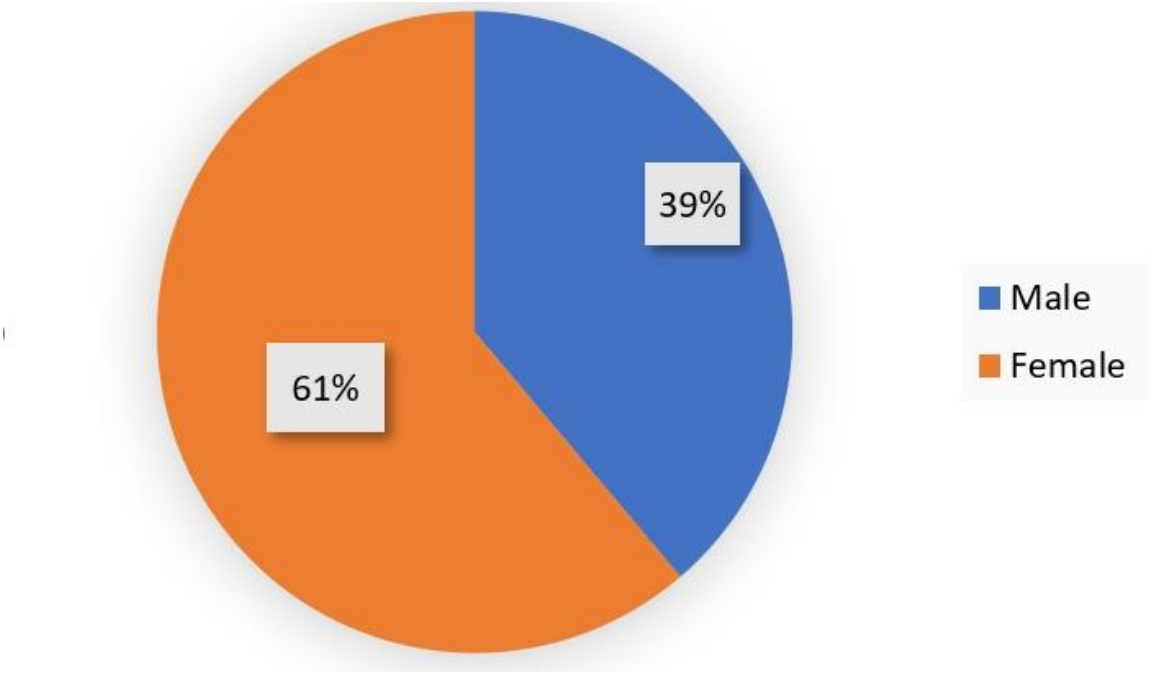

Figure 4.1*: Respondents in terms of Gender*

The findings show that women are more than men in rice farming. In this regard therefore, the findings are similar to that of Mugumaarhahama *et al.* (2021), who assert that, women produce around 80 percent of total of the national food crops in the many countries, this composed of 73 percentage of the economically productive working population in the agricultural sector. The majority of women in rural areas usually engage in and depend on agriculture for their living. A study from Anteneh, & Kumie (2010), among many other things, reveals that most of the women in South-East of Nigeria play very important roles in agricultural output in a variety of ways. For instance, Lam *et al.*, (2015) once revealed that over 80 percent of agricultural production in Africa comes from farmers, the majority of whom have been found to be women.

Especially on the continent of Africa, it has been revealed that women play very critical responsibilities in ensuring food security (Ilukol, 2022). According to the study by Lam *et al.*, (2015), many women of populations in Africa accomplish farming by successfully carrying out their responsibilities as main food crop producers as well as providers. According to Bafana (2012), women are heavily involved in fundamental types of household food production systems in Sub-Saharan Africa. For instance, women are in charge of producing all or the majority of food crops (Davison *et al.*, 2019).

Among the respondents who answered all of them, 98% (374) were Christians and 2 % (9) were other denominations. According to the 2019 census of housing and population report, it is revealed that Kenya's male-to-female ratio is 98.76 males for every 100 females (Kenya National Bureau of Statistics, 2019).

From the findings in Table 4.1, 85.2% (317) were married, 12.4% (46) were single, and 1.9% (7) as well as 0.5% (2) were widowed as well as divorced, respectively. As indicated in Table 4.1, many of the workers were between 31-40(34.5%) followed by those whose ages were between 41-50 (20.6%) and 21-30 (19.6%) respectively. The least were those whose ages were below 20 years (0.8%) and above 90 (0.3%). As shown in Table 4.1.

Table 4.1*: Socio-Economic Characteristics*

	Response	**Frequency**	**Percent**
Marital status	Single	46	12.4
	Married	317	85.2
	Widowed	14	1.9
	Divorced	6	0.5
Total		**383**	**100.0**
	Years	**Frequency**	**Percent**
Age	<20	3	0.8
	21-30	75	19.6
	31-40	132	34.5
	41-50	79	20.6
	51-60	51	13.3
	61-70	20	5.2
	71-80	11	2.9
	81-90	11	2.9
	>90	1	0.3
Total		**383**	**100.0**
Religion	Christian	374	98.0
	Others	9	2.00
Total		**383**	100.0

As shown in Table 4.2 below, those who had attained up to primary school were the majority with 76.6% (282), and this was followed by those who had attained up to secondary school with 15.8% (58), as well as colleges and universities with 1.4% (5) and 0.5% (2), respectively. However, there are those who had not attained education, and they comprised 5.7% of the population (21). Therefore, the study was conducted

among the respondents who at least could read and write, and so the researcher required a minimum amount of time to explain the questions to them.

From the data in Table 4.2 below, farmers made up 65.7% (245), businesses made up 6.4% (24), and casual laborers and salaried employees made up 26% (97) and 1.9% (7) respectively. Majority of respondents (32.1% (123), 21-30 years had 26.6% (102), 11-20 years had 18.3% (70), those who had stayed for less than 10 years had 10.4 (40), and those who had stayed for 41-50 years and more than 51 years had 6.5% (25) and 6.0% (23), respectively. The fact that the majority have lived in the area for more than 20 years demonstrates that they are very familiar with the area and thus provided very reliable answers to the questionnaires.

Table 4.2: Education level, occupation and length

Education level	None	21	5.7
	Primary	282	76.6
	Secondary	58	15.8
	College	5	1.4
	University	2	0.5
Missing	999	15	
Total		**383**	**100.0**
Occupation	Farmer	245	65.7
	Business	24	6.4
	Casual Laborer	97	26.0
	Salaried employment	7	1.9
	others	10	
Total	**Years**	**383**	**100.0**
length of stay (in years)	<10	40	10.4
	11-20	70	18.3
	21-30	123	32.1
	31-40	102	26.6
	41-50	25	6.5
	> 51	23	6.0
	Total	**383**	**100.0**

4.3 Human Waste Disposal Practices Among Rice Farmers in Mwea

The study sought to know the status of the Latrines and the materials used to construct them. It also looked at the associated risk factors of human excreta disposal practices

as well as the environmental factors related to excreta disposal practices and perceptions.

