University of New England

Understanding Farmers' Compliance with Agri-Food Safety Regulations in Kenya

A dissertation submitted by

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Certification of Dissertation

I certify that the substance of this thesis has not already been submitted for any degree and is not currently submitted for any other degree or qualification.

I certify that any help received in preparing this thesis, and all other sources used, have been duly acknowledged in the thesis.

3rd January 2022

Dedication

To my father (John Kibiwott Chepkiyeng) (1948–2019), who strongly believed in the power of education and always inspired me to never give up on studying. Unfortunately, my dad did not get to see me complete my PhD studies as he passed away during my study after a short illness.

Also, to my son (Daryl Kigen Bunei), who has been part of my PhD journey, for making me stronger, better, and more fulfilled than I could have ever imagined.

Publications Arising from This Thesis

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Abstract

Compliance with agri-food safety regulations (e.g., pesticide use) is important for food security, public health management, and economic development in many developing countries. However, balancing the interests of consumers and food producers through a policy framework is complex and dynamic. Unfortunately, there is limited scholarly literature that explores farmers' compliance with agri-food safety regulations in an African context, including Kenya. This thesis investigates farmers' and agricultural industry insiders' perceptions and attitudes about agri-food safety and agri-food safety regulations. It also examines farmers' compliance with agri-food safety regulations in a major agricultural region in Kenya. These food safety regulations and laws are in response to the Kenyan Government's aim to improve the quality and safety of agricultural products for local consumption and global trade by giving farmers increased responsibility for agri-food safety management. The study was informed by three theoretical frameworks: 1) the goal framing theory from the discipline of social psychology, 2) the rational choice theory, which is a cross-disciplinary framework, and 3) the routine activity theory, which is a criminological-based theory that focuses on understanding human deviant behaviour from a crime prevention perspective.

A sequential mixed-method design approach was adopted and involved collecting both quantitative and qualitative data and separately analysing each set of data. For the quantitative phase of the study, 160 farmers were surveyed using a semi-structured questionnaire during face-to-face interviews. Descriptive and hierarchical regression analyses were employed to analyse the quantitative data. The qualitative phase of the study involved six focus group discussions with 54 farmers and 29 key stakeholders in the agri-food chain, and the resulting data were analysed using the thematic method. The findings from the qualitative data were used to triangulate and enhance the findings from the quantitative study.

The survey results indicated that few farmers view agri-food safety as an agricultural challenge, especially among small-scale farmers. Both the survey results and focus group discussions also showed that farmers have low levels of awareness of some agri-food safety regulations. Furthermore, the two sets of data from the survey and focus group discussions revealed that farmers in the study area rarely comply with agri-food safety regulations. However, there were differences in perceptions between the farmers and the key agricultural insiders in relation to farmers' compliance with agri-food safety regulations. The key informants tended to view farmers' compliance levels as being higher than those indicated by the survey participants. Finally, both the farmer surveys and the key informant qualitative interviews revealed that farmers' breaches of agri-food safety regulations are motivated by financial stress, pressure to conform to social norms, and the need to avoid feeling guilty for causing harm to another human being. Other factors found to influence farmers' compliance with agri-food safety regulations were their lack of awareness of regulations and a lack of recognition of the legitimacy of government actions in the way regulations are designed and implemented.

The findings enhance understanding of farmers' agri-food safety practices and their compliance with agri-food safety regulations in a developing country context. Moreover, the study extends the goal framing theory to the agricultural regulatory compliance literature. Importantly, it shows that the goal framing theory is useful for understanding farmers' compliance with agri-food safety regulations in a developing country. In addition, the findings of this study should inform the development of effective, socially responsive, and acceptable agricultural and food policies and programs, especially for farmers in developing countries. The study forms a sound reference point for future studies on agricultural regulatory compliance.

List of Abbreviations

FAO	Food and Agriculture Organization
FGD	Focus Group Discussions
GDP	Gross Domestic Product
KES	Kenya Shilling
KI	Key Informants
KNBS	Kenya National Bureau of Statistics
MoALF	Ministry of Agriculture, Livestock and Fisheries
N	Number
SPSS	Statistical Package for Social Scientist
UNE	University of New England
VIF	Variance Inflation Factor
WHO	World Health Organization

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Chapter 1

Introduction

1.0. Introduction

In any nation, the safety of farm produce is vital for food security, the health of citizens, and the development of the agricultural sector. Globally, governments have introduced agri-food safety policies that are aimed at ensuring not only that consumers are protected (i.e., via reliable access to safe, nutritious, and affordable farm produce) but also that there is equal protection for other key stakeholders, especially food producers, processors, distributors, and service operators. Protection involves safeguarding livelihoods and providing access to markets, both domestic and international, as well as ensuring sustainable economic returns for farmers. Unfortunately, balancing these interests can be difficult (Jaffee et al., 2019; Liu et al., 2019). The focus of this thesis is Kenya, where the government has introduced several agri-food safety policies that seek to protect consumers and promote economic development among farmers and global trade, largely because of the importance of agriculture to the country's Gross Domestic Product (GDP) and international trade. A major obstacle to the government's pursuit, however, is the reluctance by the public, including farmers, to comply with agri-food safety regulations. Consequently, incidences of food poisoning linked to breaches of agri-food safety regulations continue to occur.

This thesis aims to contribute to understanding the factors that shape compliance with agri-food safety regulations among farmers in Kenya. Better understanding of agri-food safety and agri-food safety regulations and compliance among farmers and others associated with the industry will not only contribute to the body of knowledge but also enhance strategies for safeguarding livelihoods, public health management, and economic development among policy

makers. This thesis also aims to highlight gaps in the policies that underpin compliance with agri-food safety regulations in Kenya and generate recommendations to enhance farmers' compliance with these regulations.

This introductory chapter provides background information on the agriculture sector and agri-food safety regulatory environment in Kenya. It also presents an overview of the methodology and research approach adopted and the significance of the study. The chapter ends with a brief description of the structure of the thesis.

1.1. Background to the study

The agriculture sector is of significant social and economic importance globally, as it is arguably the largest economic sector in terms of land and water use, employment generation, export markets, and input use (i.e., seeds, pesticides, and fertilisers) (World Bank, 2020a). It is important for economic development, poverty and inequality reduction, food security, and environmental services. In developing nations, agriculture is the single most vital productive sector in terms of economic and social development (World Bank, 2020a). In Kenya, it is a critical source of income, wealth, power, status, livelihood, and employment for many rural households (Kenya National Bureau of Statistics [KNBS], 2020). Specifically, the sector contributes approximately 34.1% to Kenya's GDP annually and accounts for 65% of total exports and more than 75% of rural employment (KNBS, 2020).

Despite the important role of agriculture to the Kenyan economy, the sector faces a number of challenges. These include global competition, physical resource constraints, erratic weather and climatic changes, insurgent and stubborn pests and weeds, and the unpredictable and punitive costs of inputs (KNBS, 2020; Republic of Kenya, 2019). Other challenges are safety and security on farms, new laws and regulations, limited access to agricultural information, inappropriate land-use practices, poor marketing facilities, and inadequate rural infrastructure

(Republic of Kenya, 2019). Also, the sector continues to be impacted by increasing technological innovation, mass industrialisation, and corporatisation that involves new pesticides, antibiotics, and genetic modified seeds, all of which have undeniable effects on the nutritional content of crops and livestock and the health of humans (Republic of Kenya, 2017, 2021a). Other issues of concern are environmental degradation, labour exploitation, and food poisoning. While the problems of environmental degradation and labour exploitation have received substantial research interest internationally, the safety of agricultural produce has been neglected, despite its significant connection to human health.

Access to safe and quality food is one of the basic rights enshrined in the Constitution of Kenya (Republic of Kenya, 2010). Specifically, Article 43 of the Constitution stipulates that "everyone has a basic right to food of acceptable quality" (Republic of Kenya, 2010, p. 31). Consequently, the Government of Kenya has formulated several agri-food safety policies that are aimed not only at ensuring that agricultural products are safe for human consumption but also at promoting economic development and global trade among farmers. Some of the broad agri-food safety policies that aim at ensuring every citizen has access to safe and quality food are the *National Food Safety Policy (2013)* and the *National Health Policy (2014-2030)*. There are also agricultural sector-specific food safety policies such as the *National Strategy for Agricultural Transformation (2019-2029),* and the *National Livestock Policy (2019).* The *National Strategy for Agricultural Transformation 2019-2029* is the most recent and directly identifies agriculture, and more specifically agri-food safety, as a key component for sustainable development, improvement in national GDP, poverty reduction, and increasing household incomes in Kenya.

Despite the development of these policies, creating a culture of compliance with agri-food safety regulations has remained a significant challenge within the Kenyan agricultural sector

(Republic of Kenya, 2021a). On the farm, some of the hazards and harmful substances that have the potential to cause food poisoning or contamination are antibiotic drugs, pesticides, metal residues, and *mycotoxins*[1], as well as microbial pathogens and parasites that can cause zoonotic diseases (Gitaka et al., 2020; Republic of Kenya, 2017; Unnevehr, 2015). These hazards and harmful substances have been linked to inappropriate, uninformed, or illegal farm practices that include chemical and drug use, farm produce handling, storage, packaging and transportation, animal health and nutrition, and waste management (Inoti et al., 2012; Odwar et al., 2014). Other examples of inappropriate farm practices that can lead to food contamination are the use of polluted water, uncured animal manure, and illicit farm chemicals (Kutto et al., 2011). Some agri-food safety concerns that have become important in Kenya due to non-compliance with agri-food safety regulations are incidents of *aflatoxin*[2] poisoning and pesticide residue in fruit and vegetables (Inonda et al., 2015; Obonyo & Salano, 2018; Senerwa et al., 2016).

Consequently, the role of farmers in agri-food safety management is critical. Unfortunately, training and education of farmers and other stakeholders has not kept up with the growing awareness within governments of agri-food safety requirements and the subsequent changes in policy and regulations to improve agri-food safety practices and reduce the risks of food contamination and poisoning in the food chain. These concerns have increasingly pointed to the need to improve farmers' compliance with agri-food safety regulations. Overall, for government to succeed in achieving the objectives of the agri-food safety regulations, farmers have to accept the policies and change their traditional farm practices where required.

[1] Mycotoxins are naturally occurring toxins produced by moulds (fungi). They mostly grow on grains (such as maize), nuts, dried fruit, and beans, mostly under warm and humid conditions (World Health Organization [WHO], 2015).

[2] Aflatoxin is a toxic chemical produced by fungi that grows on maize, groundnuts and other food crops. It can cause serious health consequences to humans and animals including death. In Kenya, it mostly occurs from improper storage of farm produce, especially grains (Republic of Kenya, 2019).

Drawing from the above background information, the aim of this study is to investigate the factors that determine farmers' compliance with agri-food safety regulations in Kenya. The study is conducted with farmers and key informants in the Uasin Gishu County of Kenya and provides a new perspective of farmers' perceptions of agri-food safety, agri-food safety regulations, and their compliance with these regulations within a developing country context.

1.2. Rationale for the study

Globally, there is a plethora of research on regulatory compliance in agriculture (Ding et al., 2017; Foundjem-Tita et al., 2014; Yan et al., 2016). However, most of these studies have emanated from developed societies with few of them being undertaken in the developing world. Nevertheless, the studies in developed countries can shed light on agricultural regulatory compliance and the associated decisions of the farmers in developing countries.

In Africa, some studies have been conducted on regulatory compliance in agriculture. These have addressed compliance with bio-security (Mwatawala & Yeyeye, 2016), pesticide use (Okello & Swinton, 2010; Omari, 2014), forest use rules (Foundjem-Tita et al., 2014; Ramcilovic-Suominen & Hansen, 2012), observance of labour regulations (Ogolla et al., 2015), and conformity with agri-food safety regulations (Kiama et al., 2016; Longo et al., 2019). These studies and others provide insight into the issue of agri-food regulatory compliance in Kenya, including the causes of food contamination.

In Kenya, various studies have recognised the problem of safety in agricultural products (Inoti et al., 2012; Kiama et al., 2016; Kutto et al., 2011; Senerwa et al., 2016); however, they do not fully address the causes of food contamination. Furthermore, the vast majority of these studies on agri-food safety compliance has to date focused on the presence and prevalence of harmful substances in farm produce (Kutto et al., 2011), and rarely have they empirically explored and provided understanding of the factors that shape compliance and decision-making among the

regulated community in Kenya. Also, attention to agri-food safety regulations has primarily focused on the export market, especially high-value horticultural products, and compliance with international regulations and standards. With respect to the domestic market, a few studies have examined compliance with agri-food safety regulations concerning farm produce for local markets (Harcourt-Brown et al., 2018; Muriithi et al., 2011). However, studies that have comprehensively investigated the issue from a multi-disciplinary perspective and combined theories from the disciplines of economics, criminology, law, psychology, political science, and sociology are sparse.

More research is needed to explore farmers' compliance with national food standards and regulations and identify the factors that influence compliance with agri-food safety regulations in Kenya, especially concerning farm produce sold on domestic markets. A better understanding of farmers' compliance with agri-food safety regulations will not only contribute to the body of knowledge but is also vital for the success and development of agri-food safety policies that secure livelihoods, promote economic development, and protect consumers.

1.3. Aims and objectives of the study

The main objective of this study is to investigate the attitudes, opinions, and perceptions of farmers and industry insiders on factors that shape compliance with agri-food safety regulations by others to identify strategies for improving compliance in a developing country. The specific objectives are to:

1. examine the perceptions and opinions of farmers and industry insiders of agri-food safety and agri-food safety regulations and how well these regulations are complied with by farmers in Kenya.
2. identify the economic, socio-cultural, and legal factors that determine agri-food safety compliance in the context of a developing country such as Kenya.

3. provide recommendations on how compliance with agri-food safety regulations can be improved.

To address the research objectives, the study provides responses to the following research questions:

1. What are the perceptions of farmers and industry insiders regarding agri-food safety, agri-food safety regulations, and farmers' compliance with food safety regulations?
2. What are the economic, socio-cultural, and legal factors that shape farmers' compliance with agri-food safety regulations?
    a) To what extent does the rational calculation of costs and benefits impact farmers' compliance with agri-food safety regulations?
    b) To what extent does deterrence, specifically the risk of detection and sanction severity, impact farmers' compliance with agri-food regulations?
    c) To what extent does legitimacy, specifically perceptions of regulation and the regulator, impact farmers' compliance with agri-food safety regulations?
    d) To what extent do social norms impact farmers' compliance with agri-food safety regulations?
    e) Does farmers' awareness of agri-food safety laws impact their compliance with agri-food safety regulations?
    f) To what extent does the provision of information, extension services, and training for farmers impact their compliance with agri-food safety regulations?
    g) Do personal values impact farmers' compliance with agri-food safety regulations?
3. What changes (or reforms) are required in current regulations and arrangements to improve agri-food safety compliance by farmers and other key stakeholders in agri-food chain?

1.4. Overview of theoretical frameworks

The study was guided by three theoretical frameworks: 1) goal framing theory (Lindenberg, 2000) from social psychology, 2) rational choice theory (Clarke & Cornish, 1985), which is a cross-disciplinary framework, and 3) routine activity theory (Cohen & Felson, 1979) from criminology. The goal framing theory observes that individual actions are informed by three distinct but interrelated goals. First is the gain goal, which is concerned with the increase or preservation of resources, especially finance. The second goal is the normative goal, which focuses on conforming with formal or informal social norms. Last, the hedonic goal refers to how a person feels following an action. In this study, the goal framing theory was used to understand which goal(s) has the strongest impact on informing farmers' decisions when they decide to comply with agri-food safety regulations.

The rational choice theory is an interdisciplinary framework that focuses on micro factors (rational calculation) that influence decision-making. In this study, the rational choice theory was used to explain how non-compliance is an individualised, conscious, and calculated action based on analyses of costs (avoided) and benefits (received) in decision-making (Gök, 2011; Herzfeld & Jongeneel, 2012). Specifically, it was used to explore how farmers' non-compliance with agri-food safety regulations may result from their need to reduce or avoid compliance costs or to recover losses. It was also used to demonstrate how farmers' compliance with agri-food safety regulations lessens in importance as pressure to meet social expectations becomes more salient.

The routine activity theory concentrates on macro factors (i.e., the day-to-day activities of a farm operation, social norms-law inconsistencies, and lack of deterrence) that shape individual decision-making. It posits that non-compliance with the regulations tends to occur when three conditions converge in time and space. These conditions are motivated offenders, suitable

targets, and the absence of guardianship. The routine activity theory was used in three ways in this study. First, it was used to understand how compliance costs or informal social norms motivate non-compliance with agri-food safety regulations. Second, it was used to consider how certain farm products, farms, and farm markets are attractive for violations of agri-food safety regulations. Third, it was used to determine how lack of enforcement of agri-food safety regulations and low levels of education among farmers, food traders, and consumers encourage non-compliance with agri-food safety regulations.

While each of these theoretical frameworks were used to investigate the research questions, the goal framing theory was the main framework that guided the study. The routine activity theory and the rational choice theory were used to support the explanations from the three-goal frames of the goal framing theory. Additionally, the routine activity theory was used to address research question three of the study, which required the identification of strategies to prevent farmers' non-compliance with agri-food safety regulations. The rationale for using the routine activity theory to analyse this question was that when compared to the goal framing theory, it has a greater pragmatic leaning towards strategies that prevent law violations or improve security practices to reduce non-compliance in this context (Miró, 2014). Figure 1.1 below summarises the theoretical frameworks that guided this study.