4.3.1: Latrine status

As shown in Figure 4.2 below, the findings indicate that 97% of the respondents had latrines, while only 3 % did not have. Of those who had latrines, many of them indicated that they had one latrine (90.1 %) while a few said that they had more than one latrine (9.9%).

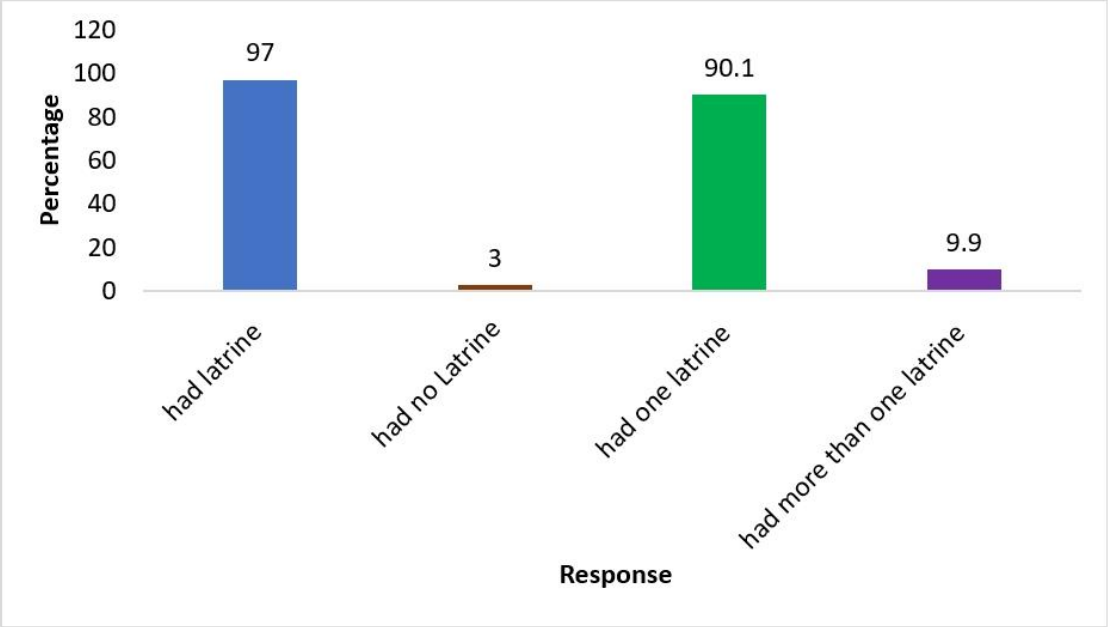

Figure 1.2: *Latrine Status (Source: Author, 2022)*

This study supports that of Njuguna (2019), whose results have an estimated 14 percent of Kenyans engaging in open defecation. Furthermore, they notice that low-income population has been linked to open defecation. It is worth noting that Kenya intends to attain 100 percent open defecation-free society by 2030, in accordance with United Nations Sustainable Development Goal 6.

As shown in Figure 4.3 below, the status of most of latrine structures is temporal, as mentioned by the majority with 78.3%, semi-permanent with 10.4%, 9.9%, and 1.3% for permanent and VIP, respectively.

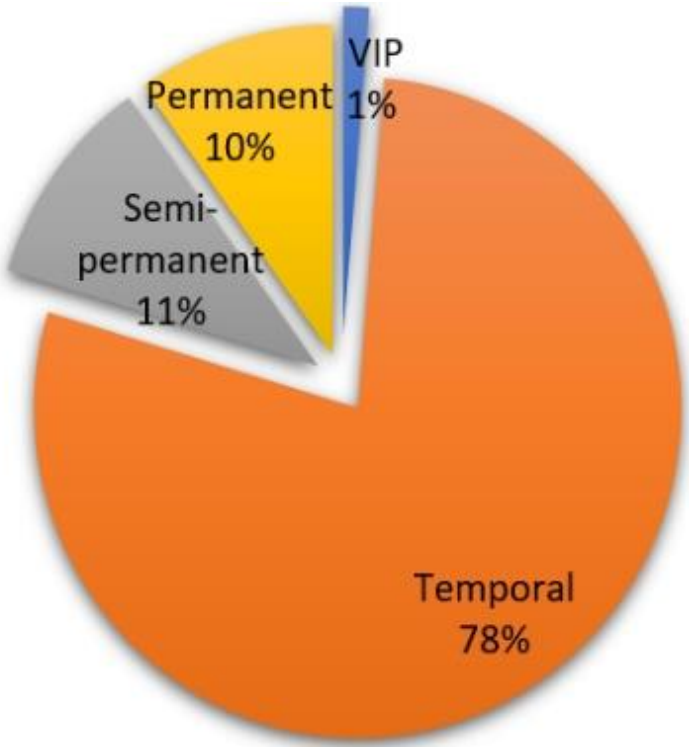

Figure 4.3: Status of toilet*s (Source: Author, 2022)*

As mentioned by Khalid (2018), poor latrine conditions, design and structure, can discourage usage of the facility and encourage a return to open defecation. Similarly, Graham, & Polizzotto (2013), add that Most of the time, many rural residents, particularly in sub-Saharan Africa, build temporary latrines, which can become destroyed very quickly. This might be because of their lack of resources, which causes them to build them using what is readily available to them locally.

As shown in Table 4.3 below, majority of latrine walls are made of timber (54.2%), with some made of stone and timber (17.4%), a few of which are made of bricks (10.5%), while others are made of mud (9.7%); the least is made of bricks and timber as well as stones and mud (7.8% and 0.5%, respectively.

Table 4.3: Materials for toilet walls

What is the wall made of?		Frequency	Percent
Valid	Stones	29	7.8
	Bricks	41	10.5
	Timber	202	54.2
	Stone and timber	67	17.4
	Bricks and timber	5	.5
	Mud	39	9.7
Total		**383**	**100.0**

These findings are supported by that of Njuguna (2019), who point out that, to track progress toward SDG 6, the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP) has developed a new sanitation ladder. Open defecation is at the bottom of the food chain. Human feces are disposed of in fields, forests, shrubs, open bodies of water, beaches, and other open locations, or alongside solid garbage. The usage of pit latrines without a slab, or bucket latrines or hanging latrines is the next level of sanitation.

Figure 4.4 indicates that many of the roofs were made of iron sheets, with 81.6%, followed by those made of polythene bags (12%), while others were made of grass, with 6%, and others were uncovered, with 0.3%.

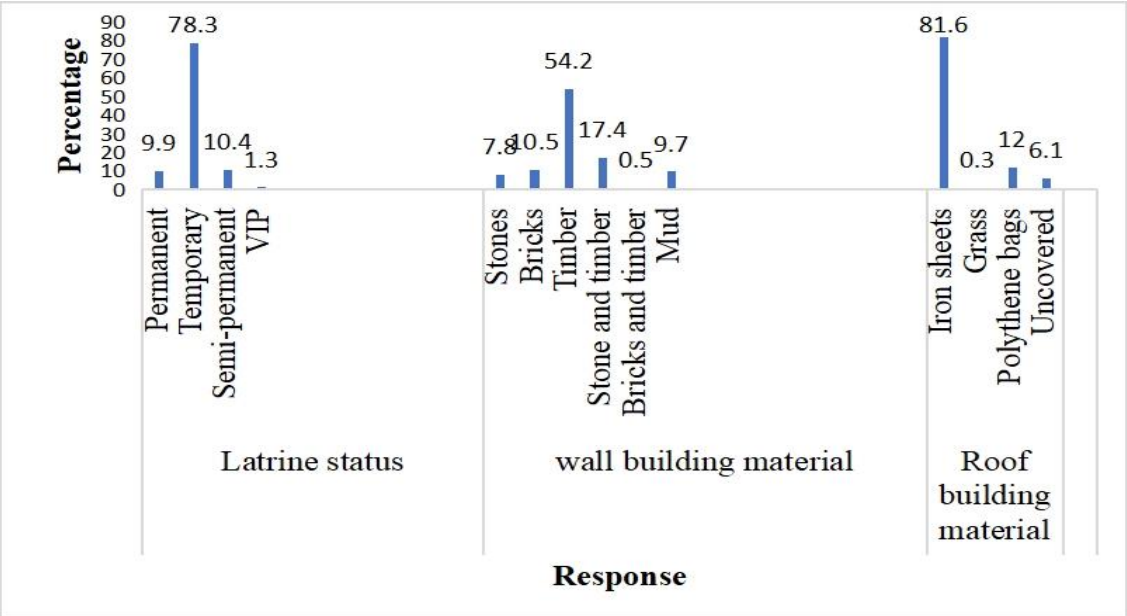

Figure 4.4: Building materials of Latrines *(Source: Author, 2022)*

The status of the latrine structure is temporal as mentioned by the majority with 78.3% (293), semi-permanent with 10.4% (39),9.9% (37), and 1.3% (5) for permanent and VIP respectively. The majority of latrine walls are made of timber 54.2% (202), with some made of stone and timber 17.4% (65), few are made of brink 10.5% (39), while others made of mud and 9.7% (36), the least were made of bricks and timber as well as stones and mud with 7.8% (29) and 0.5% (2) respectively. Many of the roofs were made of iron sheets at 81.6% (305), followed by those that were made of polythene bags with 12% (45), while others were made of grass at 6% (23) and others were uncovered at 0.3% (1).

These findings are supported by that of Njuguna (2019), who point out that a pit latrine without a slab is the most frequent sanitation method in the United States. In Kenya, the leading risk factor is unsafe water, sanitation, and hand washing. Hand washing with soap reduces the incidence of diarrhoea by 30%. The goal of Sustainable Development Goal (SDG) 6 is to achieve universal access to and sustainable management of water and sanitation.

As indicated in Plate 4.1 below, the these is one of the typical examples of toilet structure in the study area. As shown, most of the toilet facilities were dirty poorly maintained and did not have water for washing hands after visiting the toilet.

Plate 4.1: A temporal toilet structure in the area (Source: Author, 2022)

4.3.2 The associated risk factors of human excreta disposal practices

The section contains findings of whether respondents worked on rice paddies and how far it was from their farms to the closest toilet facilities. Additionally, it wanted to know who owned the vast bulk of the such latrines.

As indicated in Figure 4.5, an overwhelming majority (92.2%) of the respondents work in rice paddies while others (5.5%) are not. Many of the residents have a distance of less than 100M to the toilet. Very few of them are more than 500 meters away from the latrine. The majority of the latrines in the area are private at 94.3% (331), while others are public with 5.7% (20).

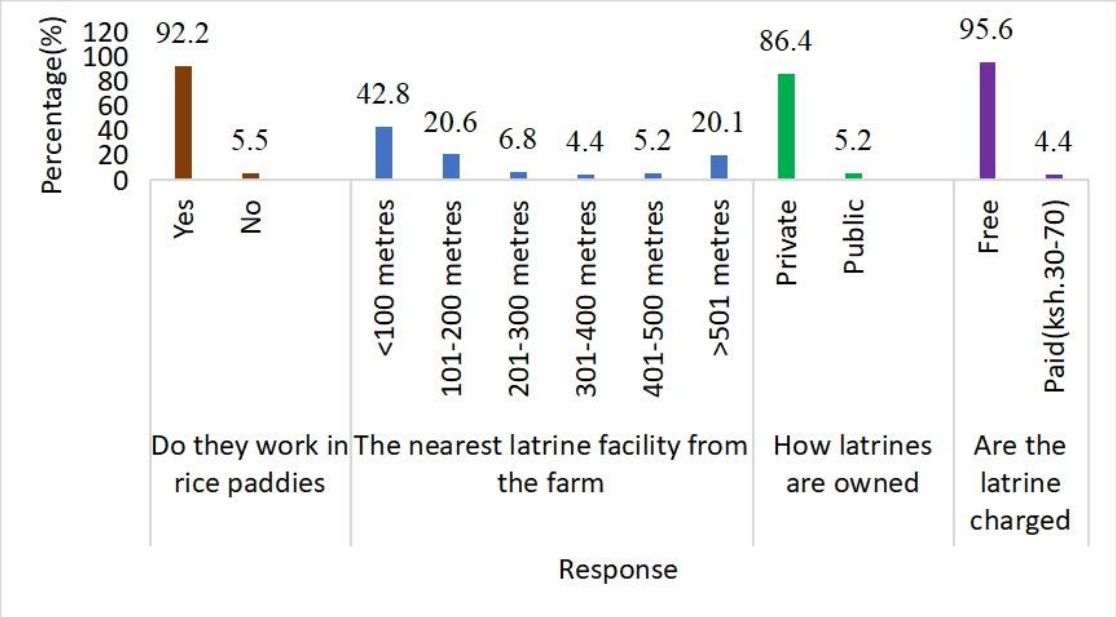

Figure 4.5: Distance and ownership of latrines *(Source: Author, 2022)*

Most of the latrines are not paid for so they are free with all respondents indicating that they do not pay. From the Key informant respondents, it was revealed that many of the areas in rice paddies do not have toilets and so the workers in the paddies do not use toilets, instead, they just dispose of their waste within the paddies.