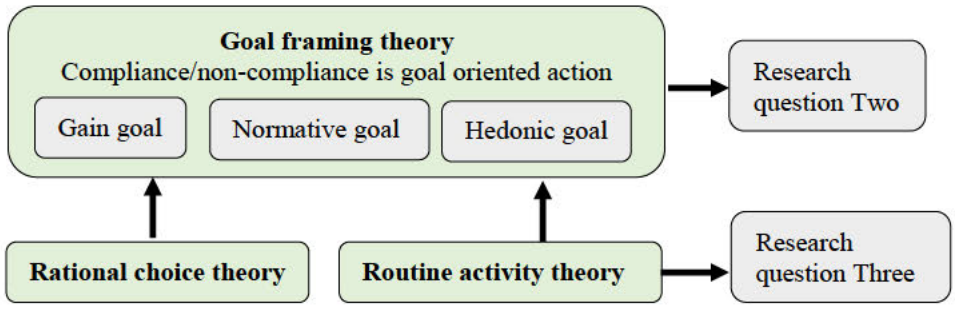

Figure 1:1: Overview of theoretical frameworks that guided the study

1.5. Overview of the research methodology and findings

The study is interdisciplinary and draws expertise, key concepts, theories, methods, and tools from the disciplines of economics, criminology, law, psychology, political science, and sociology. In terms of expertise, the principal supervisor is based within the economics discipline, the second and third supervisors are from the criminology discipline, and the author has academic roots in the disciplines of sociology and criminology. Moreover, the literature underlying this study emanates from regulatory contexts other than agriculture, such as occupational health and safety, building, environmental protection, and natural resource management.

The study was conducted in Uasin Gishu County, which is considered to be the 'grain basket' region of Kenya, over a three-year period from 2018 to 2021. The sequential mixed-method design approach was adopted and involved collecting both quantitative and qualitative data and separately analysing each set of data. The rationale for choosing the mixed-method design was to obtain a deep understanding of the research questions (Bryman & Bell, 2015; Saunders et al., 2016; Walter, 2019). Consequently, the study was composed of two phases: quantitative and qualitative.

The first phase, the quantitative study, involved a survey of 160 farmers randomly selected across the study area. The survey involved face-to-face interviews conducted by the researcher. Descriptive statistics and hierarchical regression were used to analyse the quantitative data. The overall finding was that some farmers consider agri-food safety to be a challenge, with large-scale farmers being more likely than small-scale farmers to view agri-food safety as a concern. The survey also revealed that farmers in the study area rarely comply with agri-food safety regulations. Moreover, regression analysis showed that limited deterrence measures, farmers' perceptions of the regulations, and a lack of information and extension services for

farmers are key factors that influence farmers' lack of compliance with agri-food safety regulations in the study area.

The second phase of the study involved two qualitative studies: six focus group discussions with 54 farmers and interviews with 29 key stakeholders in the agri-food chain. The key informants who participated in the study were knowledgeable in the field of agri-food safety and related food safety issues (i.e., regulations, farm produce trading, and farmer leadership), and were in positions of authority in the county in terms of administration of farming practices and trade in farm produce. Thematic analysis was used to analyse responses from the interviews and the focus group discussions. The findings from the qualitative research methods were used to triangulate and enhance the findings from the quantitative study. More precisely, they were used to generate a deeper understanding of the issues that emerged during the survey. Figure 1.2 below provides a general overview of the research methodology that guided this study.

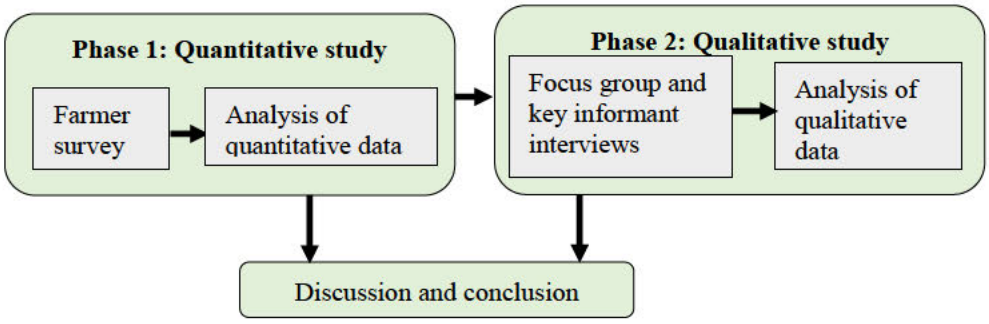

Figure 1:2:Overview of the research methodology
Source: Author

The qualitative and quantitative findings were largely consistent. Some farmers view agri-food safety as difficult to achieve and others view it as a problem of law. The key informants tended to consider agri-food safety as a major farming challenge in Uasin Gishu County while farmers tended not to consider it a major farming challenge. Another key finding was that the perspectives of farmers and key informants tended to differ in relation to farmers' compliance, with key informants reporting farmers' non-compliance being a serious concern, while farmers

do not find their non-compliance a major issue. In relation to factors that influence farmers' compliance with agri-food safety regulations, the focus group discussions and key informant interviews revealed that farmers breach agri-food safety regulations because they are motivated by financial stress and pressure to conform with social norms. The findings also showed that the need to avoid guilty feelings due to causing harm to a fellow human being positively influences farmers' compliance with agri-food safety regulations. Other factors that were identified by focus group participants and key informants as influencing how farmers respond to agri-food safety regulations were lack of awareness of regulations or respect for the legitimacy of government practices in the way regulations are designed and implemented.

1.6. Significance of the study

This thesis has several significant outcomes. First, at an operational level, it contributes to an understanding of farmers' compliance behaviour in relation to agri-food safety regulations in Kenya. By understanding the perspectives, day-to-day experiences, and activities of farmers, policy makers and law enforcers will be better informed to develop and implement sustainable food and agricultural policies as well as carry out legislative reforms. Second, the study contributes to the literature by providing a comprehensive analysis based on an interdisciplinary approach to agri-food safety studies.

The study also contributes to the agricultural regulatory compliance literature due to its focus on a developing economy context. Furthermore, it integrates theories developed for Western societies (i.e., goal framing theory, rational choice theory, and routine activity theory) to understand farmers' compliance behaviour in a developing country. Methodologically, the study provides a basis upon which other similar studies in Kenya and other developing economies can be conducted.

1.7. Definition of key terms

Since this study is interdisciplinary, it is useful to define the terms that are commonly used in different disciplines (especially agriculture, economics, law, and political sciences) as used in this study.

Farmer

In the literature, the terms 'food producers' and 'farmers' are often used interchangeably. In Kenya, the term 'farmer' is used to refer to a person who owns or hires land to grow crops or rear livestock for food either for subsistence, commercial production, or both. It is different from 'food producer', which generally refers to any person involved in any farm decisions in terms of performing, operating, or managing any activity that leads to production of food (National Academies of Sciences, Engineering, and Medicine, 2019). It includes farm owners, farmers, farm workers, and farm managers. Thus, farmers are a sub-set of food producers (Food and Agriculture Organization [FAO], 2017). However, for the purposes of this study, a farmer refers to a person who owns or hires land to grow crops (maize or vegetables) or rear livestock for milk production either for subsistence, commercial production, or both.

Small-scale farmer

In the scientific literature and in policy documents, the term small-scale farmer, small-scale producer, and smallholder are often used interchangeably (see for example, FAO, 2017; Hazell, 2020). Generally, the terms have been defined in relation to physical size of farms (i.e., land size and number of livestock), labour input amount and type of land output used, market orientation, and gross monetary value of farm produce (FAO, 2017). However, land size and gross monetary value of farm produce are the most used criteria used to define small-scale farming or production. Smallholder refers mostly to land tenure while small-scale farmer or producer refers mostly to production outputs or levels. For the purpose of this study, the term small-scale farmer is defined as farmers who farm less than two hectares and use their own

labour full time or in some cases part time, and for whom agricultural production is their primary source of food supply and income.

Food safety/agri-food safety

Food safety is a term that is applicable across the food chain and generally refers to measures taken to ensure that food is not harmful to the consumer (Rezaei, 2018). WHO (2015) defines food safety as all measures taken to preserve the quality of food during production, handling, packaging, transporting, and marketing to prevent contamination and food-borne disease. Therefore, in this study, the term agri-food safety will be used in its broadest sense to refer to all measures taken to ensure and preserve the quality of agricultural produce during production, handling, packaging, transporting, and marketing to safeguard the health and safety of consumers.

Regulation/agri-food safety regulations

A regulation is a set of rules formulated by government or public agencies for the purpose of promoting social, economic, and political goals such as environmental protection and conservation, consumer protection, or agricultural development (Sarre & Johnstone, 2004). The focus of this study is on agri-food safety regulations, and it is broadly defined to cover all food safety rules that focus on the provision and utilisation of farm inputs, on-farm activities, consumption, and processing of farm produce up to the farm gate in a manner intended to protect consumers and promote economic development.

Compliance/non-compliance

In compliance literature and policy documents, the term compliance has been defined using various words such as conforming, adhering, following, or observance (see, for example, Amodu, 2008; Foorthuis, 2012; Yan, 2017). In this study, compliance refers to the state where the farmer or anyone in the agri-food chain observes regulations or laws of food safety in Kenya. On the other hand, the term non-compliance is the process or act of not following formal

rules or regulations of agri-food safety. In this thesis, the terms violation and breaching are used interchangeably with non-compliance.

Regulated actor

A regulated actor is an individual with a responsibility to comply with particular laws, regulations or policies. Consequently, in this study, the regulated actors are the farmers, traders, and others who have a responsibility to comply with laws, regulations, or policies pertaining to agri-food safety requirements.

Regulated community

A regulated community refers to a group of people who are defined by their common responsibility to comply with the particular laws, regulations, or policies formulated by government or public agencies. In this study, the regulated community is all farmers within Uasin Gishu County, Kenya, who hold a common responsibility to comply with the agri-food safety laws, regulations, and policies implemented by government agencies such as the Kenya Dairy Board or Pesticide Control Board.

1.8. Structure of thesis

This thesis consists of seven chapters. Following this introductory chapter, Chapter 2 examines the agricultural industry in Kenya by reviewing the literature on the state of agriculture and agri-food safety. It begins with an assessment of the importance of agriculture to Kenya and then delves into the challenges faced by the sector. The problem of agri-food safety in Kenya and compliance issues are also presented. The chapter concludes by emphasising the need to understand why farmers violate agri-food safety regulations.

Chapter 3 reviews the literature on farmers, agricultural regulatory compliance, and the theoretical frameworks used to guide the study. It begins with a discussion on the process of food production, narrowing down to the role of farmers in ensuring agri-food safety. The chapter briefly explains farmer behaviour and decision-making. A review of global agricultural

regulatory compliance literature is provided as well as studies on Kenyan agri-food safety compliance. The chapter then continues to discuss the three broad theoretical explanations, (namely economic, sociological, and psychological) that affect compliance. The research framework and hypotheses relevant to the research questions are discussed. The chapter concludes with a summary of the key points identified in the review. Chapter 4 describes the methodological approach adopted to address the research questions. Specifically, the chapter details the methods employed to address the three research questions. The chapter ends by describing the ethical considerations that guided the study.

Chapter 5 presents the findings from the analysis of the farmer survey, while Chapter 6 presents the findings from thematic analysis of the focus group discussions with farmers and in-depth interviews with key stakeholders in the agri-food chain. The opinions of farmers are presented regarding agri-food safety, agri-food safety regulations, and farmers' compliance with food safety regulations. The goal framing theory is used to guide the analysis of factors that influence farmers' compliance with agri-food safety regulations. Chapter 7 summarises the key findings from all the data collected, presents the limitations of the study and implications for current agricultural regulatory compliance, and concludes with suggestions for further research.

1.9. Chapter summary

This chapter presented the introduction, background, rationale, and aims of the study. An overview of the theoretical frameworks and methodology that guided the study as well as the significance of the research and definition of key terms of the study were also provided. The thesis continues with a review of the literature, beginning with background information on agriculture and agri-food safety in Kenya.

Chapter 2

Agriculture and Agri-food Safety in Kenya

2.0 Introduction

This chapter provides an overview of agriculture and the agri-food chain in Kenya. Specifically, it discusses the state and characteristics of agriculture and the problem of agri-food safety in Kenya. The sections covered within this chapter provide contextual information for the succeeding chapter that reviews previous studies and the theories that explain farmers' decision making regarding agri-food safety regulations. The chapter comprises five sections. The first section outlines the purpose of the chapter, the second section discusses the importance of agriculture to Kenya and then delves into the challenges faced by the sector, the third section covers agri-food safety in Kenya by reviewing government policies and studies that discuss the problem of agri-food contamination in Kenya, the fourth section presents the legal and institutional frameworks for managing agri-food safety in Kenya, and the fifth section concludes the chapter by providing a synthesis and summary of the chapter.

2.1 Agriculture in Kenya

Kenya is located in the eastern part of Africa. It borders Tanzania to the south, South Sudan and Ethiopia to the north, Somalia to the east, and Uganda to the west. Kenya has the largest economy in East Africa, accounting for more than 26% of East African GDP (KNBS,2020). Across eastern and central Africa, Kenya is regarded as the economic, commercial, and transport hub for more than seven countries (Deloitte, 2016). In 2014, Kenya was elevated to a lower middle-income country (World Bank, 2014). The total population of the country was 47.6 million as at 2019, of which 69% (32.7 million) reside in rural areas. The annual population growth rate is 2.28% (approximately one million), and the average population

density is 82 persons per square kilometre. Most of the population live in agricultural areas, which comprise 37.5% of the total land surface area (KNBS, 2019).

In 2010, Kenya adopted a new political and economic governance system of national government and county governments (Republic of Kenya, 2010). One of distinct characteristics of this new form of governance was the decentralisation of resources and service provision to 47 county governments. These county governments became centres for development, especially for agriculture and health services. The estimated GDP of Kenya was US$101.014 billion as at 2020 (World Bank, 2020b) and growth rate was 5.4% (KNBS, 2020). The main contributor to the GDP of Kenya is agriculture. This sector accounts for 34.1% of the GDP. Other sectors that contribute significantly to the economy of Kenya are manufacturing (7.5%), construction (6.5%), transportation and storage (8.5%), financial services (6.0%), and real estate (6.9%) (KNBS, 2020).

With regard to the focus of this study, the agricultural sector makes a direct contribution to export income, employment, household income, industrial raw materials, nutrition, and food security (KNBS, 2020; Republic of Kenya, 2019). Specifically, the sector accounts for 65% of total exports, and 70% of local manufacturing industries (KNBS, 2020). In terms of population, the majority of Kenyans depend upon agriculture, especially for domestic food supply and livelihood. For example, the sector accounts for 18% of full-time employment and 75% of casual employment (KNBS, 2020). In rural areas, the sector accounts for 80% of rural employment (Republic of Kenya, 2019; World Bank & International Center for Tropical Agriculture [CIAT], 2015). Socially, it is an important source of wealth, power, and status, especially for many rural households in Kenya (Ortega & Tschirley, 2017). Thus, increasing agricultural productivity in Kenya is vital for improving food availability, reducing poverty,

and increasing rural employment, incomes, and the overall economy (Republic of Kenya, 2019).

Kenya's agricultural sector is composed of six sub-sectors: livestock, food crops, industrial crops, horticulture, fisheries, and agroforestry. Horticulture is the largest sub-sector and contributes 33% to the agricultural GDP. Food and industrial crops contribute 32% and 17% to agricultural GDP, respectively, while the livestock sub-sector contributes 15% (KNBS, 2020). In terms of contribution to export income, industrial crops contribute the largest percentage (38%), while food crops contribute less than 1%. The horticulture and livestock sub-sectors contribute 38% and 6% to export income, respectively. Crops that contribute a large percentage to export income are tea, coffee, avocado, passionfruit, and green beans (KNBS, 2020). Non-food crops, especially flowers, also contribute significantly to foreign income. The food crops that contribute less to export income are of major importance to Kenya's food security and stability (Republic of Kenya, 2019). Of all the food crops, maize (corn) is a significant food source and income for most households, and accounts for 15% of agricultural GDP (KNBS, 2020). Other food crops grown by the majority of households are beans, bananas, potatoes, and kale. The livestock reared by most households are indigenous cattle, sheep, goats, and chickens. Less than a million households keep exotic cattle for dairy and beef production (KNBS, 2019).

Most of Kenya's agriculture occurs in high-potential areas, which is 17.5% (approximately 18 million acres) of the total land surface of the country, of which the majority is in the central, western, and Rift Valley areas. More than 85% (approximately 18 million acres) of highly potential agricultural zones are operated by small-scale farmers who farm between 0.2 to 3 hectares of land (Republic of Kenya, 2019). Large-scale farmers who own more than 250 acres operate less than 14% (three million) of the highly potential agricultural areas (KNBS, 2019;

Republic of Kenya, 2019). A further 20% of the land area of Kenya is considered medium potential and is mostly used for livestock production and farming of drought-tolerant crops. The rest of Kenya (62.5%) is classified as a marginal-potential agricultural zone. This agricultural zone is mostly in the northern part of Kenya, which is considered arid and semi-arid. It is most suitable for livestock production, especially ranching. Almost all agricultural production in Kenya is rain-fed, and therefore it is highly susceptible to drought, rain-failure, and climatic changes (KNBS, 2020). Figure 2.1 shows the land classification in Kenya.

In terms of households, 52% of all households practise farming (KNBS, 2020), of which 75% (approximately 4.5 million) are small-scale farmers (Republic of Kenya, 2019). Most small-scale farmers are mixed farmers who often grow crops (especially maize, beans, and vegetables) and rear livestock (especially cattle, sheep, goats, and chickens) mainly for home consumption, sale to local markets, and for export markets (Republic of Kenya, 2019). In terms of market participation, small-scale farmers account for 63% of Kenyan marketed farm produce (KNBS, 2019; Republic of Kenya, 2019). More specifically, the small-scale farmers account for over 80% of milk production, 70% of maize farming, 70% of beef production, 65% of coffee production, and 50% of tea farming (KNBS, 2019). While large-scale farmers do not account for much of the marketed farm produce, they are critical contributors to domestic food security and the export market. The majority of large-scale farmers grow cash crops (especially tea, coffee, and flowers) and food crops (especially wheat, maize, and avocados) for commercial purposes.