The findings are almost similar to that of Njambi *et al.* (2020), who pin point that, toilet facilities should be within a quarter mile of all workers, including those working in the fields. Field toilets should be isolated from growing fields by a barrier such as a field road, ditch, or berm, non-produced vegetation such as a hedgerow or shelter belt, or by a sufficient distance to prevent accidental floods or spillage from contaminating producing areas. Schmidlin *et al.* (2013) suggest that there should be at least one hand-washing facility for every twenty workers in the field. Workers should be able to use the toilet whenever they need to, not just wait until they get back to their various homes. They also state that having a nearby toilet minimizes the possibility of workers using unsuitable settings, such as water bodies, bushes, open fields, and other areas, to dispose of their waste.

4.3.3 The environmental factors related to excreta disposal practices and perceptions

This sub section presents another finding to determine how often respondents used the toilet while in paddies, how many toilets they owned, whether they washed their hands after using the toilet, and how long they stayed in paddies.

From Table 4.4 below, very few of the respondents use toilet facilities at 9.2% (33) while in the paddies, while many (90.8%) of them do not use a toilet facility. Many of them (59%) wash their hands after visiting the toilet, a number of them occasionally (25.3%) wash their hands, and a few (15.1%) never wash their hands after visiting the toilet. Many of those with paddies spend between 5 and 8 hours in the rice fields, with 79.5% (283), while others usually stay there for below 4 hours and more than 8 hours, with 19.7% (70) and 0.8% (3), respectively. In the findings, all the respondents indicated that they had latrines at their homes at 100% (375). Of those who had latrines, many (99.7%) of them indicated that they had one latrine, while a few (0.3%) said that they had more than one latrine.

Table 4.4: Human Waste Disposal Practices Among Rice Farmers **(n=383)**

Statement		Frequency(n)	Percent (%)
Do you use a toilet facility while in the paddies?	Yes	58	15
	No	325	85
Total		**383**	**100.0**
How often do you wash your hands after visiting the toilet?	Never	70	18.3
	Occasionally	94	24.5
	Always	219	57.2
Total		**383**	**100.0**
How long do you usually stay in the rice fields?	Below 4hrs	97	25.3
	Between 5 and 8hrs	283	73.9
	More than 8hrs	3	0.8
Total		**383**	**100.0**
Is there a latrine in your home?	yes	383	100.0
Total		383	100.0
How many latrines are there?	One	372	97.1
	More than one	11	2.9
Total		**383**	**100.0**

According to the findings of this study, a number people do not utilize toilet facilities while in paddies, implying that open defecation is frequent. This is in addition to the fact that they work long hours in paddies, making human waste disposal a problem. However, while many of them have toilet facilities at their homes, they are unable to leave their job in paddies and return home to dispose of their waste, forcing them to defecate in paddies. This is reinforced by a focus group discussion responder who stated, *"In paddies, we don't have toilet facilities, thus people urinate and defecate only within the paddies thus becoming harmful to them.*" Yet another respondent stated that*, 'the water in paddies is heavily polluted by human waste, which is improperly managed due to the lack of toilets. Farmers in the area who plant rice are commonly barefooted, which enhances the likelihood of infections.*

These findings concur with that of Ntaro *et al.* (2022) who say that, infected human excreta contain different dangerous disease-causing microorganism that are linked to a variety of health problems. For instance, (WHO & UNICEF (2017) and Manetu & Karanja (2021), reveal that a gram of human excreta which is infected can comprise up to 106 virulent viruses and pathogenic virions, 106-108 pathogenic bacteria, 103 protozoan cysts, as well as 10-104 helminth eggs.

In addition, Uljanovas *et al.* (2021) explains that inadequate human waste management also raises the danger of exposure to microorganisms that can cause serious health problems such as infectious illnesses, typhoid, diarrhea, and cholera, and also viral infections (Awoke & Muche, 2013). It is revealed that soil-transmitted helminths (STH) continue to pose a significant concern to humans, particularly children in underdeveloped nations such as Kenya (Grimes *et al.*, 2016).

In addition, WHO & UNICEF (2017), argue that open defecation increases women's vulnerability to verbal, physical, and sexual assault, harming them physically and psychologically Due to a lack of household toileting facilities, many women must go significant distances from their home to obtain private restrooms.

4.4 Health and Environmental Risks Associated with Rice Cultivation Practices Among People Employed in Rice Paddies

This section presents findings on the locations of farmers' household water sources, the types of those sources, how long it takes to draw water from them, and the availability of cleaning materials.

As shown in Table 4.5, many of those who participated in the study indicated that their major water sources of domestic usage are from wells 49.9% (186), followed by canal sources 39.4% (147), while another source of water comes from the river and taps 10.2% (38) and 0.5% (2) respectively.

Table 4.5: Water availability in rice paddies

(n=383)

Statement		Frequency(n)	Percent (%)
What is the main source of water for domestic use?	Well	186	49.9
	River	38	10.2
	Canal	147	39.4
	Tap	2	.5
	999	10	
Total		**383**	
How is the nature of the source of water?	Protected	19	5.1
	Exposed surface water	298	80.5
	Collected rain water	53	14.3
	999	13	
Total		**383**	
How long do you take to get to the source of water?	In premises	121	32.5
	Less than 30minutes	240	64.5
	More than 30minutes	11	3.0
	999	11	
Total		**383**	
Is water or cleaning materials available?	Yes	335	96.8
	No	11	3.2
	999	37	
Total		**383**	

From the results in Table 4.5, the nature of the sources of water is that many of them are exposed to surface water 80.5% (298), while others are protected and collected rainwater with 5.1% (19) and 14.3% (53). Many of them spend less than 30 minutes to draw water with 64.5% (240), others draw water in premises and others spend more than 30 minutes with 32.5% (121) and 3.0% (11) respectively. Most (96.8%) of the respondents said that water or cleaning materials are available, while only 3.2% indicated that they are not.

Plate 4.2 below shows a section of canal where people draw water from. One can therefore tell that the water unclean for human consumption since it is exposed to water erosion from it banks especially when it rains.

Plate 4.2: A canal, one of the water sources in the area (Author, 2022)

This study is in line with that of Gichuki *et al* (2019) who suggest that that *S. mansoni is* still a public health issue in Mwea irrigation system, Kirinyaga County, Central Kenya, affecting people of all ages. In addition, the majority of households do not have access to upgraded water sources, but they do have access to better sanitation facilities. Wangari (2022) notes that, with a population of 53 million people, 15% of Kenyans rely on poorly maintained water sources such as ponds, shallow wells, and rivers, while 41% lack access to basic sanitation solutions. Moreover, these issues are particularly visible in both urban informal settlement and rural areas where individuals are frequently still unable access to piped water infrastructure. Safe, clean, and sufficient freshwater is essential for the survival of all living species as well as the smooth operation of ecosystems, communities, and economies (Tantoh, 2021).