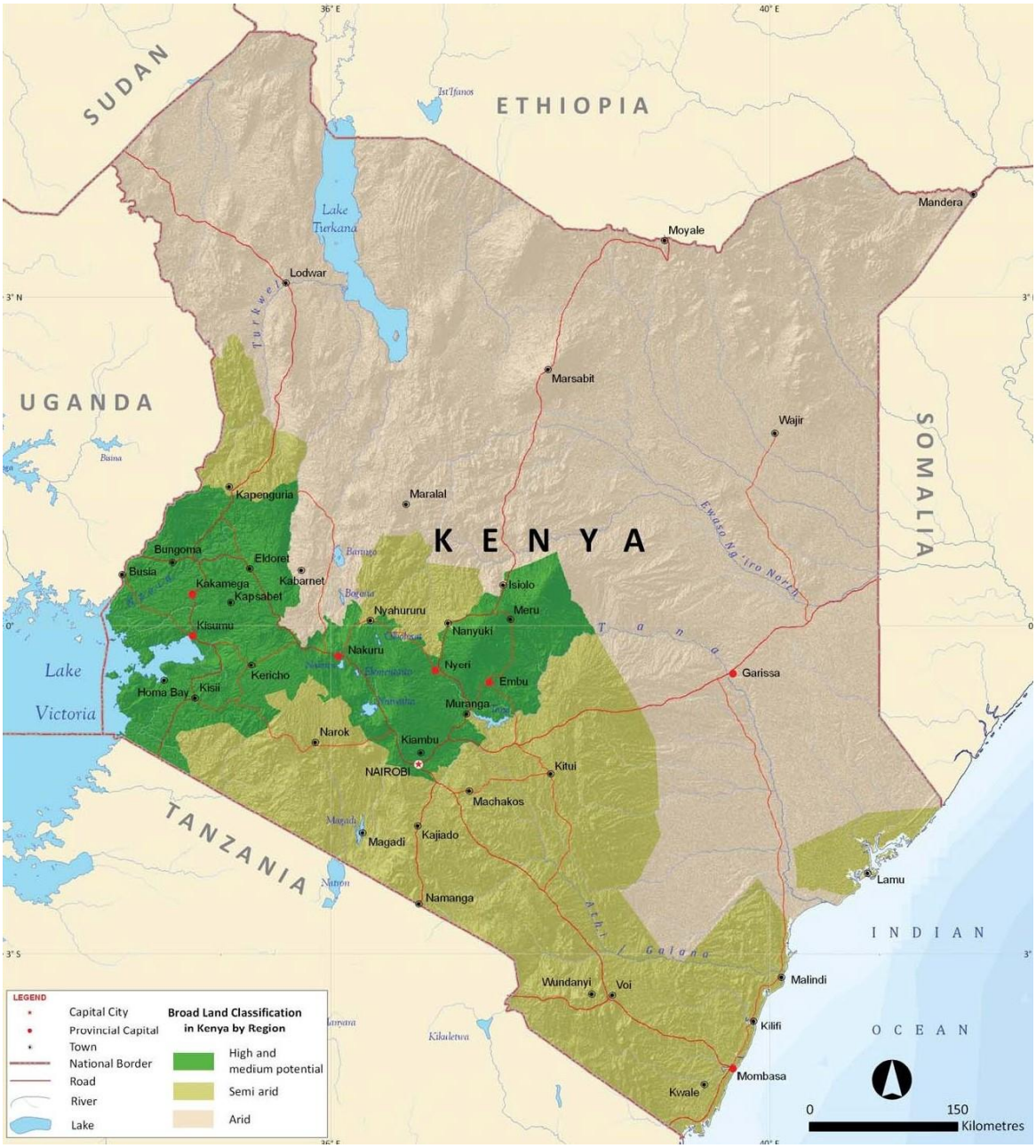

Figure 2:1: Land classification in Kenya.
Source: Adapted from National Environment Management Authority (2018)

Furthermore, most small-scale farmers engage in on-the-spot market transactions, involving selling to local markets that are poorly regulated (Hoffmann et al., 2013b; Woolverton & Neven, 2014). Local outlets for small-scale farmers are village and urban open farm produce markets, green grocers, peri-urban roadside markets, hotels and restaurants, livestock agents, grain traders, or other intermediaries who purchase farm produce from farmers and resell them

to retailers or wholesalers. Factors that contribute to the prevalence of on-the-spot market transactions and domestic markets in Kenya are the long distance between farms and formal markets, high transportation costs, a desire for quick cash, difficulty in finding formal buyers, and the stringent safety and quality requirements of the formal markets (World Bank & CIAT, 2015). While the marketing of agricultural produce has been transformed, as evidenced by a rise in cooperative and contract marketing, especially by supermarkets, these modern markets have strict regulations that tend to exclude small-scale farmers.

In addition to the above, efforts have been made to modernise agricultural production with a major aim of boosting agricultural production and farm incomes (Republic of Kenya, 2019). Some of the modernisations of the agricultural sector are the adoption of technology; use of hybrid seeds, fertilisers, pesticides and machinery; promotion of value addition; and introduction of organic farming. While these modernisation efforts have led to improvements in productivity, some farmers, especially small-scale producers, still follow traditional farming practices (Republic of Kenya, 2019; Woolverton & Neven, 2014). More specifically, traditional farming practices such as the use of natural resources, compost manure, traditional storage facilities, indigenous food preservatives, and intensive human labour still exist, especially in remote areas. These practices have been found to affect agricultural productivity and transformation.

In terms of agricultural transformation, the Kenyan Government has made several efforts to support farmers to overcome the above challenges (see, for example, Republic of Kenya, 2019). More importantly, strategies and policies have been initiated to transform and promote agriculture into a commercial and profitable sector that makes significant contributions to food security, poverty reduction, rural employment, and export income (for example, *Kenya Vision 2030, Economic Recovery Strategy for Wealth and Employment Creation (2000), National*

Livestock Policy (2014), and *National Strategy for Agricultural Transformation 2019-2029*). *Kenya Vision 2030* seeks to transform agriculture into "a profitable, commercially oriented and internationally and regionally competitive economic activity" (Republic of Kenya, 2007, p. 51). More specifically, *Kenya Vision 2030* seeks to increase agricultural productivity by reducing input costs, increasing acreage under irrigation, increasing adoption of improved technologies, and inculcating good farming and farm management practices. The *National Strategy for Agricultural Transformation 2019-2029* has four objectives: increasing small-scale farmers' income, increasing agricultural outputs, promoting value addition, and boosting household food resilience (Republic of Kenya, 2019).

Although Kenya has made significant strides in formulating policies and strategies to transform the agricultural sector as mentioned above, the sector still faces the challenges of global competition, erratic weather and climatic changes, insurgent and stubborn pests and weeds, and the unpredictable and punitive costs of inputs (Republic of Kenya, 2016). Other challenges are safety and security on farms, inappropriate land-use practices, lack of post-harvest services, poor marketing facilities, inadequate rural infrastructure, and increasing illness and disease linked to contaminated farm produce (Edewa, 2016; Karanja et al., 2014).

Lastly, while efforts have been made to incorporate contemporary challenges such as climate change into Kenya's agricultural development, some aspects of agriculture, especially animal welfare and agri-food safety, have not received the required attention (Republic of Kenya, 2013, 2019). However, some of these aspects are important for improvement of agricultural incomes and for increasing trading opportunities, economic development, and public health. The issues of safety of agricultural products and contaminated farm produce and their links to increasing illness and disease in Kenya are the focus of this study and are discussed in detail in the next section.

2.2 Agri-food safety in Kenya

The safety and quality of agricultural produce directly impact on food security, economic development, and the public health of any society (Jaffee et al., 2019). The new constitution of Kenya of 2010 under the Bill of Rights (Articles 43) stipulates that every citizen has a right "to have adequate food of acceptable quality" (Republic of Kenya, 2010, p. 31). However, studies (see, for example, Momanyi et al., 2019; Odwar et al., 2014; Yen et al., 2018), government reports and policies (see, for example, *National Food Safety Policy (2013), National Health Policy (2014-2030), National Livestock Policy (2019),* and *National Strategy for Agricultural Transformation 2019-2029*), have identified agri-food safety as one of the key problems afflicting Kenya's agricultural sector. Likewise, numerous media reports (see, for example, "Six meat retailers in city closed down", 2019; Hoffmann, 2021) have identified safety and quality of farm produce as issues of concern in Kenya. More specifically, these reports have identified agri-food safety concerns as a crucial issue for agricultural development and public health management.

Some of the agri-food safety concerns that have been identified as key issues in Kenya are aflatoxin contamination in maize and milk, pesticide residues in fruit and vegetables, metal residues in vegetables, and microbial contaminants such as *Escherichia Coli* [3] and *Salmonella* (see, for example, Inonda et al., 2015; Odwar et al., 2014). These agri-food safety risks occur right from the time a farmer selects input to when they sell their farm produce. Coupled with these agri-food safety hazards are increasing public health concerns about antibiotic resistance (non-effectiveness of drugs in treatment of human sickness) (Gitaka et al., 2020; Republic of Kenya, 2017). This non-effectiveness has been traced to use and overuse of drugs in animal treatment.

[3] *Escherichia coli* (abbreviated as *E. coli*) is a type of bacteria found in foods and intestines of animals that can make a person sick. It mostly causes diarrhoea (Centers for Disease Control and Prevention, 2019).

In line with the constitution of Kenya 2010, the *National Food Safety Policy* was formulated in 2013. This new food safety policy was comprehensive in that it proposed radical and rational changes to the agri-food safety regulatory environment in Kenya (Republic of Kenya, 2021a). Some of these changes are the establishment of a food safety authority to coordinate food safety activities, the development of methods and technology to enable traceability of food from farm to fork, and the improvement of food safety validation, inspection, and certification.

The *National Strategy for Agricultural Transformation 2019-2029* is the most recent strategy that directly identifies agri-food safety as a key component for improvement of national GDP and household incomes in Kenya. More specifically, the strategy seeks to promote competitiveness of Kenya's agricultural commodities by ensuring that they meet both national and international food safety standards. It also aims at ensuring that Kenya's agricultural commodities meet food safety standards that can be accepted by new regional and international markets such as the Common Market for East and Southern Africa (COMESA), the Africa Common Free Trade Area agreement, and other inter-country trading relationships.

Furthermore, several studies have reported that some agri-food products that are produced and sold in Kenya have more than the permitted residues of chemicals, metal, and bacterial strains, which can cause serious food contamination and poisoning (see, for example, Grace et al., 2018; Odwar et al., 2014; Senerwa et al., 2016). Kutto et al. (2011) and Inoti et al. (2012) found that some of the vegetables produced in the urban centres of Kenya contained more than the permitted levels of metal residues (such as cadmium and lead), which originated mostly from the use of wastewater. Furthermore, research by Kiama et al. (2016) and Senerwa et al., (2016) revealed how meat and milk contamination can be traced to contaminated animal feed and handling practices. Grace et al. (2018) found that some milk products in Kenya had traces of aflatoxins and microbial and antimicrobial residues.

Inonda et al. (2015) and Inoti et al. (2012) analysed pesticide residues in vegetables and fruit on farms and reported that most of this produce contained high levels of chemical deposits that were traced to effluent from local industries, pesticides, and fertiliser inputs. Odwar et al. (2014) found that raw retail chicken meat sold in the capital city of Kenya was highly contaminated with strains of *E. coli*. A recent study by Thuita et al. (2019) found that more than 50% of commercial chicken feed in Kenya was not fit to be used as animal feed as it contained high levels of aflatoxin.

Although these studies show that there are food safety concerns in Kenya's agri-food chain, most of the studies have focused on the presence and prevalence of harmful substances in farm produce. Rarely have they empirically explored why these agri-food safety hazards are occurring or what farming practices encourage these hazards to occur within the farming communities in Kenya. Moreover, as discussed in Section 2.2, traditional farming and food preservation practices still exist, especially in remote areas. These include practices such as the use of compost manure in food production and traditional preservation processes such as sun drying, roasting, or milk fermentation (Huho, 2020). For example, in Kalenjin community, the shelf life of milk is prolonged through fermentation. Among the Kikuyu, who live in central Kenya, meat is preserved by roasting and then applying natural honey (Roesel & Grace, 2014). These traditional farm and food practices have been found to adversely affect the safety and quality of farm produce; however, these practices are decreasing as the use of modern methods of food preservation increases.

Consequently, there is a need to understand from the perspective of farmers and industry associates why these agri-food safety hazards continue to occur in Kenya. More importantly, there is need to understand the factors that influence how farmers respond to food safety regulations. This information is vital not only for improving food safety in Kenya but also for

improving economic development. In the next section, a discussion of the legal and institutional frameworks for addressing the safety and quality of agri-food in Kenya is presented. Consideration is given to the gaps and challenges that affect the implementation of these frameworks.

2.3 Agri-food safety legal and institutional frameworks

2.3.1. Legal frameworks

There are several Acts of Parliament that regulate food safety in the Kenyan agricultural industry. They are the Public Health Act, Cap 242 (Rev. 2002), the Dairy Act Cap 336, Crops Act (2013), Food, Drugs and Substance Act Chapter 254, Meat Control Act Cap 496, Fertilizer and Animal Feedstuffs Act Cap 345, Biosafety Act (2009), and Pesticide Control Products Act Cap 346. These Acts of Parliament are sector-specific regulations that collectively seek to ensure that food from Kenyan farms is produced, handled, stored, processed, and distributed in a safe manner and is wholesome and fit for consumption, and that information on labels is accurate and reliable. They are intended for consumer protection and the promotion of economic development (Edewa, 2016; Oloo, 2010).

Kenya is also party to various international food safety standards, including the International Standards for Phytosanitary Measures and Cartagena Protocol on Biosafety. These regulations provide guidelines for food production or food trade to ensure animal, plant, and/or animal health. Although these international standards, agreements, and treaties are voluntary, it is important for countries to ratify these standards to promote global food trade through export (Edewa, 2016). While these international food safety standards and regulations are not the focus of this study, they do provide insights and foundations for the structure of the study. It is also important to note that some of these international food safety agreements are ratified through Kenyan national regulations, which are the focus of this study.

While much effort has gone into the development of agri-food safety laws and regulations in Kenya as outlined above, incidences of food poisoning linked to farm produce still occur. Worse still, attempts to introduce new robust agri-food safety regulations (such as Dairy Industry (sales by producers) Regulations of 2019 and Crop (Food Crops) Regulations of 2018) have met with resistance from farmers (Mwere, 2019). For example, in 2019, the regulators (Kenya Dairy Board and Agriculture and Food Authority) withdrew the food safety regulations that were aimed at improving the general safety and tradability of farm produce in Kenya. Some of the reasons that contribute to regulation resistance by the farming communities are the perception that the proposed regulations are costly, lack of public participation in the formulation of the regulation, and the perception that regulations are not beneficial to the majority of farmers, who are small-scale farmers. Hence, the continued incidences of illness and disease from farm produce coupled with farmers' resistance to agri-food safety regulations is the gap that necessitated this study.

2.3.2. Institutional frameworks

Based on the constitution of Kenya of 2010, food and agriculture is managed by two levels of government: the national government and 47 county governments (Republic of Kenya, 2010). The primary role of the national government is policy formulation and capacity building of service providers. The county governments oversee agricultural extension and development. Figure 3.2 below provides a summary of institutions managing agri-food safety in Kenya.

The national government implements agri-food safety through three ministries: Ministry of Health, Ministry of Agriculture, Livestock and Fisheries (MoALF), and Ministry of Trade, Industrialisation and Enterprise Development. These ministries have the primary responsibilities for developing food, agriculture, and health policies in Kenya. At the national level of government, especially the MoALF, there are several independent food safety agencies

whose responsibilities are the development and enforcement of regulations to ensure food crops and animal outputs are produced under good sanitary and hygienic conditions (Edewa, 2016; Oloo, 2010). These agencies are commonly referred to as 'boards' or 'authorities'. Some of these food safety regulatory agencies include Kenya Plant Health Inspectorate Service, the Kenya Bureau of Standards, the Kenya Dairy Board, the Pesticide Control Board, the Directorate of Veterinary Medicines, the Directorate of Veterinary Services, the Agricultural and Food Authority and the Horticultural Crops Development Authority.

The Police Service in Kenya play a minimal role in the enforcement of food safety regulations; in most cases, they are relied upon to assist regulatory bodies. The majority of enforcement is carried out by regulatory bodies (i.e., the Kenya Dairy Board, the Directorate of Veterinary Medicines), which are highly fragmented (Republic of Kenya, 2021a). The Kenya Plant Health Inspectorate Service maintains the safety and quality of agricultural inputs, particularly seeds. The Kenya Dairy Board ensures that milk is safe and of good quality before it is consumed or sold. The Pesticide Control Board ensures that farmers have access to pest control products that are safe, effective, and of high quality. The Directorate of Veterinary Services is responsible for ensuring that food of animal origin is inspected and certified, whereas the Directorate of Veterinary Medicines ensures that veterinary medicines are administered safely. AFA is responsible for guaranteeing the safety of plant-based foods during production, storage, transportation, processing, and marketing. The Kenya Bureau of Standards develops safety standards relating to agricultural inputs and products. Finally, the Horticultural Crops Development Authority ensures the safety and quality of all horticultural products (Republic of Kenya, 2021a).

At the county level, the Agriculture, Livestock and Veterinary Department has primary responsibility for promoting crop and livestock production, promoting marketing, ensuring

quality management, and providing extension services (Republic of Kenya, 2010), and the Veterinary Services Department plays a key role in the surveillance and treatment of animal diseases and biosecurity. The Department of Public Health has limited responsibility for agri-food safety management as their mandate is to ensure that the environment in which food is prepared is safe (Republic of Kenya, 2010).

The strategies used by most agri-food safety regulatory agencies to manage compliance are deterrence-based (i.e., inspections and fines). However, most of these deterrence strategies, especially inspections, are mostly reactive, and are rarely done on farms and rural areas (Republic of Kenya, 2021a). Non-deterrence strategies that exists include provision of education and training on importance of food safety and compliance with law; voluntary self-policing, price premiums for food grown in adherence with law, and subsidy programs to support the use of safe farm inputs. Notably, some researchers and non-governmental organisation have piloted the use of economic incentives such as prime payment to induce compliance among farmers to produce quality and safe maize and milk (Hoffmann & Jones, 2021; M'ithibutu et al., 2021; Wairimu et al., 2021). Unfortunately, these economic incentives have not been upscaled to the whole country.

While the above agencies have improved management of agri-food safety in Kenya, many of them still experience challenges in their mission to address food contamination on farms. First, lack of financial and human resources which impede the enforcement of food safety regulations (Jaffee et al., 2019; Muriithi et al., 2011). Second, as discussed in Section 2.2, the majority of Kenyan farmers are small-scale farmers with no identifiable market; consequently, policing them is economically challenging, especially for enforcers who are poorly resourced (Republic of Kenya, 2021a). Another challenge is that information on compliance or non-compliance rates is scant. In fact, police crime statistics and reports by regulatory bodies rarely show the

incidences of agri-food safety non-compliance rates (KNBS, 2021). Further, the problem of corruption continues to limit the implementation of food safety management. The major form of corruption is the bribery of law enforcers.

Last, most of these agri-food safety agencies work independently (Edewa, 2016; Kariuki et al., 2012). This lack of uniform control of agri-food safety regulations has led to disjointed and overlapping responses, competition, blaming, and a lack of consistency in addressing compliance with agri-food safety regulations (Oloo, 2010). To address this challenge of lack of uniform control of food safety management, the National Food Safety Coordination Committee was established in 2013. It is an amorphous body comprising the National Ministry of Agriculture and Health and other food safety-related agencies. At the time of this study, there were ongoing discussions to change some of the regulations on food safety authority. There was also on-going deliberations on the need create Office of the Food and Feed Safety Controller to coordinate the various agri-food safety regulatory agencies in Kenya (Republic of Kenya, 2021a & 2021b).

Other challenges that have been identified to affect food safety control in Kenya are lack of information on the rate of non-compliance, the limited traceability system of farm produce, limited and underdeveloped human resources (food safety specialists), and low public awareness of food safety (Edewa, 2016; Republic of Kenya, 2021a).

2.4 Chapter summary

This chapter presented an overview of agriculture and agri-food safety issues in Kenya in three major sections. The first section dealt with agriculture in Kenya. It began by introducing readers to the geographical location, governance, economic performance, and population of Kenya, before focusing on the agricultural industry. It also discussed the main industry sectors and their GDP contributions to the economy of Kenya. Some of the issues discussed under the

agricultural industry were the sub-sectors of agriculture, the GDP of the key sub-sectors of agriculture, and the importance of and challenges faced by the agricultural sector in Kenya. The challenge of contamination of farm produce and the increasing incidences of illness and disease linked to agri-food was singled out as one of the main problems that needs attention.

The chapter revealed that agri-food safety is essential for public health, economic development, and regional and global integration. Several of the studies reviewed showed that there are safety concerns in Kenya's agri-food chain. However, it was noted that rarely have these studies empirically explored the factors that shape compliance and decision making within the farming community in Kenya, especially with farm produce for local consumption. Significant efforts have been made to establish agri-food safety regulations in Kenya; however, incidences of illness and consumption of contaminated farm produce still occur. It was also noted that farmers' resistance to new agri-food safety regulations is hampering attempts to ensure food produced by farmers is safe. These two concerns necessitated this study, which aims to examine the factors that inform farmers' decisions to comply or resist regulations that are meant to ensure that the food they produce is safe for human consumption.

Having reviewed the agricultural industry and agri-food safety in Kenya, the next chapter discusses agricultural regulatory compliance and the theoretical frameworks used to understand the factors that shape how farmers respond to regulations, specifically agri-food safety regulations in Kenya.

Chapter 3

Farmers, Regulations, and Compliance

3.0 Introduction

This chapter reviews recent research on agricultural regulatory compliance and theoretical frameworks that have been used to study compliance with a view to explaining the research gap and identifying appropriate theories for the study. The review is inter-disciplinary and draws key concepts, theories, methods, and tools from well-established fields, specifically law, criminology, economics, psychology, sociology, and political science, to explain agricultural regulatory compliance. Also, some of the literature reviewed draws upon regulatory compliance within contexts other than agriculture, such as occupational health and safety, building, environmental protection, and natural resource conservation.

The chapter consists of 12 sections. The second section discusses the process of food production, narrowing down to the role of farmers in ensuring food safety, and the third section builds on the second section by discussing farmer behaviour and their decision-making process. The fourth section focuses on defining regulations, while the fifth section concentrates on explaining the term ‘compliance’ (the important concept of this study) and its relevance. The sixth section delves into the conceptual definition of food crime and its relationship to law compliance, the seventh session discusses compliance strategies, and the eighth section delves into prior studies on agricultural regulatory compliance with the aim of identifying gaps in knowledge. The ninth section presents the theories used to explain compliance behaviour. It segments the theoretical frameworks into three major explanations of compliance: economic, sociological, and psychological. The approach the study adopted to theory development is explained in the tenth section, while the research and hypotheses relevant to the research

questions are developed and discussed in the eleventh section. The chapter ends with a summary of the key points identified in the review.

3.1 Farmers and food production

Food production comprises a series of decisions made by farmers that cover the choice of raw materials, farming practices, and marketing of the finished produce. These decisions made not only provide economic benefits but can also produce harm because they occur within a context where economic outcomes and ethical values compete (Sage, 2012). Furthermore, food production has undergone significant technological transformation with the aim of improving food safety. However, these technical changes can pose risks to human health, for example through the misuse of agricultural chemicals or the infiltration of counterfeit chemicals into the agricultural materials market (Carolan, 2016). Consequently, a wide variety of integrity issues have been identified that are associated with food production. Two of these issues are the sale of contaminated food and the inappropriate use of chemicals and antibiotics that are threats to human life, animal health, and environmental resources (see, for example, Manning & Monaghan, 2019; Yang et al., 2019). This study focuses on food safety on farms and the sale of contaminated food.

Anecdotally, there is some suggestion that incidents of food poisoning from food processing and preparation tend to have more immediate health consequences than food poisoning occurrences from farm practices (Okeyo, 2017). However, studies have found that gradual and fatal poisoning does occur in food production, which is an integral part of the food system (Akenga et al., 2017). Therefore, food safety practices must be implemented before and after the farm gate. Jaffee et al. (2019, p. xxi) state that “the safety of food is a result of action or inaction” of people in the food production system. Consequently, food safety is a shared responsibility where every stakeholder in the food chain has a specific role in ensuring that the

final food product is safe. It is also not only defined by the physical space of production but also by socioeconomic and political decisions at all stages of the food chain by different stakeholders in the food chain (Jaffee et al., 2019). These stakeholders include farmers, food traders, food sellers, consumers, food policy makers, the media, and food regulators.

On farms, food contamination and poisoning mostly occur during the growing of crops, the feeding or slaughtering of livestock, or the storage and transportation of farm produce (Rocha, 2017). Farmers, therefore, have a major role to play in promoting food safety through ethical farming practices and compliance with food regulations, policies, and standards (Oloo, 2010). Ethical farming practices and compliance with food regulations affect all stages of production, from selection of farm inputs and resources, land preparation, and pest control management to harvesting, sorting, grading, packaging, transporting, and storing of farm produce. They also cover consumption or sale of farm produce. Therefore, the choices and actions that farmers make concerning food safety constitute an important research topic.

Despite farmers occupying a major part of the food chain (organising and using resources to produce for their own or public consumption), studies such as Rezaei (2018) have observed that farmers are too often neglected in the study of food safety management along the food chain. This study, therefore, assesses the attitudes, opinions, and perceptions of farmers about factors that shape their compliance with agri-food safety regulations to identify strategies for improving their compliance. Investigating factors that affect farmers' choices in food safety decisions is important for improving food integrity.

3.2 Farmers and decision-making

Farmers have been universally characterised as persons of high integrity, hardworking, conservative, profit-oriented, and rational (see, for example, Donnermeyer, 2017; Schoon & Grotenhuis, 2000; Smith, 2013). Schoon and Grotenhuis (2000) observed that farmers are good

stewards of social welfare, environmental protection, and the continuation of farming. Likewise, farmers often describe themselves as stewards of the environment for the sustainability of their farm operations (Beedell & Rehman, 2000). However, farmers have also been known to be risk-averse and, therefore, less likely to accept new, unproven, or innovative ideas or methods (Sulewski & Kłoczko-Gajewska, 2014).

Farmers are entrenched in place-based social, economic, cultural, and political environments that shape their daily decisions and farm activities, and therefore, they are bound to make numerous decisions in their course of farming (Ellis, 1998; Schirmer, Berry, & O'Brien, 2013). These decisions are varied and deal with issues of climate change, biosecurity, environmental conservation or protection, natural resource management, human welfare, tax compliance, law or regulatory compliance, and animal welfare (Kaine et al., 2010; Phuong et al., 2018; Uckert et al., 2017). These decisions are also multifaceted and may be oriented to profit or capital, competition, and challenges in the agricultural system (Dessart et al., 2019; Ellis, 1998). Ellis (1998) observes that farmers make economic decisions that are largely dependent on three issues: the physical relationship between output and input; the method of production; and the profit or benefit that can be received from a given set of farm resources. Yet, some of these decisions can pose ethical dilemmas because they may be the result of broad social, political, economic, and cultural contexts over which farmers have little control (see, for example, Cheng, 2012; Ellis, 1998; Hamilton, 2015; James Jr, 2018).

Globally, a substantial volume of literature has been devoted to understanding farmer decision-making from a variety of perspectives, usually economic, sociological, and psychological (see, for example, Barclay & Bartel, 2015; Phuong et al., 2018; Woolverton & Neven, 2014). Many of these studies focus on understanding the motives, values, and attitudes that shape farmers' decisions while producing food (Ogolla et al., 2015; Phuong et al., 2018; Toma et al., 2013).

These studies recommend interventions that have raised awareness among the wider public and policymakers on factors that shape farmers' decisions. Some of these interventions have been used by some governments across the globe to develop policies that are acceptable to farming communities.

While some interventions are accepted outright, in some cases the interventions are met with resistance from farmers (Dessart et al., 2019). Therefore, for sustained behavioural change, policymakers and implementers should first establish an understanding of the decision-making process of those whose behaviour they want to change. An understanding of their views and contexts (social, cultural, economic, or political) would help to reduce resistance and increase acceptance of new interventions (Kaine et al., 2017). This thesis focuses on decision-making related to compliance with agri-food safety regulations in Kenya.

3.3 Concept of regulation

Regulation is a key concept in this study, and therefore, its definition is important. Regulation is used synonymously with terms like rules, standards, statutes, laws, and prescriptions (Foorthuis, 2012; Giraud-Héraud, Grazia, & Hammoudi, 2009; Sarre & Johnstone , 2004). Sarre and Johnstone (2004, p. 4) define regulations as "a set of authoritative rules accompanied by a mechanism, usually administered by a public agency, for monitoring and promoting compliance with those rules". While the terms 'regulation' and 'law' are used interchangeably in policy documents and scientific literature, they differ in their formulation, the way they are enacted, and in the severity of punishment (Kosti et al., 2019). Laws are created by a legislative branch of government (i.e., parliament) through a bill process [4], While a regulation is created by an executive branch of government (usually via a specific public entity, for example the

[4]Bills (acts of parliament or proposed laws) made by parliaments in different jurisdictions in the world pass through almost similar stages before they become law. Usually, they are sponsored by a legislator, debated, and passed before being assented into law by the executive.

Kenya Dairy Board) through an internal process different from the stages involved in a bill process.

Usually, regulations are a sub-set of laws and are formulated to manage what is permitted by law (Kosti et al., 2019). For example, in the context of this study, the sale of farm produce is not outlawed, but there are regulations that are aimed at ensuring that consumers are sold food that is safe (for example, in relation to packaging). Whereas regulations are enacted by independent government agencies, in most countries, they have to be approved by parliament. These notwithstanding, both law and regulation have a similar outcome of permitting or prohibiting certain practices as well as stipulating repercussions for violation (J. Braithwaite et al., 2007). However, violations of laws attract harsher penalties than regulations (Kosti et al., 2019). This study focuses on agri-food safety regulations; however, the literature on law compliance is utilised to support the study.

Regulatory techniques can be low intervention or highly prescriptive, international or national, general or industry-specific (Giraud-Héraud et al., 2009). Regulations can be made at different levels of government (national, central, federal, state, territory, county), government ministries or agencies, or non-governmental organisations. The consequences for not complying with regulations are usually penalties or injunctions, but in worst-case scenarios, imprisonment may result. A regulation is successful if it solves or reduces the problem or problems that it was designed to address (Kaine et al., 2010). In most countries, regulations are made at the national or central level of government, and regulations made by government entities are mostly ratified by the top-level government through legislation. In Kenya, regulations are usually enacted by the national government through ministries or agencies, but these must be ratified by the national assembly (Republic of Kenya, 2010).

The intent of most agricultural regulations is to channel the behaviour of farmers to achieve food quality, consumer protection, farm workers' welfare, and environmental protection. The focus of this study is agricultural regulations that promote consumer protection. Specifically, the regulations under scrutiny are those made to ensure that farmers produce safe and quality produce. These regulations set out the minimum standards or conditions that anyone in the food chain must comply with to make food (in this study, farm produce) is safe and of adequate quality (FAO, 2005). They broadly cover all food safety regulations that focus on the provision and utilisation of farm inputs, on-farm activities, and the consumption, processing, and sale of farm produce.

In Kenya, like other countries in the world, there are numerous and diverse agri-food safety regulations as discussed in Chapter 2. Consequently, this study limits itself to two issues. First, as it is difficult to study all agri-food safety regulations in Kenya, for the purposes of this study, three areas of Kenyan agri-food safety regulations were identified as the major focus: 1) the use of recommended containers for the storage and transportation of farm produce, especially milk, 2) the adherence to recommended ways of disposing of farm produce, especially livestock, and 3) the prohibition of the sale of contaminated farm produce. These regulations were chosen because they are the areas where food safety compliance is most prevalently compromised in Kenya (Odwar et al., 2014; Oloo, 2010). Second, the farm products that are of interest to this study are milk, maize, livestock, and vegetables. The rationale for the choice of these farm products is that they have received less research attention than horticultural products such as passionfruit, beans, and mangoes. Also, these farm products are mostly traded in domestic markets, which are the focus of this study.

3.4 Concept of compliance and its importance

The concept of regulatory compliance has been examined from various perspectives: by those regulated or the regulatory agency; in the disciplines of management and business studies, economics, law, political science, sociology, and psychology; and in a range of contexts – financial, political, legal, social, and safety, and yet there is no accepted standard definition of compliance (see, for example, Amodu, 2008; Foorthuis, 2012; Yan, 2017). According to Amodu (2008), compliance is an unrefined concept that remains tacit in most of the regulatory compliance literature, Yan (2017, p. 21) defines compliance as the state of conforming to rules, regulations, or legislation, and Manning (2020) defines compliance as the act of obeying laws or regulations proscribed by government or any other agency affiliated with government. For Foorthuis (2012, p. 162), compliance is a binary adherence to the regulations (yes or no, adhered to or not adhered to). For the purposes of the present study, Manning's (2020) definition is adopted.

Compliance with regulation is important to different organisations and individuals for many reasons (Amodu, 2008; Gunningham, 2010; May & Wood, 2003). For any government, compliance is important for a country's security (including food security), stability, and economic development (Yan, 2017), while for business entities, compliance is important for strategic development, marketing, brand development, and customer satisfaction. In business, non-compliance can lead to damage or loss of reputation and income in terms of loss of customers and shareholders (Sarre & Johnstone, 2004), and the consequences of non-compliance for individuals include the loss of reputation, fines, or personal liberty.

In terms of food safety, compliance is crucial for public health, consumer protection, and business development. Compliance with agricultural regulations is particularly important in farming as it protects farmers and consumers, enhances sustainability, protects the

environment, minimises health risks, and contributes to food security (Divanbeigi & Saliola, 2017; Jongeneel, 2007). Non-compliance with food safety regulations can lead to damaging and catastrophic events for a country, with impacts on industry, communities, or individuals in terms of loss of life and income (Jaffee et al., 2019).

Therefore, to understand the effectiveness of any regulations, there is a need to assess the attitudes and perceptions of the regulated actors about the purpose of the policy and their compliance behaviours (Kaine et al., 2010; Yan, 2017). In essence, compliance is the 'lens' or central organising principle for understanding the effectiveness of any regulations (Amodu, 2008).

3.5 Food safety, compliance and the concept of food crime

The ultimate purpose of any government is proper functioning of society (Amodu, 2008; Gunningham, 2010; May & Wood, 2003). This is achieved by ensuring that citizens comply with laws and regulations. However, practically, it is difficult to achieve full compliance due to the limitations of resources, especially financial, to implement, promote, and enforce regulations (Short, 2021; Yan, 2017). Thus, it is not surprising that citizens fail to comply with laws and regulations. The focus of this study is on farmers' compliance with agri-food safety regulations. Accordingly, it is necessary to understand how farmers and other stakeholders perceive non-compliance with agri-food safety regulations from a criminology perspective, as farming affects all aspects of the human experience, society, and the environment (Croall, 2012; Mol, 2013).

Food crime has been defined by various authors (see, for example, Cheng, 2012; Croall, 2012; Tourangeau & Fitzgerald, 2020) from two major approaches (i.e., legal and social-legal or social harm) to broadly mean practices or actions that are harmful (i.e., physically, socially, economically, or psychologically) to consumers, food producers (i.e., farmers, farmworkers,

farm managers), farm animals, and the environment along the whole food chain (i.e., from farm to fork). The legal definition recognises food crime to be all those violations of farm and food practices that are proscribed by law. The socio-legal approach, by contrast, defines food crime as including not only what the law prohibits but also those actions that violate moral standards or are harmful (i.e., physical, economic, social, or psychological) to society, even if they are not prohibited by law.