Water quality challenges are complicated and varied, and they require immediate worldwide attention and action (Mishra *et al.,* 2021). They add that the quality of water sources is influenced by both natural processes and human actions. Access to safe drinking water, a safe toilet, and the materials and facilities needed to practice hygiene is a basic human right. Despite this, Lal (2015), note that millions of people

worldwide and thousands of localities, including some of the world's wealthiest cities, are denied these rights.

4.5 To Determine the Extent to Which the Group Is Conscious of The Health Hazards Associated with Excreta Disposal Activities in Rice Cultivation Paddies

This section present results on the locally available materials that are used to construct latrines, knowledge of the community to construct latrines, the depth and permeability of the soil in the area, the ground water table in the area as well as whether toilet can be dug by hand or not.

Table 4.6 indicates that the locally available materials for constructing latrines include; timber and iron sheets (42.3%), timber (21.8%), stones (33.1%), stones and iron sheets (2.0%), as well as grass and iron sheets, (3% each). From the findings, the majority (55.0%) of the respondents indicated that the community is not familiar with the construction of latrines, while a minority (45%) is most likely to use them.

Most (99.7%) of the respondents indicated that they use latrines, while very few (0.3%). The depth and permeability of the soil in the area, as indicated by the majority of 58.7% (225) is 4-6M while others mentioned were 7-9M as indicated by 1.6% (6). The pit can easily be dug by hand, as indicated by the majority (100%). The majority of people in the area indicated a groundwater table level of 1-3M, with 50.9% (195), followed by 4-6M with 35.5% (136), 7-9M with 9.4% (36), and those who indicated above 10M with 4.2% (16).

Table 4.6: Construction and use of latrine

(n=383)

Statement		Frequency	Percent
What are the locally available materials for constructing latrines?		151	42.3
	Timber and iron sheets	78	21.8
	Timber	118	33.1
	Stones	7	2.0
	Stones and Iron sheets	1	0.3
	Grass	1	0.3
	Iron sheets	1	0.3
	999	26	
Total		**383**	**100.0**
Are there any people in the community familiar with Latrine construction?	Yes	167	45.0
	No	204	55.0
	999	12	
Total		**383**	**100.0**
What is the soil depth and permeability?	1-3	134	35.0
	4-6	225	58.7
	7-9	6	1.6
	>10	18	4.7
	Total	383	100.0
Do they use the latrines?	Yes	372	99.7
	No	1	.3
	999	10	
Total		**383**	
What is the level of the ground water table in the area? (metres)	1-3	195	
	4-6	136	
	7-9	30	
	>10	16	
	Total	383	

The findings show that there were locally available materials for constructing latrines such as timber and iron sheets which is mainly used by majority. However, most of the community is not familiar with the construction of latrines. The depth and permeability of the soil in the area, as indicated by the majority is 4-6M which probable limit the construction of toilet by majority. However, toilet in this area can be dug by hands thus reducing cost of construction.

The findings concur with those of Antwi-Agyei *et al.* (2022), who reveals in most of the developing world, there is an issue of limited access to basic sanitation, and access to water remains a challenge. The high prevalence of poor-quality pit latrines and shallow wells predisposes residents to public hygiene challenges with potential escalation, especially during floods. In addition, factors of geology and soils, topography, and flood-risk patterns are believed to equally influence the nature of sanitation facilities that people construct in these areas (Douglas *et al.,* 2008). In Mwea, the water table rises during the growing season and then falls below 150 cm.

4.6 Community's perception about infections of diseases associated with excreta disposal

The section contains findings on the condition of the toilet, availability of cleaning agent and water after visiting the toilet, contemporary attitudes as well as customs around disposing excrement, sharing of latrines, the prevailing practices for anal cleaning

As shown in Table 4.7 above, the majority (72.0%) of the respondents indicated that they used leaky tins, clean water, and soap for washing their hands after visiting the latrines. The majority (67%) of the respondents said that the contemporary attitudes as well as customs around excrements disposal, mostly in regard to men, women, men, as well as children, are shared equally with minorities (32.9%) indicating that there are no traditional beliefs. The majority (77.5%) of respondents stated that all people share a latrine, while the minority (22.5%) stated that the prevailing practices for anal cleaning are: tissue paper leaves with 45.2% (33) magazines.37% (27) newspapers 8.2% (6) book sheets 1.4% (1). Most (96.8%) of the respondents said that water or cleaning materials are available, while only 3.2% indicated that they are not. 100% indicate that this kind of practice leads to disease transmission.

Table 4.7: Community's perception about infections of diseases

Statement		Frequency	Percent
Are there leaky tins, clean water and soap for washing hands after visiting the latrines?	Yes	268	72.0
	No	104	28.0
	999	11	
Total		**383**	
What are the current traditions, and beliefs that concern excreta disposal especially regarding women, men as well as children?	No traditional beliefs	123	32.9
	Shared equally	251	67.1
	999	9	
Total		**383**	
Do all people share latrine?	Yes	289	77.5
	No	84	22.5
	999	10	
Total		**383**	
What are the prevailing practices for anal cleaning?	Tissue paper	33	45.2
	Leaves	27	37.0
	Magazines	6	8.2
	Newspaper	6	8.2
	Book sheets	1	1.4
	999	310	
Total		**383**	
Do you think the excreta disposal method you use is safe?	Yes	326	87.4
	No	47	12.6
	999	10	
Total		**383**	

Table 4.8 indicates that, many (70.7%) think that not all people have access to facilities, and many (71.7%) of them indicated that the present practices of defecation tend to cause health issues like disease transmission. The findings further indicate that duties of constructing, paying for, maintaining as well as cleaning latrines are for women as majority (38.4%) indicates.

Table 4.8: Current defecation practices and responsibility to take care of the toilet facility

Do you think all people have access to facilities?	Yes	109	29.3
	No	263	70.7
	999	11	
Total		**383**	
According to you are the current practices of defecation a threat to health like disease transmission?	Yes	103	28.3
	No	261	71.7
	999	19	
Total		**383**	
If so how?	Disease transmission	74	100.0
	999	309	
Total		**383**	
Whose role is it to construct, pay for, maintain and clean a latrine?	Women	143	38.4
	Men	132	35.5
	Children	8	2.2
	Both men and women	89	23.9
	999	11	
Total		**383**	

These findings concur with that of Mara (2017), who assert that many rural people are not able to have latrines due to the fact that unfavorable soil factors make pit-based sanitation challenging and expensive, which include weak or rocky soil as well as a high-water table. This is in addition to the fact that only women are still responsible for building, maintaining, and cleaning the toilets.