Croall (2007, p. 206) defines food crime as any dishonest conduct that occurs in the processing, production, distribution, and selling of food that is likely to be seriously detrimental to the quality, authenticity, or integrity of the food, and Cheng (2012, p. 257) defines food crime from a socio-legal perspective to mean any activity that is inconsistent with formal rules or norms expected of members of the food industry. However, Gray (2018, p. 97) defines food crime from both legal and social-legal perspectives to mean any behaviour (i.e., physical, economic, social, or psychological) that is harmful to society as well as those illegal acts that misrepresent food quality standards such as food adulteration.

Within the field of criminology, food crimes have been analysed through the lenses of critical and green criminology (Croall, 2007; Gray, 2018). These two fields of criminology are different, but they essentially broaden the definition of food crime beyond the legal construction to include moral acts that are significantly harmful to society (Gray & Hinch, 2015; Tourangeau, 2016b). From a green criminological perspective, the major difference between the legalistic definition of food crime and a social-legal approach is in the definition of "what constitutes a crime and who are victimised by it" (Tourangeau & Fitzgerald, 2020, p. 205). In terms of what constitutes food crime, green criminology defines any action that is either proscribed by formal law or moral standards as a crime. Victims of food crime, from the green criminological perspective, include not only direct victims such as consumers but also

indirect victims such as farm animals, farm workers, or the environment. Critical criminology on the other hand defines food crime to include not only violation of regulations that are prohibited by law but also serious harms (i.e., to both humans and non-humans) that are associated with the violation of both formal rules and social norms. Gray (2018) proposes that food crime needs to be viewed through critical criminological lenses to reduce the tendency for narrow definitions.

Therefore, to reduce violations by farmers, it is important to understand how farmers and other stakeholders in the agri-food chain view non-compliance with food safety regulations. Particularly, do farmers and other stakeholders in the agri-food chain perceive non-compliance with agri-food safety regulations as a crime? Alternatively, what do they think constitutes food crime? Recognition of non-compliance as a crime is critical as some food and farm practices are socially mediated and context-dependent and, therefore, they affect how farmers interpret and make decisions about compliance with regulations. It is also vital when formulating strategies to reduce criminal opportunities (Spink & Moyer, 2011).

3.6 Compliance enforcement strategies

The success of agri-food safety regulations depends on both how a regulator formulates and enforces regulations and the commitment from farmers to follow the regulations. This section focuses on enforcement strategies that can be used to ensure compliance among the regulated actors. The aim is to highlight key strategies that help to improve farmers' compliance with food safety regulations. Prior studies of compliance enforcement strategies for improving farmers' compliance with agri-food safety regulations in Kenya are limited (Ajwang, 2020; Hoffmann & Jones, 2021).

Enforcement strategies are basically tactics, philosophies, or methods that a regulator uses to achieve compliance (May & Wood, 2003). They include decisions by a regulator about what

to enforce, how to allocate resources for implementation of the law, and the kind of enforcement tools to use (May & Winter, 2011). Compliance studies (see, for example, Amodu, 2008; Gunningham, 2010; May & Wood, 2003; Yapp & Fairman, 2006) have discussed various strategies that regulators and government can use to achieve policy outcomes effectively and efficiently without creating resistance or non-compliance from the regulated community. However, it is not practical to expect to achieve full compliance. The extant literature identifies six major strategies that can be used to enforce regulations or achieve compliance: punitive, persuasive, responsive regulatory, meta-regulatory, smart regulatory, and risk-based (Amodu, 2008; Gunningham, 2010).

3.6.1. Punitive strategies

Punitive strategies are based on deterrence theory and, therefore, focus mostly on detecting violations, prosecution, and punishment (Gunningham, 2010). The strategies assume that individuals are self-interested rational actors who choose whether or not to comply based upon cost-benefit analysis or existence of opportunity. Some of the punitive enforcement strategies are patrols by regulators, prosecution, and punishment (fines or imprisonment) (Gunningham, 2010). According to Amodu (2008), prosecution remains a central technique for achieving compliance. Punishment is also used to send a message to non-compliers and would-be non-compliers that failure to follow the law will be met with a harsh penalty. Some of the punitive strategies used in the agricultural industry are patrolling, inspections, fines, imprisonment, loss of business, and injunctions from future production (Haines et al., 2004).

Punitive enforcement strategies are appropriate for influencing rational, hard core, or repeat offenders (Gunningham, 2010). One of the limitations associated with punitive enforcement strategies is the assumption that people are rational beings who will make conscious decisions based on available options. However, some people have little option when making decisions

due to underlying contextual issues, such as poverty (Amodu, 2008; Gunningham, 2010). Other limitations are the fact that a punitive approach focuses too much on violations and not what causes a person to violate the law. It also assumes that both the regulated and regulators have enough resources and capacity to ensure compliance, which, in reality, it is not always the case (Murphy, 2008).

3.6.2. Persuasive strategies

Unlike punitive strategies, with persuasive strategies, compliance is viewed as a process for remedying existing problems and preventing non-compliance by others. Basically, compliance is not an end but a means. According to Amodu (2008), the primary goal of any regulator or regulations should be to assist those being regulated to comply rather than to force them to comply. Therefore, more focus is placed on the context (i.e., social, economic) of the regulated. Thus, the strategy is to negotiate, bargain, persuade, or enable compliance.

Although both punitive and persuasive strategies share a common goal of ensuring compliance, the difference is in the approach to secure compliance. In punitive strategies, compliance is achieved through coercion and confrontation while persuasive strategies seek cooperation and conciliation or provide assistance for the regulated to comply (Gunningham, 2010). Consequently, most tactics of persuasion are non-legal and employ innovative, accommodative, economic, social, or psychological means such as education and training, incentives (subsidies, premium prices), and the provision of information to the regulated community (Giraud-Héraud et al., 2009; Kaine et al., 2017). Also, persuasive strategies take different forms, such as token enforcement (e.g., tax incentives), flexible enforcement (e.g., bargaining on which provision to follow first), or assisted enforcement through subsidies.

Some of the persuasive strategies that have proven to be effective in promoting compliance are the provision of information, education and training, rewards, and incentive-based programs

(Hoffmann & Jones, 2021; Saenger et al., 2013). Training or raising the awareness of the regulated actors about the regulations, the rationale, the benefits of compliance, and the consequences, sanctions, and penalties of non-compliance have been found to have a significant impact on attitudes and compliance rates (Amodu, 2008; Foorthuis, 2012; M'ithibutu et al., 2021). Use of rewards and incentive-based programs such as price premiums for products produced in accordance with the law have also been found to significantly improve compliance rates (Hoffmann & Moser, 2017; Navarro et al., 2015; Saenger et al., 2013). In the same line of thought, programs that assist compliance, such as subsidies, can improve compliance (Hoffmann & Jones, 2021; M'ithibutu et al., 2021).

One major weakness of persuasive strategies is that they can discourage compliant-regulated actors if the regulator is lenient on those who do not comply (Gunningham, 2010). Nevertheless, persuasive strategies have been the primary approach for agricultural industries, environmental protection, and natural resource conservation (Kronrod et al., 2012). Recent agri-food safety compliance studies from developing countries (for example, Hoffmann & Jones, 2021; M'ithibutu et al., 2021; Wairimu et al., 2021) demonstrate that persuasive tactics such as price premiums for farm produce grown in accordance with the law, guaranteed market prices, and subsidies do promote agri-food compliance.

3.6.3. Responsive regulatory strategy

The responsive regulatory strategy was formulated by Ayres and J. Braithwaite (1992), who argued that compliance is a gradual process. Basically, it combines both punitive and persuasive enforcement strategies to achieve compliance (Gunningham, 2010). It is based on the principle of incremental enforcement or sanctioning. According to Amodu (2008), it is not always wise to implement several regulations at one time. Rather, a step-wise implementation is better, as it allows the regulated community to learn gradually and the regulatory process is

less stressful. Ayres and J. Braithwaite (1992) observe that compliance enforcement strategies are layered in a "pyramid shape", as shown in Figure 3.1.

Figure 3:1: Enforcement pyramid.
Source: Ayres and J. Braithwaite (1992)

The foundational strategies are used to prevent, persuade, support, encourage, or reward compliance. These foundational strategies are information provision, training, and education. It also involves informal sanctions such as shame and embarrassment to influence compliance. Persuasive strategies are used first, and if these enforcement strategies do not work, the approach is escalated to punitive strategies. Punitive strategies should be the last resort for ensuring compliance.

The responsive regulatory strategy has been found to be not suitable for small firms and in situations where there is a high risk of resistance from the regulated community (Gunningham, 2010). It has also been found to be not appropriate for communities who are at risk of being excluded by the introduction of a law (Ajwang, 2020). It is mostly used in regulating large-scale operations where the regulated community holds legitimate concerns, or in situations

where the regulator has frequent interactions with the regulated entity (Ajwang, 2020; Gunningham, 2010). In a study of the implications of responsive regulation among small-scale fresh fruit and vegetable farmers in Kenya, Ajwang (2020) found that this type of enforcement strategy secured the participation of farmers in value chain programs.

3.6.4. Meta-regulatory (self-regulation) strategy

The main principle underlying the meta-regulatory strategy is that a government indirectly implements regulations by allowing a third party to make their own regulations (Yapp & Fairman, 2006). Gunningham (2010 p. 135) refers to this as government "regulating at a distance". The strategy uses the principle of group or peer pressure to promote compliance among actors who share similar characteristics. The regulated actors are grouped and then allowed to form rules that are approved by government (Yapp & Fairman, 2006). The main role of the government or regulator is to oversee the regulated organisation or group and if one regulated actor fails to follow the law, the consequences are applied to all members of the group (Gunningham, 2010).

Self-regulation has mostly been used in industries where regulated communities are homogeneous. It has also been advocated in developed economies as a way to improve compliance with food safety regulations (Hoflund & Pautz, 2013; Yapp & Fairman, 2006). In Kenya, the self-regulation strategy has mostly been used for improving compliance among farmers growing horticultural produce for export (Mwambi et al., 2020). Mwambi et al. (2020) found that organising farmers into cooperatives increased compliance, as the fear of shame for ruining the reputation of the group drives farmers to comply with law. The Government of Kenya has also adopted a self-regulation strategy to increase media accountability (Obuya, 2012). Another sector in Kenya that has used a self-regulation strategy to improve compliance is the public transport sector. The major constraint to this strategy is that it requires a high level

of cooperation between many regulators, and is only applicable to situations where there are many regulated actors (Hoflund & Pautz, 2013).

3.6.5 Smart regulatory strategy

The smart regulatory strategy is a pluralistic approach that involves more than one party (i.e., stakeholder) and strategy at the same time. It has the strategies of self-regulation and co-regulation (a hybrid form in which private actors are incorporated by public agencies to enforce or implement regulatory activities) (Gunningham, 2010; Martinez et al., 2013). It is a flexible and multifaceted compliance enforcement strategy that is based on the principle that third parties or key stakeholders can indirectly promote compliance (Gunningham, 2010). According to Gunningham (2010), third parties are 'surrogate' regulators whose main role is to support or complement government in fostering compliance. Third party regulators include consumers, suppliers, civil society, non-governmental organisations, local community groups, insurance companies, and banks (Alonso et al., 2018; van Gossum et al., 2010). This strategy has been found to be cost effective and applicable to situations where there are diverse interests and the probability of resistance is high. It has also been found to be suitable for introducing regulations for new innovations and technologies (Kingiri & Ayele, 2009).

The smart regulatory strategy has primarily been applied in promoting compliance in the sectors of banking, insurance, agri-food safety management, and environmental conservation (Alonso et al., 2018; Kingiri & Ayele, 2009; Saenger et al., 2014). In relation to this study, compliance among farmers can be improved by involving consumers, input suppliers such as chemical companies, and local farmer organisations. For example, Hoffmann et al. (2013b) found that if consumers are involved in agri-food safety law enforcement by training them to buy food that has been produced sustainably, ethically, and responsibly, farmers are more likely to change their compliance behaviour.

A criticism of smart-based regulation is that it is not able to address institutional issues such as values and philosophies that inform how regulated actors and policy implementers operate (van Gossum et al., 2010). It is also seen as unsuitable for situations where there is need for a specific response, there are few regulated actors, or there is a serious risk of irreversible loss as a result of a decision (Gunningham & Sinclair, 2017; van Gossum et al., 2010).

3.6.6. Risk-based strategy

The risk-based strategy is a compliance enforcement strategy in which regulators conduct an analysis of the impact of different regulatory decisions or activities and target resources to those activities, persons, or places that present threats to their achievement of compliance (Gunningham, 2010; Martinez et al., 2013). Like the smart regulatory strategy, it incorporates principles of co-regulation (Martinez et al., 2013). Its main principle is identifying, assessing, and controlling risks associated with any regulatory option or decision (Gunningham, 2010). Risk analysis in compliance includes knowing the sources of greatest resistance, the weak points, the most costly options, the profitable options, and the greatest risks. Consequently, the regulator deploys a range of enforcement strategies that correspond to the risks identified.

This strategy has mostly been used in business, public health management, road safety, and environmental and natural resources conservation (Martinez et al., 2013). For instance, in introducing natural resource conservation regulation among indigenous communities, risk-based regulation will involve analysing risks such as who is likely to pose resistance in the community. In agricultural regulation, individuals whom farmers trust within the community are the first to be targeted and convinced. In food safety management, a framework that corresponds to the risk-based strategy is Hazard Analysis and Critical Control Points (HACCP) (LaBorde, 2020). HACCP is a primary risk management framework that focuses on identifying hazards and risks in the food chain that can cause food (in this study farm produce) to be unsafe.

In the context of this thesis, risk-based compliance strategies may take the form of examining areas or points where most law breaches occur or are likely to occur in the agri-food chain. The points where most violations occur have been referred to as "pinch-points" (Soon et al., 2019). Strategies and resources are then deployed to address these points or parts of the agri-food chain where violations mostly tend to occur. A major limitation of risk-based regulation is that it tends to focus on minimising risks that hinder compliance rather than expanding resources to combat the violation of laws or regulations (Beaussier et al., 2016).

This section has presented six major compliance strategies: punitive, persuasive, meta-regulatory, responsive regulatory, smart regulatory, and risk-based. Many of the strategies are mostly utilised during the implementation of regulations; however, the meta-regulatory and smart regulatory strategies are also formulated during the regulatory design stage (Gunningham, 2010). It should be noted that different strategies are suited to different contexts. According to (Gunningham, 2010), the principal of choosing any strategy is its effectiveness and efficiency. However, the choice of strategy to secure compliance depends on several structural, contextual, and personal factors. Such factors are the kind of industry, the level of organisation of the regulated actors, the geographical distribution of the regulated community, the type of offender, the size of the firm, and the industry type. Other factors are the degree of risk of non-compliance, the political environment, the social context, the market structure, and the regulated actors' perceptions and attitudes towards compliance and structural constraints (Amodu, 2008; Kingiri & Ayele, 2009).

In Kenya, some of the factors that are critical when designing agri-food safety compliance strategies for farmers are the dominance of small-scale farmers and their preference for informal markets (Hoffmann et al., 2013b; Roesel & Grace, 2014). Consequently, designing effective and acceptable agri-food safety compliance strategies requires an understanding of

these local dynamics. The majority of scholars strongly recommend that punitive strategies should be used as the last resort in achieving compliance, for offenses with serious consequences, or for those individuals who have repeatedly committed offences (Amodu, 2008; Gunningham, 2010). Others have observed that persuasive or punitive strategies are not effective tactics for achieving compliance, and they advocate for a hybrid or mix of persuasive, educative, and punitive strategies and assisting the regulated to achieve compliance.

3.7 Review of previous research on agricultural regulatory compliance

A substantial volume of socio-legal literature on agricultural regulatory compliance has been devoted to understanding the factors that determine why some farmers choose to comply or not comply with the regulation (Table 3.1 provides a summary of these studies). These socio-legal studies have focused on understanding the motivations and capabilities of farmers to comply with regulations [5] on forest use, pesticide use, labour welfare, biosecurity, and natural resource management (see, for example, Barclay & Bartel, 2015; Foundjem-Tita et al., 2014).In the literature, there are several factors that shape agricultural regulatory compliance: deterrent measures, compliance costs, monitoring and enforcement challenges, regulated actors' attitude and beliefs, and social and cultural issues (see, for example, Winter & May, 2001; Yan et al., 2016). To begin with, scholars who support rational choice and deterrence explanations of compliance have always argued that to change a person's behaviour or make people comply with the law, there is a need to increase detection probabilities and the severity of sanctions or punishments. Thus, if the consequences of non-compliance are swift, certain, and severe, regulated actors are more likely to comply with regulations (Foundjem-Tita et al., 2014; Ramcilovic-Suominen & Hansen, 2012).

[5]Socio-legal agricultural regulatory studies that have utilised the term 'law' in their presentation are also reviewed.