Besides, the Plate 4.3 below is a typical temporal structure of a toilet with no anal cleaning material. Plate 4.4 a pictorial representation of uncovered well where they draw water from and seem not to be clean.

Plate 4.3: A toilet structure with no anal cleaning material

Many of the respondents indicated that they don't think all people have access to facility 263 (70.7%) while others thought that they have access to facility 109 (29.3%). Many respondents (38.4%) indicated that women are responsible for building, paying for, maintaining, and cleaning latrines, followed by men with 35.5% (132), children with 2.2% (8), and others who said both men and women are responsible with 23% (89).

Plate 4.4 shows one of the uncovered wells in the study area from where majority of the community source water from. This is a clear indication that these uncovered wells increase dangers of water borne disease infections in the area as they are exposed to contamination from the surrounding besides people stepping on its sides when drawing water from them.

Plate 5.4: One of the uncovered wells in the study area (Author, 2022)

The two sub-counties with open defecation-free status had a lower prevalence of diarrhea cases compared to sub-counties that were yet to attain open defecation-free status (Njuguna, 2016). In addition, this suggests that eliminating open defecation may reduce the number of diarrhea cases. Open defecation is defined as defecation in the fields, bushes, bodies of water, or other open spaces. According to the study by Saleem *et al.* (2019), 2.3 billion people have no access to improved sanitation facilities (flush latrine or pit latrine), and nearly 892 million of the total world's population are still practicing open defecation.

4.7 Community level of awareness on health risks measures.

This section represents kind of media available and accessible to the population and the health promotion activities that take place in the area. It includes the findings of whether they wash their hands after visiting toilet or not.

As indicated in Table 4.9 below, community health workers are the main promoters of health that are available and close to the community in the area, according to 100% of respondents (370), and there are health promotion activities taking place, according to the majority (84.7%); however, 15% indicated that no such activities are taking place. As was indicted by the majority, washing hands with water and soap regularly (75.4% (279), ensuring latrines are clean at all times (1.4% (5), ensuring latrines are well built (0.3% of 1), and constructing water taps for hand washing (0.5% (2) were all indicted. This is indicated in Table 4.9.

Table 4.9: Community level of awareness on health risks measures

Statement		Frequency	Percent
What is the health promotion media available/accessible to the population in the area?	Community Health Worker	370	100.0
	999	13	
Total		**383**	
		Frequency	Percent
Are there any health promotion activities taking place?	Yes	315	84.7
	No	57	15.3
	999	11	
Total		**383**	
What is the current level of awareness on sanitation related public health risks?	Washing hands with water and soap regularly	279	75.4
	Ensuring latrines are clean at all times	5	1.4
	Ensuring latrines are well built	1	.3
	Putting leaky tins and soap	83	22.4
	Constructing water taps for hand-washing	2	.5
	999	13	
Total		**383**	
How frequently do the public health personnel visit the area?	Never	72	19.4
	Rarely	179	48.2
	Regularly	120	32.3
	999	12	
Total		**383**	

The findings are similar to that of Othoo *et al. (*2020) explain that the establishment of knowledge and understanding on enhanced toilet facilities able to withstand the

challenges of raised water tables and frequent flood risks is preferred in the short term, while the long-term advancement of specific toilet construction guidelines concerning depth and building structure is not properly followed. Furthermore, the majority of the local community is unaware of such guidelines. McKenzie *et al.* (2022) and Ahmed *et al.* (2022) note that, community health initiatives involve provision of education and media efforts that address a number of concerns influencing local community's health. According to the study by Ahmed *et al.* (2022), it is important to note that, without such local community health programs, many impoverished people would have no other health intervention options.

CHAPTER FIVE: SUMMARY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Prominently, the present chapter includes an overview of research results, research conclusions, and recommendation.

5.2 Summary of Findings

This part outlines the findings of the study, and the summary is in keeping with the study's goal to; determine the risks and perceptions on human excreta disposal practices among rice farmers in Mwea Kirinyaga county, Kenya.

5.2.1 Human Waste Disposal Practices Among Rice Farmers in Mwea

The findings indicate that 97% of the respondents had a latrine, with only 3%. Of them lacking latrines. Many (90.1 %) of them indicated that they had one latrine while a few (9.9%) said that they had more than one latrine. The status of most of latrine structures is temporal, as mentioned by the majority (78.3%), semi-permanent with 10.4%, 9.9%, and 1.3% for permanent and VIP, respectively. Many (81.6%,) of the roofs were made of iron sheets, followed by those made of polythene bags (12%), while others were made of grass, with 6%, and others were uncovered, with 0.3%. The status of the latrine structure is temporal as mentioned by the majority (78.3%, 293), semi-permanent (10.4%, 39), (9.9%, 37), and (1.3%, 5) for permanent and VIP respectively.

The majority of latrine walls are made of timber (54.2%, 202), with some made of stone and timber (17.4%, 65), few (10.5%, 39) are made of brink while others (9.7%, 36) are made of mud and the least were made of bricks and timber as well as stones and mud with 7.8% (29) and 0.5% (2) respectively. Many (81.6%, 305) of the roofs were made of iron sheets, followed by those (12%, 45) that were made of polythene bags while others (6%, 23) were made of grass at and rest (0.3%, 1) were uncovered.

The associated risk factors of human excreta disposal practices

Many (92.2%) of the respondents work in rice paddies while others (5.5%) are not. Many of the residents have a distance of less than 100M to the toilet. Very few of them are more than 500 meters away from the latrine. The majority (94.3%, 331) of

the latrine in the area are private while others (5.7%, 20) are public. Most of the latrines are not paid and so they are free with 100% of the respondents indicating that they do not pay. From the Key informant respondents, it was revealed that many of the areas in rice paddies do not have toilets and so the workers in the paddies do not use toilets, instead, they just dispose of their waste within the paddies.

The environmental factors related to excreta disposal practices and perceptions

Very few (9.2%) of the respondents use while in the paddies, while many (90.8%) of them do not use a toilet facility. Many (59%) of them wash their hands after visiting the toilet, a number (25.3%) of them occasionally wash their hands, and a few (15.1%) never wash their hands after visiting the toilet. Many (79.5%), of those with paddies spend between 5 and 8 hours in the rice fields, while others usually stay there for below 4 hours and more than 8 hours, with 19.7% (70) and 0.8% (3), respectively. In the findings, all (100%) the respondents indicated that they had latrines at their homes and of those who had latrines, many (99.7%) of them indicated that they had one latrine, while a few (0.3%) said that they had more than one latrine.