Table 3:1: Summary of studies related to determinants of agricultural regulatory compliance

	Study (year)	Method	Country, regulations, type of farming, sample size	Key findings
1.	Winter and May (2001)	Quantitative	Denmark, environmental regulations, dairy, 1,652 farmers.	Compliance behaviour of farmers is positively related to awareness of regulations, social benefits, and law enforcers' behaviour and enforcement styles.
2.	Bartel and Barclay (2011)	Mixed method	Australia, environmental regulation, not specified, 5,235 farmers.	Immediate regulatory environment (jurisdiction, content, administration, and enforcement) influence compliance behaviour of farmers
3.	Yan et al. (2015, 2016)	Mixed method	China, pesticide regulations, vegetable, 150 farmers.	Compliance is multi-dimensional that is influenced mostly by considerations of cost-benefit analysis, deterrents, legitimacy, and personal morals.
4.	Kaine et al. (2010)	Qualitative	Australia, environmental regulations, vineyards and wineries, 15 farmers.	The more farmers are involved in policymaking and understanding of policy intention, the higher the likelihood of compliance.
5.	Davies et al. (2007)	Qualitative	Australia and New Zealand, environmental regulations, dairy, 35 farmers.	Awareness of law, good attitude, or perception of policy objectives increase compliance.
6.	Arias (2015)	Mixed method	Costa Rica, marine conservation regulations, fish, 99 farmers and 41 key informant interviews.	Financial contextual factors such as poverty and unemployment greatly disempower farmers, making non-compliance attractive.
7.	Burton et al. (2008)	Qualitative	Germany and Scotland, agri-environmental regulations, mixed farming (livestock and cereal), 25 farmers.	Social capital or desire to be good farmer has more influence on compliance intention than economic factors.
8.	Siddiki et al. (2012)	Mixed method	USA, aquaculture regulations, 415 farmers and 86 industry insiders.	Participatory law making, appropriate law, and desire for good reputation in society increases compliance intention.
9.	Barns et al. (2009)	Qualitative	England, environmental regulations, dairy farming, 14 individuals.	They found involvement of farmers in policymaking can lead to high compliance rates.
10.	Ramcilovic-Suominen and Hansen (2012)	Quantitative	Ghana, forest regulations, 226 farmers.	Perceptions of rules as fair and fear of consequences are positively related to compliance.
11.	Mwatawala and Yeyeye (2016)	Quantitative	Tanzania, plant protection laws, tomatoes, 91 farmers.	Compliance is positively related with level of awareness, education, and farmer training.
12.	Foundjem-Tita et al. (2014)	Quantitative	Cameroon, forest use rules, agro-forest farming, 394 farmers.	Social norms have a significant impact on compliance decisions.
13.	Longo et al. (2019)	Quantitative	Tanzania, feed quality standards, chicken farming, 107 stakeholders (61 chicken farmers, 2 feed producers, 21 meat and egg sellers, 21 consumers, and 2 regulators).	Extension services, health consciousness, and awareness of law have significant correlation with compliance.
14.	Hatcher et al. (2000)	Quantitative	United Kingdom, fisheries regulations, fish farming, 69 farmers.	Non-monetary factors such as moral norms and legitimacy of regulations and regulators influence compliance.
15.	Toma et al. (2013)	Quantitative	United Kingdom, biosecurity regulations, cattle and sheep farming, 900 farmers.	Experience, economic factors, farmers' perceived importance of policy intention, knowledge about biosecurity measures, attitudes towards animal welfare, and social capital (membership in a group) significantly influence behaviour.

Closely connected with deterrence explanations of human compliance behaviour is the cost-benefit analysis approach (see, for example, Gosling et al., 2014; Herzfeld & Jongeneel, 2012; Yan et al., 2015). In a business context, regulatory compliance means incurring costs that increase production costs (fixed and operational), and this therefore reduces profits (Winter & May, 2001). Yan et al. (2015) examined the compliance behaviours of 150 vegetable farmers in China regarding pesticide regulations through a self-reported non-compliance approach and found that farmers' compliance behaviour is largely related to cost-benefit analysis.

There is also growing evidence that farmers are very likely to comply with laws or regulations when social sanctions are consistent with formal rules (see, for example, Burton et al., 2008; Ding et al., 2017; Siddiki et al., 2012). Essentially, what all these authors have observed is that resistance to regulations or non-compliance tends to occur if a law is inconsistent with cultural norms and other social mores that people have learned through experience and socialisation. Consequently, social sanctions such as a desire to maintain a good reputation in the community and fear of being viewed as an outsider can have a strong influence on compliance behaviour. For instance, Burton et al.'s (2008) cross-cultural study in Germany and Scotland on non-economic determinants of adoption of voluntary agri-environmental programs found that cultural capital or the desire to be a good farmer overrides other economic factors in shaping farmers' behaviour. Similarly, Winter and May (2001) investigated Danish farmers' compliance with environmental regulations and found that social pressure can bolster compliance. Following a similar line of thought, Siddiki et al. (2012), while examining American farmers' compliance with aquaculture regulations, found that the desire to maintain a good reputation and a strong feeling of guilt significantly affected farmers' compliance intentions.

Scholars have considered procedural justice (fairness in the processes of administration of law in terms of law formulation and enforcement) as another motivation for compliance by farmers (see, for example, Davies et al., 2007; Ramcilovic-Suominen & Hansen, 2012; Sok & Fischer, 2019). According to Murphy (2017), procedural justice plays a vital role in explaining compliance decision-making as it enhances cooperation and reduces resistance and negative commotion between the regulated community and regulator. In the same line of thought, the studies identified above have found that if farmers perceive the regulatory process (design, implementation) as inappropriate, unfair, irrelevant, and confusing, the chances of compliance decrease (Ramcilovic-Suominen & Hansen, 2012). Also, regulated actors are more likely to follow the law if the regulated community perceives the government or regulator as legitimate (Yan et al., 2016) and trustworthy (Scholz, 2003).

According to James Jr and Hendrickson (2008), a regulator's behaviour can foster a "good climate" in which an individual sees an outright benefit in any chosen action even if it involves compliance. Kaine et al. (2010) added that compliance increases if the regulated actor has a good attitude or perception of a policy outcome. Winter and May (2001) observed that compliance decreases if the regulations are too legalistic, vague, prescriptive, and complex. Barns et al. (2009), Sutinen and Kuperan (1999), and Siddiki et al. (2012) have all noted that the more participatory the law-making and implementation process, the greater the chances of compliance. Siddiki et al. (2012) further observed that the more the farmers perceive the law as appropriate, the more likely they will comply.

Studies have also focused on understanding the relationship between compliance and regulated actors' capability in terms of being knowledgeable of the law and their financial capability (see, for example, Alonso et al., 2018; Arias et al., 2015; Davies et al., 2007). Davies et al. (2007) noted that if farmers are aware of what the law seeks to address and the law itself, compliance

levels increase. In their study of fishermen's compliance with marine regulations in Costa Rica, Arias et al. (2015) reported that financial context issues such as poverty and unemployment have a significant impact on how regulated actors respond to regulations. The ultimate consequence of these financial contextual factors is that it disempowers farmers economically, which leads to a choice of non-compliance.

Whereas most of the studies reviewed above have yielded substantial findings that have helped to understand farmer behaviour toward regulations, the majority of studies on agricultural compliance have focused separately on a limited number of motivations. For example, some have examined the role of economic factors such as perceived benefits and compliance costs (James Jr, 2018; Yan et al., 2016) or the impact of social sanctions (Burton et al., 2008), while others have assessed attitudes towards regulations and regulators (Kaine et al., 2010). Only a few studies have considered the motivation for agricultural compliance as being multi-dimensional (Winter & May, 2001; Yan et al., 2016). Winter and May (2001) examined motivations for compliance with environmental regulations in Denmark through three dimensions: calculated, normative, and social motivations. Although Winter and May's study provides a basis for this present study, it fails to incorporate other major motivational factors, especially procedural justice and the actors' attitudes and perceptions of the issue being regulated.

In addition, globally, like other regulated actors, farmers are situated in different contexts, such as different spatial locations, political systems, and cultural practices. Consequently, it is anticipated that these contextual differences would yield different compliance behaviours. Some studies (see, for example, Foundjem-Tita et al., 2014; Mwatawala & Yeyeye, 2016; Ramcilovic-Suominen & Hansen, 2012) have analysed the compliance behaviour of farmers

in the developing world context, however, few of these studies have approached compliance from a multi-dimensional perspective.

Foundjem-Tita et al. (2014) examined the awareness, perception, and willingness of farmers in Cameroon to accept forest laws and the effects of these regulations on their farm decisions. Utilising data from 394 households, the authors found that few farmers were aware of the forest laws governing indigenous trees. They also found that social norms had a significant impact on the compliance decisions farmers made concerning forest use and regulations in Cameroon. Mwatawala and Yeyeye (2016) examined compliance with plant protection laws in Tanzania. Interviewing 91 tomato farmers, the authors reported that compliance was significantly related to awareness of the law, farmer training, and the level of education of the farmer. In the same country, Longo et al. (2019) examined awareness and compliance with feed regulations among 107 chicken farmers and found that compliance was significantly related to access to extension services, the health consciousness of the farmers, and farmers' awareness of the law.

Some recent compliance studies in Kenya (see summary of these studies in Table 3.2) have primarily focused on the export market, especially high-value horticultural products, and compliance with international regulations and standards, (Muriithi et al., 2011; Okello & Swinton, 2007). Edewa (2016) interviewed 600 smallholder avocado producers in 15 selected counties in Kenya to determine farmers' awareness of international food safety regulations. The author found that most smallholder farmers were not aware of the International Sanitary and Phytosanitary Standards (ISPS) and programs in Kenya. Muriithi et al. (2011) examined the determinants of awareness and compliance with EureGap standards among bean farmers in Kenya. Interviewing 103 farmers, the authors found that compliance with international food standards was significantly related to initial compliance costs, access to extension services, farm size, and financial capability in terms of capital.

Table 3:2: Summary of studies related to agricultural regulatory compliance in Kenya

	Study (year)	Part of Kenya	Regulation (national or international)	Crop or livestock/farm produce	Market (domestic or international)	Method	Sample size and sampling method	Key findings
1	Harcourt-Brown et al. (2018)	Nairobi	National	Livestock/milk	Domestic	Survey, face-to-face interviews	96 farmers; random sampling	Three in seven farmers were aware of milk safety regulations in Kenya
2	Hoffmann and Jones (2018)	Meru and Tharaka-Nithi Counties	Not specific	Crop/maize	Home consumption versus selling	Experiment	540 farming households; random sampling	Farmers who produce for home consumption are more likely to adhere to agri-food safety regulations than those producing for commercial purposes
3	Nguetti et al. (2018)	Kirinyaga County	National	Crop/tomatoes	Domestic	Survey, face-to-face interviews	Not disclosed	Twenty-three percent of tomato farmers in Kenya did not observe recommended pre-harvest duration before selling or consuming
4	Edewa (2016)	15 counties [6]	International	Crop/avocado	International	Survey, face-to-face interviews	600 farmers; systematic and proportionate sampling	Most of the avocado farmers were not aware of international regulations
5	Tuei (2010)	Kiambu County	National	Livestock/milk	Domestic	Survey, questionnaires	85 farmers; purposive and stratified sampling	Two in five farmers have little knowledge of dairy regulations
7	Muriithi et al. (2011)	Kirinyaga County	International	Crop/French beans	International	Survey, face-to-face interviews	103 farmers; random sampling	Compliance is significantly related to cost, access to extension services, farm size, and financial capacity
8	Okello and Swinton (2007)	Kirinyaga and Machakos County	International	Crop/green beans	International	Case study, face-to-face interviews	Two producers, industry insiders; purposive sampling	Enforcement, risk of detection, and economic sanctions (such as contract termination and variable product pricing) were significantly related to compliance

[6] Uasin Gishu, Trans Nzoia, Bungoma, Kakamega, Kisii, Nyamira, Kiambu, Muranga, Nyeri, Kirinyaga, Meru, Embu, Makueni, Machakos, Taita Taveta

Although these studies have suggested factors that shape the compliance decisions of farmers producing food for export, few studies have principally focused on gaining insight into and understanding of the factors that shape how farmers comply with agri-food safety regulations that affect farm produce destined for domestic markets in Kenya (Karki et al., 2016). The few studies that have examined the compliance behaviour of farmers trading in domestic markets reveal disparate findings (see, for example, Grace et al., 2018; Harcourt-Brown et al., 2018; Nguetti et al., 2018).

Harcourt-Brown et al. (2018) found that 30% of dairy farmers were not aware of daily regulations in Kenya, and Nguetti et al. (2018) examined the safety practices among commercial tomato farmers and found that 23% of farmers failed to observe the recommended wait time between pesticide application and harvesting for consumption or selling. Hoffmann and Moser (2017) observed that cereals, especially maize, that are rejected by formal buyers because of not meeting safety standards are redirected to informal markets where there is low enforcement of food safety regulations and monitoring of compliance.

There is, therefore, a need to identify the factors that influence farmers' compliance with agri-food safety regulations in Kenya, especially concerning farm produce sold on domestic markets. The present study addresses this gap in the literature and provides an opportunity to advance the understanding of the challenges that have been shaping agri-food safety compliance in Kenya. This understanding is vital for the development of focused, effective, acceptable, and appropriate agri-food safety policies and enforcement strategies in Kenya. The findings may also guide further research and understanding of compliance issues in farming areas in other developing nations.

3.8 Theoretical frameworks for examining agricultural regulatory compliance

This section reviews the theories on the motivations behind compliance behaviour in the literature in order to select the most suitable theoretical framework for this study. The aim is to highlight key concepts and review theories that can be used to understand the compliance behaviour of farmers with respect to agricultural regulation. While these theories have been used to explain human behaviour generally, their primary use in this study is to guide understanding of compliance or non-compliance in a regulated community.

A review of theories on compliance behaviour shows that they can be categorised into three approaches: economic, sociological/criminological, or psychological. Although these theoretical orientations provide different perspectives for understanding compliance behaviour and individual motivations, they nevertheless complement each other (Foorthuis, 2012). Generally, all these theories view compliance as a purposive, deliberate, rational, self-motivated, or 'pressured' action (see Table 3.3 for a summary of these studies).

3.8.1 Economic theories

The first category of theories is based on an instrumental perspective that demonstrates that compliance is a rational extrinsic action. This perspective views actors as being utility maximising when they choose an action that generates the greatest gain or benefit or least cost or pain (Gök, 2011). Many of the theories that subscribe to this view of compliance have roots in the economics discipline and can be traced to Becker's (1968) neoclassical approach. Non-compliance will, therefore, occur if an actor perceives that the expected benefits of non-compliance exceed the perceived costs of complying (Herzfeld & Jongeneel, 2012). Following this approach, regulation becomes a constraint and individuals violate regulations to avoid costs (Muriithi et al., 2011).

Table 3:3: A summary of theories and perspectives covered in the literature review

	Theory	Author(s)	Brief description
1	Rational choice theory	Clarke and Cornish (1985)	Non-compliance occurs if an actor perceives that the expected benefits of non-compliance exceed the perceived costs of complying. Views regulated actors as utility maximising agents. The factors motivating compliance are either to maximise benefits or avoid costs or sanctions (informal or formal)
2	Game theory	Painter (1996), Gibbons (1992)	Actors adjust their decision whether to comply or not with a specific rule depending on their circumstances or situations
3	Deterrence theory	Becker (1968)	Non-compliance is a rational action that is committed when actors comply with regulations when punishment is severe, swift, and certain
4	Theory of basic human values	Schwartz (1992)	That value actors hold or subscribe to have a significant impact on how they respond to law
5	Value-belief-norm theory	Stern (2000)	Personal values, beliefs, and norms have adverse effects on how actors respond to laws
6	Social learning theories	Bandura (1971)	Compliance or non-compliance behaviour is learned through social interaction or observation of others in the immediate social environment such as peers, friends, family, or group
7	Social cognitive theory	Bandura (1986)	Focuses on understanding the impact of personal experience and observation of behaviours of close associates
8	Self-control theories	Gottfredson and Hirschi (1990)	Postulate that non-compliance is unplanned behaviour that occurs when actors with low self-control are unable to consider consequences of their choices, especially in situations where there are opportunities for benefit.
9	Routine activity theory	Cohen and Felson 1979)	Non-compliance deviance tends to occur when three conditions converge in time and space: motivated offenders, availability of a suitable targets, and the absence of guardianship
10	Neutralisation theory	Sykes and Matza (1957)	The central proposition is that individuals who commit a deviant act acknowledge that their behaviour is wrong but seek ways to distort facts or negate social norms by justifying or rationalising their deviant behaviour as acceptable
11	Theory of normative social behaviour	Rimal et al. (2005)	Non-compliance behaviour is an outcome of an individual's attempt to emulate a group identity or meet the expectations of the group to which they belong
12	Group engagement	Tyler and Blader, (2000)	Compliance is strongly related to an actor's evaluation or views about how processes of justice are administered by the regulator to the group to which the actor belongs
13	Motivational postures	V. Braithwaite (1995)	Actors maintain a safe social distance between themselves and the regulator. The social distance between actor and regulator is depicted by the actor's posture and the attitudes or stances actors use to depict or describe how they relate with the regulators
15	Responsive regulation theory	J. Braithwaite (2002)	Combines utilitarian principles and game theory assumptions to frame how compliance emerges from the way law is designed, implemented, or enforced.
16	Motivation crowding theory	Frey and Jegen (2001)	External incentives to change behaviour can undermine (crowd-out) or increase (crowd-in) an actor's internal motivation to comply with rules
17	Goal framing theory	Lindenberg (2000)	Motivation for compliance is significantly related to an actor's personal goals (gain, normative, or hedonic) at any given time

Becker's ideas have inspired other theories, especially rational choice and game theories (Etienne, 2011). The rational choice theory has applications in all fields of social science and is used to explain social and economic behaviour (Clarke & Cornish, 1985). The universal concept of the rational choice theory views regulated actors as utility maximising agents. The factors that motivate compliance are either to maximise benefits or avoid costs or sanctions (informal or formal) (Hatcher et al., 2000). In other words, an actor's tendency not to comply with regulations is tempered by the perceived sanctions (in terms of compliance costs, anticipated fines and penalties, and societal disapproval) versus the associated rewards (money saved, profit made, time saved, or societal approval) (Hart, 2005; Herzfeld & Jongeneel, 2012).

The deterrence theory (Beccaria, 1986) has a close connection with the rational choice theory. It postulates that non-compliance is rational behaviour and occurs when actors choose to break a law if it pays to do so according to their comparison of the utilities for different behavioural options (Glöckner et al., 2019). According to this theory, two aspects of punishment determine the compliance decisions of the actor: punishment severity and detection probability. Therefore, non-compliance with the law increases when there are low chances of being caught and the punishment is not severe (i.e., the amount of a fine or period of imprisonment). On the other hand, compliance occurs when punishment is severe, swift, and certain (Trang & Brendel, 2019). Thus, to improve compliance, it is necessary to increase the number of controls, patrols, surveillance, and inspections (D'Arcy et al., 2009). Also, the costs of punishment should be swift, severe, and certain.

The ideas and assumptions of the deterrence and rational choice theories have significantly influenced policy formulation worldwide and have generally led policy makers to improve compliance by increasing deterrence measures (Hauck, 2008). However, the ideas and assumptions of the rational choice theory have been criticised on the grounds that not all

violations of law are explained only by the rational calculation of costs and benefits or fear of punishment (Herzfeld & Jongeneel, 2012). Consequently, these theories fail to explain why two actors facing the same conditions behave differently, or why some actors comply while others continue to violate laws or regulations even when rationally, compliance presents an optimal choice. For example, studies have found that sometimes greater compliance occurs when fines are reduced, or non-compliance persists even when fines are increased (Etienne, 2011; Onel & Mukherjee, 2017).

One theory that has been used to explain why actors may not behave rationally in some circumstances is game theory (von Neumann & Morgenstern, 1944). Game theory is the study of strategic decision-making and has applications in social science and economics. Game theory maintains that actors adjust their decision whether to comply or not with a specific rule depending on their circumstances or situation (Painter, 1996). Thus, an actor can fail to follow the law even in a situation where compliance is a reasonable expectation or even useful. The main hypothesis of game theory is that actors have bounded rationality that shapes how they choose actions depending on circumstances or situations (Tsebelis, 1991).

Whilst the main hypothesis of these theories (rational choice theory, game theory, and deterrence theory) is that compliance is a rational utilitarian action, not all compliance decisions are an outcome of rationality. Thus, some theories have generally viewed compliance as being determined by the actor's subjective attitudes (V. Braithwaite, 1995; Tyler & Blader, 2000), while others have compliance as a product of socialisation processes and existing contextual factors (Bandura & Walters, 1971). Theories that view compliance as an extrinsic outcome of socialisation processes or a product of contextual factors have roots in sociological literature, while those that focus on intrinsic issues determined by subjective attitudes and

perceptions are based in the psychology discipline. Some theories also view compliance as both an extrinsic and intrinsic issue (Frey & Jegen, 2001; Lindenberg, 2000).

3.8.2 Sociological and criminological theories

Sociological theories view compliance behaviour as a product of external nonmaterial factors that exist within the social structures of society (Foorthuis, 2012). These factors are beyond an individual's control and predispose them not to comply with regulations. Two of these external factors, incentives, or inducers are cultural or social pressure (i.e., the need to belong, guilt, fear of shame or stigma, or preservation of reputation) and economic pressure (poverty, unemployment, lack of access to credit, and market forces) (see, for example, Foundjem-Tita et al., 2014; Winter & May, 2001). Specifically, these theories support the view that society has inward pressure on how an individual respond to formal rules (regulations and laws). The basic assumption of these theories is that compliance is either an instrumental or normative process (Winter & May, 2001). The normative approach is based on the principle of consistency between and appropriateness of informal and formal rules. If regulations are consistent and appropriate with existing informal social norms and practices, compliance is more likely to occur (Étienne, 2010). The leading source of tension between informal and formal rules is social norms, which are external inducers (Byron et al., 2016; Foorthuis, 2012). To improve or enhance compliance under this model, the focus should be on fostering cooperation and providing assistance to comply (Foorthuis, 2012).

Some of the theories that subscribe to the belief that compliance is a product of the socialisation process or personal development are the theory of basic human values (Schwartz, 1992, 2007) or the value-belief-norm theory (Stern et al., 1999), the theory of normative social behaviour (Rimal et al., 2005), social learning theory (Akers & Jennings, 2015; Bandura & Walters, 1971), social cognitive theory (Bandura, 1986), self-control theory (Gottfredson & Hirschi,

1990), the routine activity theory (Cohen & Felson, 1979), and neutralisation theory (Sykes & Matza, 1957).

Social learning theory (Akers & Jennings, 2015; Bandura & Walters, 1971) views compliance as a behaviour that can be learned through social interaction or observation of others in the immediate social environment, such as peers, friends, family, or the group (Warkentin et al., 2011). This theory has been used by researchers who aim to understand compliance with cyber security policies (Trang & Brendel, 2019). In the context of the present study, social learning theory can be used to understand how farmer groups or family values can influence behaviour around compliance with agri-food safety regulations.

Self-control theory (Gottfredson & Hirschi, 1990) postulates that non-compliance is unplanned behaviour that occurs when actors with low self-control are unable to consider the consequences of their choices, especially in situations where there are beneficial opportunities. Gottfredson and Hirschi (1990) conceptualised low self-control as the lack of assessment of the impacts of one's actions or decisions, such as fines or imprisonments. They identified six dimensions of low self-control: self-centredness, risk-seeking, a preference for simple rather than complex actions, impulsivity, a preference for physical activities rather than mind-straining activities, and lack of anger management. These dimensions of low self-control determine how an actor makes decisions regarding compliance with the law. It has mostly been used to guide and understand public health behaviours such as smoking and environmental harms (Partin et al., 2020). Although this theory has significant application to understanding criminal behaviour, its strong claim that self-control is the major (if not only) predictor of non-compliance has been the major limitation (Glöckner et al., 2019).

The theory of normative social behaviour (Rimal et al., 2005) posits that non-compliance behaviour is an outcome of an individual's attempt to emulate a group identity or meet the

expectations of the group to which they belong (Byron et al., 2016), and social cognitive theory focuses on understanding the impact of personal experience and observation of the behaviours of close associates (Bennett et al., 2018). Most of these theories have been used to understand, interpret, and make recommendations in relation to non-compliance with drug and alcohol laws, conservation and environmental protection laws, or public health laws (Real & Rimal, 2007).

Another important sociological framework that has been applied to understand compliance behaviour is the theory of basic human values (Schwartz, 1992; Schwartz et al., 2012). This is a social-psychological theory that observes that the values that actors hold or subscribe to have a significant impact on how they respond to the law. According to Schwartz (2006), values are inextricably linked to affection, and when they are activated, they become infused with personal feelings, which may influence how actors respond to a situation or action. Schwartz (2006) identified 10 basic values that are link to the motivations for human behaviour: stimulation, self-direction, universalism, hedonism, conformity, achievement, power, benevolence, security, and tradition. Whereas prior research has supported Schwartz's (2006) postulation that the value orientations discussed above have an impact on compliance behaviour, it has also been criticised for only focusing on intrinsic variables (Balliet et al., 2008).

Closely linked with Schwartz's theory of basic human values is the value-belief-norm theory (Stern, 2000; Stern et al., 1999). Stern's (2000) theory proposes that an individual's behaviour is driven by an internalised sense of obligation to act in certain ways. These personal values have an adverse effect on the values an actor holds and the actions they take. In terms of compliance decision-making, the more an actor is aware of the negative consequences of not following certain personal values, the more likely it is that they will comply with the law. For

example, if a community has strong norms that guide the use of forests or values around forest protection, they are very likely to comply with government regulations governing tree felling (Foundjem-Tita et al., 2014). Although the value-belief-norm theory is popular and used mostly by environmental policy researchers, it has rarely been used to explore human behaviour beyond the environmental domain.

The routine activity theory (Cohen & Felson, 1979) is a criminological theory that posits that deviance (in this case non-compliance) tends to occur when three conditions converge in time and space: motivated offenders, availability of a suitable targets, and the absence of guardianship. A motivated offender is an actor who is willing to violate the law should an opportunity arise (Cohen & Felson, 1979). In this present study, it may include financially constrained farmers, rogue law enforcers, or food traders. Suitable targets are people, items, or places that are attractive to an offender. In this study, it may include financially constrained farmers, high-value, high-demand, and easily-sold farm produce, and poorly regulated farm markets. A capable guardian is anyone or anything that can prevent an offence from occurring. In relation to this study, it may include random inspections, patrols, educated farmers, consumers or traders, or cameras in farm markets.

There are some other factors that are important in the routine activity theory. The first factor is the issue of the costs and benefits of violating the law. In the context of this study, aspects such as the avoidance of compliance costs and loss aversion are expected to increase motivation to violate laws or regulations. Loss aversion is the general tendency to avoid losses over gains (Engström et al., 2015). The second factor relates to deterrence principles (i.e., the severity of punishment and risk of detection), which are very important for determining how motivated offenders make decisions. Last, the role of ‘place’ is also important in the routine activity theory. Some places are more amenable to offences occurring by virtue of particular contextual

issues such as economic opportunities, poverty, and prevailing social norms (e.g., tolerance of corruption, silence, or cultural beliefs). These contextual issues provide opportunities for offending (Eck & Weisburd, 1995). In this study, local farms, farm produce transportation routes, and farm markets can be places that can provide opportunities for non-compliance with agri-food safety regulations, especially if they are poorly regulated and monitored.

Another sociological/criminological theory that complements postulations by rational choice theory is neutralisation theory, which was developed by Sykes and Matza (1957). The central proposition of this theory is that individuals who commit a deviant act acknowledge that their behaviour is wrong but seek ways to distort facts or negate social norms by justifying or rationalising their deviant behaviour as being acceptable. Typical justifications include blaming others (mostly victims or law enforcers), arguing that no one was harmed, refusing to accept blame, positing that no loss was incurred, and arguing that everyone believes the victim deserved the outcome (see, for example, Cheng et al., 2014; Hinduja, 2007; Willison, Warkentin, & Johnston, 2018).

3.8.3 Psychological theories

The last group of theories view compliance as a product of individual intrinsic actions. The central view of these theories is that individual behaviour is influenced by personal attitudes and perceptions of the legitimacy of rules and the regulator (see, for example, V. Braithwaite, 1995; Hartner et al., 2008; Tyler & Blader, 2000). Tyler and Blader's (2000) group engagement theory observes that compliance is strongly related to an actor's evaluation or views about how processes of justice are administered by the regulator to the group to which the actor belongs. If actors view regulators as procedurally fair in their actions or decisions with respect to regulation-making, implementation, or enforcement, actors are very likely to develop supportive attitudes and values that will, in turn, enhance compliance (Hartner et al., 2008).

Ramcilovic-Suominen and Hansen (2012) explored farmers' compliance with forest regulations by interviewing 226 farmers in Ghana and found that farmers' perceptions of forest rules as fair and fear of sanctions were significantly correlated with compliance with forest regulations.

J. Braithwaite's (2002) responsive regulation theory combines utilitarian principles and game theory assumptions to frame how compliance emerges from the way law is designed, implemented, or enforced. He argues that actors' cooperation with regulators and commitment to compliance depends to a large extent on the trust they have in the regulators. Some strategies that can be used to persuade actors to comply are information provision, training, and education. Punitive strategies, especially fines and punishment, are the last to be deployed (Gunningham, 2010).

Another theory developed by V. Braithwaite in 1995 is that of motivational posture. The central proposition of this theory is that actors maintain a "safe social distance" in order to avoid being observed by authority (V. Braithwaite et al., 2007). The social distance between actor and regulator is depicted by the actor's attitudes towards the regulators (V. Braithwaite, 2017; Drahos & Krygier, 2017). Five postures were identified by V. Braithwaite (1995): commitment, capitulation, resistance, disengagement, and game playing. Commitment and capitulation postures are compliance-oriented while the latter three are non-compliance-oriented. Like the other theories discussed above, the motivational posture theory suffers from the major limitation of taking for granted that actors may hold emotional or strategic attitudes when deciding to comply. Also, the theory fails to take into consideration that actors may employ strategic reasoning in their decision-making (Étienne, 2010).

The motivation crowding theory by Frey and Jegen (2001) is a psycho-economic theory that observes that motivation to comply is both intrinsically and extrinsically derived. The

underlying principle is that external incentives to change behaviour can undermine (crowd-out) or increase (crowd-in) an actor's internal motivation to comply with rules (Promberger & Marteau, 2013). In other words, individuals can use external incentives, especially financial rewards, to fight the urge not to comply with the law. According to Frey and Jegen (2001), crowding out the effect of external motivation to comply becomes more effective if the problem being policed is of interest to the actor and the regulated actor is involved in the development of the regulation. Other factors that may increase the crowding-out effect are aspects such as regulations being implemented uniformly, harsh punishment for non-compliance, and rewarding compliance.

The motivation crowding theory has significantly influenced understanding of how financial incentives can be used to reduce the intrinsic motivation not to comply with the law. Although this theory has been praised as practical (Étienne, 2010), it has been criticised for assuming that intrinsic motivation to comply is always automatic, as there may be other factors that can inhibit individual decisions about whether or not to follow the law. For example, social norms have been found to have the greatest impact on individual feelings (Burton et al., 2008).

The goal framing theory, which was developed by Siegwart Lindenberg (2000), is a social-psychological theory that utilises the principles of cognitive science and behavioural economics to understand human behaviour. It argues that actors have several goals that determine how they respond to situations and make decisions. The goal framing theory views motivation for compliance as being significantly related to an actor's personal goals at any given time (Lindenberg, 2000). For example, when actors are deciding whether or not to comply, goals such as to save money, to preserve one's image or community heritage, to feel good, or to act appropriately may significantly inform their decision collectively or individually (Etienne, 2011).

3.8.4 Selection of a goal framing approach

Whereas the theories discussed above have succeeded in guiding several studies and informing several policy interventions, one major limitation that has accompanied them, with the exception of the goal framing theory, is the tendency to view motivation to comply as singular (Etienne, 2011). For example, theories aligned with economic explanations view compliance as a profit-oriented action, while theories that take a deterrence approach view non-compliance as a failure in the design of the punishment. Etienne (2011) observes that there is no coherent theory that can singularly explain compliance. He argues that there are two major challenges that the theories discussed above do not address: first, they do not acknowledge that there is multiplicity of motivations for compliance, and second, they do not discuss how these varied motivations influence each other to inform compliance decision-making.

This observation by Etienne has been acknowledged by many recent reviews of compliance studies (see, for example, Castiglioni et al., 2019; Hameed & Khan, 2020; Longo et al., 2019; Serido et al., 2020). These studies have observed that there are multiple motivations for compliance, ranging from fear of legal norms, fear of social sanctions, search for personal gain, and attitudinal issues towards the regulator or regulations (see, for example, van Wijk & Six, 2014; Yan et al., 2016). Consequently, in accordance with Etienne (2011), compliance behaviour can be considered a multi-goal phenomenon, which means studying it requires a multifaceted approach. This multifaceted approach views compliance as an outcome of an individual's personal goals. Therefore, compliance emanates from what a person aims to achieve at any given time or situation.

Given the above argument, Lindenberg's goal framing theory (Lindenberg, 2000; Lindenberg & Frey, 1993) is best suited to guide the present study because it takes a multifaceted approach to explaining the complexity of motivations for compliance. Etienne (2011) reconceptualised

Lindenberg's goal framing theory to explain regulatory compliance. He observed that compliance decision-making depends on more than one objective, and factors that are not exclusive may interact to shape how goals are selected by the actors. Non-compliance or compliance is, therefore, a product of the goal framing process, in which the regulated actor's personal goals at any moment determine whether they will comply with the law or not (Chakraborty et al., 2017; Longo et al., 2019).

According to Lindenberg (2000), people have different goals in life. Lindenberg proposed three overarching goals: the gain goal, the normative goal, and the hedonic goal.

a) **The gain goal** is concerned with maximisation of an advantage or benefit, especially an economic benefit. Consequently, an actor pursuing this goal will seek to improve or gain rewards or benefits such as profit, money saved, time saved, a positive rating by the community, costs avoided, or convenience by not complying (Etienne, 2010). This goal is characterised by a focus on perceived outcomes that are in the (near) future, such as money that will be saved by following a certain option. According to Chakraborty et al. (2017), the gain goal makes actors highly opportunistic, strategic, and calculated in the pursuit of benefits. Studies by Castiglioni et al. (2019) and van Wijk and Six (2014) show that if any action enhances or promotes positive outcomes or the status of the actor, compliance increases. Also, studies by Chakraborty et al. (2017) and Jaafar et al. (2019) show that the gain goal has the highest impact on an actor's decisions and a destabilising effect on other goals. In a regulatory context, actors are likely to comply with the law if they are likely to benefit or receive a positive outcome such as more profit. Also, they are less likely to comply with the law if it involves extra cost or leads to financial loss.

b) **The normative goal** is the desire to act appropriately according to formal rules or informal social norms or expectations of a group that an actor subscribes to (Etienne, 2011; Longo

et al. 2019; van Wijk & Six, 2014). It is long term in nature and involves obtaining approval for one's behaviour and choices from one's social environment, especially family, peers, community, media, government, and trade associations or advocacy groups. Studies have shown that social pressure, the need to belong or togetherness, fear of being excluded, and preservation of social status may be more salient than formal legal sanctions in motivating compliance decisions (Jaafar et al., 2019; Peterson & Diss-Torrance, 2014). In regulatory compliance, if people around a regulated actor such as family, peers, or trade union members have sanctioned that the law is consistent with the informal social norms, then it is likely the rational actor will comply with the formal norms or laws (Jaafar et al., 2019). In this present study, the cultural practices and social norms of the community or group a farmer belongs to, such as cooperatives, can provide a basis for choosing to comply with agri-food safety regulations to avoid expulsion from the group or being viewed as a deviant farmer. This observation supports theories such as the theory of basic human values (Schwartz, 1992; Schwartz et al., 2012) and the theory of normative social behaviour (Rimal et al., 2005). Equally, some farmers may choose not to comply with agri-food safety regulations because of cultural pressures that are against formal laws in order to avoid shame from their local communities.

c) **The hedonic goal** aims at promoting the way one feels after accomplishing tasks(s) (Etienne, 2011). It is concerned with feelings such as fun, joy, comfort, happiness, fear, shame, guilt, discomfort, or anger (Chakraborty et al., 2017). The drive to pursue a hedonic goal is short term in nature and is characterised by a focus on the present and an urge to be fulfilled immediately (Lindenberg, 2000). In a compliance context, actors who are afraid of prosecution or those who want to safeguard their reputations are more likely to comply with the law.