According to the study, many of the population in the research area do not have toilet facilities while in paddies, implying that open defecation is frequent. This is in addition to the fact that they work long hours in paddies, making human waste disposal a problem. However, while many of them have toilet facilities at their homes, they are unable to leave their job in paddies and return home to dispose of their waste, forcing them to defecate in paddies. This is reinforced by a focus group discussion responder who stated, "In paddies, we don't have toilet facilities, thus people urinate and defecate only within the paddies thus becoming harmful to them." Yet another respondent stated that, ‘the water in paddies is heavily polluted by human waste, which is improperly managed due to the lack of toilets. Farmers in the area who plant rice are commonly barefooted, which enhances the likelihood of infections.

5.2.2 Health and Environmental Risks Associated with Rice Cultivation Practices Among People Employed in Rice Paddies

Many (49.9%, 186) of those who participated in the study indicated that their primary water sources for domestic usage are from wells followed by canal sources (39.4%,147), while another source of water comes from the river and taps 10.2% (38) and 0.5% (2) respectively. From the findings, the nature of the sources of water is that

many (80.5%,298), of them are exposed to surface water while others are protected and collected rainwater with 5.1%,19 and 14.3%,53 respectively. Many (64.5%,240) of them spend less than 30 minutes to draw water while others draw water in premises and others spend more than 30 minutes with (32.5%, 121) and (3.0%, 11) respectively. Most (96.8%,335) of the respondents said that water or cleaning materials are available, while only (3.2%,11) indicated that they are not.

5.2.3 The Extent to Which the Group Is Conscious of The Health Hazards Associated with Excreta Disposal Activities in Rice Cultivation Paddies

The locally available materials for constructing latrines include; timber and iron sheets (42.3%), timber (21.8%), stones (33.1%), stones and iron sheets (2.0%), as well as grass and iron sheets, (3% each). From the findings, the majority (55.0%) of the respondents indicated that the community is not familiar with the construction of latrines, while a minority (45%) is most likely to use them. Most (99.7%) of the respondents indicated that they use latrines, while very few (0.3%). The depth and permeability of the soil in the area, as indicated by the majority (58.7%,225) is 4-6M while others mentioned were 7-9M as indicated by 1.6% (6). The pit can easily be dug by hand, as indicated by the majority (100%). The majority (50.9%) of people in the area indicated a groundwater table level of 1-3M, (195), followed by 4-6M with 35.5% (136), 7-9M with 9.4% (36), and those who indicated above 10M with 4.2% (16).

Community's perception about infections of diseases associated with excreta disposal

The majority (72.0%) of the respondents indicated that they used leaky tins, clean water, and soap for washing their hands after visiting the latrines. The majority (67%) of the respondents said that the present traditions as well as beliefs that concern disposal of excreta mainly in regard to men, women, as well as children, are shared equally with minority (32.9%) indicating that there are no traditional beliefs. The majority (77.5%) of respondents stated that all people share a latrine, while the minority (22.5%) stated that the prevailing practices for anal cleaning are: tissue paper leaves with 45.2% (33) magazines, 37% (27) newspapers 8.2% (6) book sheets 1.4% (1).

Most (96.8%) of the respondents said that water or cleaning materials are available, while only 3.2% indicated that they are not. 100% indicate that this kind of practice

leads to disease transmission. Many (70.7%) of the respondents indicated that they don't think all people have access to facility while others (109, 29.3%) thought that they have access to facility Many (38.4%) respondents indicated that women are responsible for building, paying for, maintaining, and cleaning latrines, followed by men (35.5%,132), children (2.2%, 8), and others (23%, 89) said that both men and women are responsible).

Community level of awareness on health risks measures

Community health workers are the main media for promoting health that are available and reachable to the community in the area, according to many (84.7%) of respondents, there are health promotion activities taking place, however, 15.3% indicated that no such activities are taking place. As was indicted by the majority (75.4%, 279), washing hands with water and soap regularly ensuring latrines are clean at all times, some (1.4%, 5), said that ensuring latrines are well built (0.3% of 1), and constructing water taps for hand washing (0.5%, 2) were all indicted.

5.3 Conclusions

From the findings, the most common human waste disposal practice among rice workers in Mwea is open defecation within paddies. Some of the farmers use toilets, with the majority of them having only one latrine, which is shared. The status of most latrine structures is temporal. Many of the roofs were made of iron sheets, polythene bags, and grass. However, some of the latrines were uncovered. The status of most of the latrine structures is temporary, and when these toilets become destroyed, this forces many of the farmers to practice open defecation since constructing another one immediately is a big challenge.

The majority of latrine walls are made of timber, stone and timber; brick, mud. Many of the roofs were made of iron sheets, polythene bags, grass, and the rest were uncovered. The associated risk factors of human excreta disposal practices involves that many of the respondents work in rice paddies and have long distance to the toilet. The findings showed that the majority of the latrine in the area are private and so not everyone is allowed to use it. The available few unclean public toilets are more than 500M from the majority thus making it had for the farmers to walk all the way. Instead, they end up disposing their waste within the paddies.

The environmental factors related to excreta disposal practices and perceptions was determined and from the findings, many of the farmers do not wash their hands after visiting the toilet. Others stated that they occasionally wash their hands after using the restroom. Farmers are forced to dispose of their waste only within the rice plantation since they spend long hours in the paddies (between 5 and 8 hours) many population in the research area, never use toilet facilities while in paddies, meaning that open defecation is common.

In addition, they work long hours in paddies, which makes human waste disposal an issue. While many of them have toilets at home, they are unable to leave their work in paddies and come home to dispose of their waste, forcing them to defecate in paddies. Another important aspect is that rice farmers in the area frequently go barefoot, which increases the risk of infection. According to the findings of the study, Health and Environmental Risks Associated with Rice Cultivation Practices Among People Working in Rice Paddies, unprotected wells are the primary source of water, in addition to rivers and canals are other sources of water.

According to the data, some farmers have awareness as far as the health risks associated with excreta disposal activities in rice cultivation paddies, while others are not. the majority of respondents responded that the community is unfamiliar with the construction of latrines and that they prefer to use the toilet. Because the depth and permeability of the soil in the area, as stated by the majority, is 4-6 M, the pit may simply be dug by hand. However, the findings show that the bulk of the areas' groundwater table level is 1-3M, making it difficult to dig a long-lasting pit latrine.

Community health workers are the main health promotion media available or accessible to the community in the region; there are health promotion activities taking place, but some of them indicated that none are. The majority stated that some of the actions that provide disease protection include routinely washing hands with water and soap, ensuring latrines are clean at all times, ensuring latrines are adequately constructed, and constructing water taps for hand washing.

5.4 Recommendations

1. Most toilet structures are in a temporary state; they are constructed of iron sheets, some are covered with polythene papers, and others are built of mud that has

already begun to fall out, in addition to those that are not covered. Most of the toilets in the region are temporary, and their maintenance and cleanliness are poor probably due to the fact that they are mostly maintained by only one gender (women). All gender must assume full responsibility for toilet care. In addition, since the water table of the study region is high, building pit latrines is a major issue; thus, national and county governments must intervene to prepare other better places for toilet construction. There is a need to improve the cleanliness of the few existing toilets in the neighborhood, which will lower the occurrences of illness infections.

2. The environmental factors related to excreta disposal practices and perceptions in the area, most farmers do not wash their hands after using the toilet every time, while others do so on occasion. Furthermore, due to extended working hours in paddies (between 5 and 8 hours) and the lack of toilets, farmers are obliged to dispose of their waste solely within the paddies. Furthermore, wells are the primary supply of water, and the majority of these wells are not filth-free. Other water sources include rivers and canals, and very few farmers get their water from Kirinyaga Water and Sanitation Company (KIRWASCO), and even fewer employ rainwater collection. Water and cleaning materials, on the other hand, are not abundant. In this regard, there is a need to raise awareness among all farmers and county residents about the dangers of drinking and using untreated water from open water sources.

3. Community health professionals are the primary health promotion media available or accessible to the local people, and health promotion initiatives are underway. As a result, they should raise community awareness about the importance of washing hands with soap and running water. They must also verify that strict toilet construction methods are followed and that every citizen uses the toilet, whether at home or in paddies. Wells must be well-protected from pollution, and open water sources, such as those collected from rivers and canals, must be thoroughly treated or boiled before use.

5.5 Area of Future Studies

i. The extent of water recharge pollution that may arise from contaminated water seeping into the ground and eventually reaching the ground water systems needs to be studied.

ii. Studies should be done to determine how contaminated surface water from rivers and flooded pit latrines affects animals like cattle.

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APPENDICES

Appendix 1 Informed consent

I'm a master's student at Kenyatta University named Ruth Wambui Wachira, and I'm here to conduct research, "**RISKS AND PERCEPTIONS ON HUMAN EXCRETA DISPOSAL PRACTICES AMONG RICE FARMERS IN MWEA, KIRINYAGA COUNTY."**

By participating in the study, which is being conducted to fulfill my academic requirements, you will contribute crucial data that could aid your society, local allies or interested parties, as well as the government in developing suitable interventions suitable for the Mwea community while having a better insight into the perceptions and procedures that underlie excreta disposal.

It is for this reason that I respectfully ask for your involvement in the study by answering a few questions, which could take up to 30 minutes of your time. No one will learn your name or real identity. Additionally, your voluntary participation in this study will not result in any cash compensation. The choices of individuals who choose to respond to all of the questions will be honoured, just like those who may chose not to participate in answering any of the issues. We guarantee that the data you provide will only be utilized for this research project.

I have understood the above informed consent and accept that my participation in the study is entirely voluntary and so there will be no financial gain from my participation.

Please complete the following sub-section (IF YES, move on to Question 1; IF NOT, thank the community member for participating;

YES. I have agreed to participate.

signature……. Date…….

Appendix II: Questionnaire.

Human excreta disposal practices and perceptions in Mwea rice cultivation paddies Mianya village, Kirinyaga County, Kenya.

Socio- demographics.

a) Name of the respondent…….

b) Age……..

c) Gender……..

d) Religion……

e) Marital status……

f) Highest level of education……..

g) Main occupation……..

h) Length of stay……

Latrine status

1. Is there a latrine in your home? Observe a) yes b) no

2. How many latrines are there? A)1 b) more than 1

3. What is the status of the structure? A) Permanent B) Temporary C) Semi-permanent d) VIP

4. What is the wall made of? A) Stones B) Bricks C) Timber D) Stone and timber E) Bricks and timber F) Timber only G) Mud

5. What is the roof made of? A) Iron- sheets B) Grass C) Polythene bags D) Uncovered

The associated risk factors of human excreta disposal practices

1. Do you work in the rice paddies?

2. How far is the nearest latrine facility from the farm?
3. Is the latrine facility private or public?
4. Is it a free or a pay facility?
5. If it's a pay how much do you pay?
6. Do you use a toilet facility while in the paddies? a) yes b) no
7. How often do you wash your hands after visiting the toilet? A) never b) occasionally C) always
8. How long do you usually stay in the rice fields? A) below 4hrs b) between5&8 hrs c) more than 8 hrs
9. What is the main source of water for domestic use? A) well b) river c) canal d) tap
10. How is the nature of the source of water? A) Protected b) Exposed surface water c) Collected rain water.
11. How long do you take to get to the source of water? A) In premises b) less than 30 minutes c) more than 30 minutes.
12. How frequent do the public health personnel visit the area? A) Never b) rarely c) regularly?
13. How many times do you feel unwell in an interval of 3 months? A) Once b) twice c) thrice d) more than four times.
14. Where do you go when you are sick? A) Hospital b) pharmacy c) herbalist d) any other.
15. How many times have you been treated for any of these diseases in the last six months? Malaria, bilharzias, intestinal worms, typhoid, amoebiasis a) 0 b) 1-2 c) 3-4 d) 5-6

The environmental factors related to excreta disposal practices and perceptions.

16. Do all people in your community share latrines regardless of their gender?
    A) yes
    B) B) NO
17. What are the common anal cleaning practices ? A) water b)tissue paper c) leaves d) any other paper (specify)
18. What are the latrine facilities that exist in the fields? If so are they used?
19. What are the locally available materials for latrine construction?
20. Are there any people in the community knowing how to construct latrines?

21. What is the soil permeability and depth of the soil and how easily can it be dug by hand?
22. What is the level of the ground water table in the area?
23. Are there leaky tins, clean water and soap for washing hands after visiting the latrines?

Community's perception about infections of diseases associated with excreta disposal.

25. What are the present traditions and belief that concerns excreta disposal especially regarding women, men and children?

26. Do all people share latrines?

27. Do they use the latrines?

28. What are the prevailing practices for anal cleaning? Is water or cleaning materials available?

29. Do you think the excreta disposal method you use is safe?

30. Do you think all people have access to the facilities?

31. According to you what are the present practices of defecation threatening health? If so how?

32. Whose role is it to construct, pay for, maintain and clean a latrine? A) Women b) Men c) Children d) Both Men and Women

Community level of awareness on health risks measures.

33. What is the health promotion media available/accessible to the population in the area?

34. Are there any activities for promoting health in the area?

35, Do you know any health risk measure in the area?

36. What is the present sanitation awareness level related to public health risks?

37. What health risks are you aware of in the community?

38. Are you aware of any health risk measures in the area?

39. What health risk measures do you know that are put in place in the area?