According to the goal framing theory, any decision an actor makes at any time is linked to at least one of the above goals. However, at the same time, there is a dominant or focal goal that has the greatest influence on action alternatives and how an actor responds to the situations or circumstances. This dominant goal is referred to as a goal frame (Steg et al., 2014). Frames are immediate situations, surroundings, or circumstances that inform or shape an actor's attention, thoughts, beliefs, or knowledge (Lindenberg, 2000). These different immediate circumstances lead to different actions that in turn determine which goal dominates the decisions made. For example, if the farmer is residing in a close-knit community or family, this circumstance may determine behavioural actions that promote the normative goals of the actor's community. Similarly, if the farmer is experiencing economic hardship, these circumstances will inform the choice of gain goal in their actions. Lindenberg (2000) observed that during the goal-framing process, non-dominant goals are relegated to the background but still influence the decisions a person makes by either strengthening or weakening the focal goal. Factors that contribute to a goal becoming dominant are varied but depend on situations and personal factors such as the relevance of information or accessibility of knowledge (Chakraborty et al., 2017).

Although the goal framing theory is a stand-alone holistic theory, it nevertheless incorporates principles of the rational choice theory, game theory, the deterrence theory, neutralisation theory, and the value-belief-norm theory in explaining how an actor chooses a certain goal over others (Etienne, 2011; Onel & Mukherjee, 2017). For example, neutralisation theory supports the goal framing theory in that actors may neutralise/justify how they select a specific goal. The actor may justify that he/she failed to comply with regulations so as to act appropriately in society (normative goal). Stern's (2000) value-belief-norm theory supports the goal framing theory's normative and hedonic goal selection (Chakraborty et al., 2017; Onel & Mukherjee, 2017), and Schwartz's (1992) theory is incorporated in the goal framing theory model through

the hedonic goal. Table 3.4 summarises how other theories contribute to the goal framing theory.

Table 3:4: Summary of how other theories contribute to the goal framing theory

	Theory	Author(s)	Contribution to goal framing theory
1	Rational choice theory	Clarke and Cornish (1985)	Contributes to gain and normative goals: the rational choice of decisions that lead to the improvement of resources. It also contributes to a normative goal when an actor chooses compliance that leads to a positive status in society.
2	Game theory	von Neumann and Morgenstern (1944)	Observes that actors adjust their decision about whether or not to comply with a specific rule depending on their circumstances or situations that correspond to goal frames in goal framing theory.
3	Deterrence theory	Becker (1968)	Maintains that actors are more likely to violate a law if the benefits of violation outweigh the costs of non-compliance (that is the severity of punishment and risk of detection). This theory contributes to the gain goal.
4	Theory of basic human values	Schwartz (1992)	Incorporated into goal framing theory through the hedonic goal.
5	Value-belief-norm theory	Stern (2000)	Supports goal framing theory normative and hedonic goal selection (Onel & Mukherjee, 2017; Chakraborty et al., 2017).
9	Neutralisation theory	Sykes and Matza (1957)	Supports goal framing theory in that actors may justify how they select a specific goal.
10	Theory of normative social behaviour	Rimal et al. (2005)	Supports normative and hedonic goal selection when non-compliance is an outcome of an individual's attempt to emulate a group identity or meet the expectations of the group to which they belong.
11	Group engagement	Tyler and Blader (2000)	Compliance is linked to normative and hedonic goals related to an actor's evaluation or views about how processes of justice are administered by the regulator to the group to which the actor belongs.
12	Routine activity theory	Cohen and Felson 1979)	Supports goal framing theory as it offers pragmatic ways to address how individuals' goals can be controlled to prevent non-compliance.

The goal framing theory remains one of the promising modern theories that have been praised for viewing human behaviour as a multifaceted framework, and is appropriate for understanding and offering practical solutions to sensitive human behaviour. It has been used to explain compliance behaviours with environmental regulations (Chakraborty et al., 2017; Peterson & Diss-Torrance, 2014), animal feed safety standards (Longo et al., 2019; van Wijk & Six, 2014), patient safety regulations (McGivern et al., 2015), financial behaviour change (Serido et al., 2020), energy use regulations (Hameed & Khan, 2020; Koo & Chung, 2016), and tax laws (Castiglioni et al., 2019).

McGivern et al. (2015) examined the dynamics of patient safety regulations and compliance in the United Kingdom and found that regulators need to align their interventions with wider societal norms (a patient's family, peers, and professionals) to improve compliance. van Wijk (2014) examined the dynamics of multiple motivations for compliance decisions among food entrepreneurs in the Netherlands and reported three major findings. First, hedonic motivations had more influence than economic and normative gains. Second, where there is more than one motivation (gain, normative, or hedonic) to comply with regulations, the strongest motivation generates the greatest impact on compliance decisions but the other goals either stabilise or reinforce the dominant motivation. Lastly, contextual factors such as family, financial situation, and procedural justice play a large role in shaping an actor's motivation.

Despite the goal framing theory being a theoretical framework that has been praised for its ability to frame human behaviour as being multifaceted, it has not escaped criticism. First, the theory has mostly been applied in Western societies to understand human behaviour (Chakraborty et al., 2017; Peterson & Diss-Torrance, 2014) and less in developing countries like Kenya, where economic, social-cultural, and political structures differ. For example, would goal signals, as suggested by the goal framing theory, have any influence in the Kenyan situation? Or how do regulated communities utilise the tripartite goals in responding to regulations in Kenya, which is a capitalist, multi-ethnic, and developing society. These are the gaps this study seeks to address.

Additionally, the majority of studies that have utilised the goal framing theory have focused more on understanding how human beings respond to environmental regulations (Chakraborty et al., 2017; Onel & Mukherjee, 2017) and less on understanding how an actor's personal goals influence how they respond to agri-food safety regulations in a developing country context. For example, it remains unclear how social norms and cultural practices can influence the

normative goals of behaving appropriately, and how these in turn can supersede the hedonic goal of maintaining safe food standards in society and the protection of human life. One recent study that applied the goal framing theory in a developing country context for agri-food safety is that of Longo et al. (2019). These authors tested Lindenberg's (2000) proposition by investigating the determinants of compliance with animal feed regulations among chicken farmers in Tanzania. Following in-depth interviews with 107 chicken farmers and other stakeholders in the agri-food chain, the authors found that normative goals (especially farmers working with the regulator) were significantly related to compliance.

Lastly, the theory assumes that all decision-makers have a choice between the three broad heterogeneous goals. However, this is not always the case, as some actors may not have the option to choose between these goals, as they are confined by their circumstances (Ellis 1998). Ellis (1998) noted that the decisions farmers make are dependent on the goals of farming and resource constraints. Some of the goals Ellis' identified include securing food for the family, profit maximisation, income stability, fulfilling societal obligations, and achieving certain nutritional supply. Consequently, this study seeks to enhance the goal framing theory by testing it within a developing country context in an agri-food safety regulatory domain.

Following the multi-factional approach to compliance, this study aims to use the goal framing theory, which is a human behaviour theory that was developed in Sweden and other Western societies, to understand which goal(s) have the strongest impact on informing farmers' decisions to comply with agri-food safety regulations. When applying the goal framing theory to the context of agricultural regulations, farmers may, for example, agree with the goal of the regulations (benefit to practice); however, they may choose to not comply with these regulations because of the economic benefits that non-compliance entails (gain goal), or the fear of being excluded from their community, friends, or family (normative and hedonic goals).

This theoretical construct also takes into consideration the principles of the rational choice theory (cost-benefit analysis), the deterrence principles (sanction probability and severity), the perceptions and attitudes of farmers towards regulators, the regulation or what is being regulated, and contextual factors (e.g., farm size, social practices of farmers, marketing challenges, legal knowledge, poverty, and unemployment) that shape how these goals are developed and selected as a point of reference in compliance decision-making.

It is hypothesised that farmers' violation of agri-food safety regulations is a goal-oriented action that is informed by multiple individual and contextual factors. These factors affect how personal goals (such as saving money, avoiding social disapproval, or escaping punishment) are developed and chosen as a point of reference in deciding whether or not to comply. Consequently, farmers may not comply with agri-food safety regulations for some gainful purposes, such as saving money, increasing profit, or preserving social status.

To support the goal framing theory, two theories (rational choice theory and routine activity theory) were selected. For example, Rational choice theory was selected as it has strength in explaining the reasons (i.e., need for money, fulfilment of societal expectations, profit maximisation, avoidance of loss or shame, among others) that inform the choices an individual makes in relation to opportunities in terms of costs and benefits (Gök, 2011; Herzfeld & Jongeneel, 2012). It was also selected so as to help explain decisions farmers make when they are confronted with two or more goals. Specifically, which goal is dominant or salient when farmers decide to comply or not with agri-food regulations.

To address research question three, 'what changes (or reforms) are required in current regulations and arrangements to improve agri-food safety compliance by farmers and other key stakeholders in agri-food chain?', the routine activity theory is adopted. The rationale for using the routine activity theory to complement the goal framing theory is that the latter has

limitations in suggesting how to prevent law violations or improve security practices to decrease non-compliance. The routine activity theory has been found to be pragmatic in suggesting strategies to prevent crime (in the case of this study, non-compliance) (Miró, 2014).

3.9 Approach to theory development

As discussed earlier in this chapter, this study takes a cross-disciplinary approach that combines theories from agricultural economics, rural sociology, psychology, and rural criminology to frame the research problem. According to Saunders et al. (2016), it is important to be clear on how theories are treated in a study as this determines the study design.

Overall, there are two major contrasting directions under which theory is developed: inductive and deductive. The inductive direction begins with specific variables of interest or a proposition and then moves to collect data in order to formulate a general theory of behaviour. It is most suitable for research that is new and exciting with limited existing literature. On the other hand, deductive research begins with a general statement, theory, or known premise and then a research strategy is designed to test it in order to arrive at a specific conclusion. It is most appropriate for research where there is a wealth of knowledge from the onset of the study and where the theoretical framework and hypotheses can be stated in advance (Hyde, 2000; Saunders et al., 2016). According to Hyde (2000), the deductive approach can be used in a situation where concepts and hypotheses are stated before data collection.

However, there is another approach that seeks a middle ground by combining the deductive and inductive approaches (Bryman & Bell, 2015). This approach, referred to as abduction, observes that research processes are not linear but data are gathered and then used to explore the topic of study, identify themes, explain trends, and test an existing theory or generate a new one (Saunders et al., 2016, p. 145). It is mostly applicable for research topics where there is a

wealth of information in one context but less in other contexts (Bryman & Bell, 2015; Saunders et al., 2016).

There are many factors that determine whether a study should be approached inductively or deductively. These are the nature of the research problem, the research type, and the amount of data required to address the research questions (Saunders et al., 2016). Saunders et al. (2016) advise that a balance of induction and deduction is often advantageous, although one is used as the dominant approach. For the present study, the researcher used existing theories to identify propositions and variables that informed the research process. However, the study did not strictly test the validity of a theoretical framework, but rather aimed to enhance theory by generating new insights and explanations from applying theories devised in developed countries to a developing country context, namely Kenya. As a result, this research process was primarily deductive but utilised an inductive approach to build a dialogue between theory and the empirical findings.

3.10 Research model/approach

Figure 3.2 provides a visual representation of the hypothesised relationships of the study variables using the framework of the goal framing theory. However, other related theories, especially the rational choice theory, the theory of basic human values, and the routine activity theory, were used to select the variables that were investigated. In this research model, agri-food safety regulatory compliance is viewed as being based on cost-benefit, purposive, deliberate, rational, self-motivated, self-interested, or 'pressured' behaviour that is influenced by contextual, regulatory, and subjective factors.

As discussed in Section 3.7, there are several contextual and subjective factors that influence farmers' compliance decisions: hedonic goals or person-centred factors (personal values,

experience, or perception of risk), gain goals or economic factors (resource and time availability or constraints), and normative goals or social-cultural factors (culture, social pressure). Farmers are also influenced by characteristics of the regulator (credible, competent, available) and the regulations (simple, understandable, appropriate).

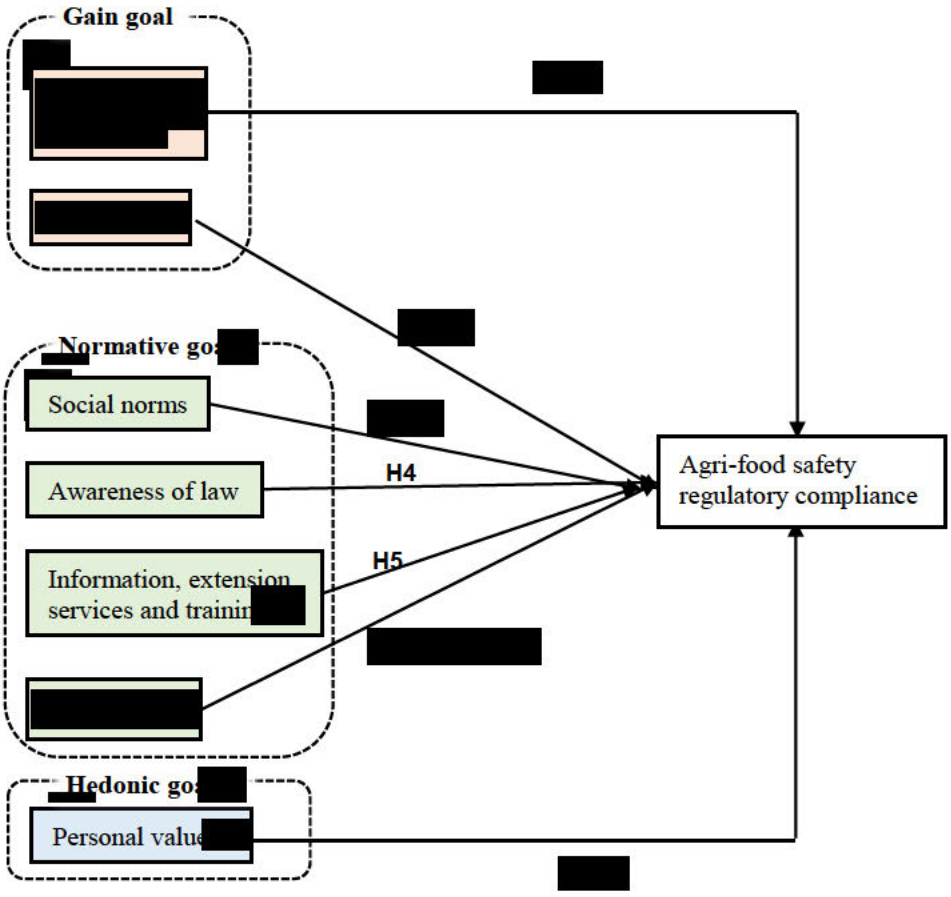

Figure 3:2: Theoretical model of the relationship between variables

However, to have a manageable study and for the study to be in line with the assumptions of the goal framing theory, seven variables were hypothesised to affect compliance with agri-food safety regulations: (1) cost-benefit analysis of compliance, (2) deterrence, (3) legitimacy, (4) awareness of law and policy outcome, (5) social norms, (6) provision of information, extension services, and training, and (7) personal values. These independent variables of the study represent the plausible factors that shape agri-food safety regulatory compliance, which is the dependent variable. In the goal framing theory, the variables of cost-benefit analysis of

compliance and deterrence illuminate the gain goal, the normative goal is represented by legitimacy, awareness of law and policy outcome, social norms, and provision of information, extension services, and training, while the hedonic goal is represented by personal values.

It is also important to note that this study utilises a subjective approach rather than an objective evaluation to understand compliance behaviour as it does not measure actual behaviour. Specifically, it focuses on gathering information on compliance behaviour as perceived by the regulated actors. This approach has been used by several researchers (see, for example, Nielsen & Parker, 2009; Yan et al., 2015) and has proven to be a viable strategy for understanding compliance behaviour.

The framework above suggests that farmers' agri-food safety regulatory compliance increases when farmers:

a) perceive that compliance is beneficial or favourable or perceive compliance costs are low or fair;

b) perceive high threats from formal sanctions (i.e., risk of detection or severity of punishment);

c) feel guilty after violating agri-food safety regulations or endangering the life of fellow human beings;

d) are aware of agri-food safety regulations;

e) perceive that regulations are simple and understandable;

f) perceive agri-food safety actions of government and regulators as being legitimate, relevant, and fair.

Consequently, eight hypotheses were constructed to guide this study. The following sub-sections describe the key independent variables and associated hypotheses.

Cost-benefit analysis of compliance (gain goal)

The cost-benefit analysis of compliance is defined as the overall expected favourable consequences or gain (economic, tangible or intangible) that an actor receives from complying or not complying with the law (Parker & Nielsen, 2017). In this study, the focus is not on actual benefit but the regulated actors' subjective assessment of the perceived economic benefit of not complying with agri-food safety regulations. This may take the form of money saved or generated, time saved, and costs or losses avoided by not complying with regulations. Essentially, this study expects that some farmers choose not to comply for financial gain. Thus, it is hypothesised that:

Hypothesis 1*:* There is a positive relationship between the rational calculation of the costs and benefits of compliance and farmers' compliance with agri-food safety regulations.

Deterrence (gain goal)

Deterrence is defined as the prevention of law violation by fear of punishment (Becker 1968). Deterrence acts as a disincentive to an individual's decision to not comply as the threat of punishment and related costs such as shame, loss of money, freedom or time, or incarceration deter non-compliance. In particular, two aspects of deterrence affect compliance decisions by an actor: the risk of detection and the severity of punishment (Herzfeld & Jongeneel, 2012). Scholars who support the rational choice theory have always argued that to change a person's behaviour or make people comply with the law, there is a need to increase the severity of formal sanctions or punishments (Foundjem-Tita et al., 2014; Ramcilovic-Suominen & Hansen, 2012). In line with cost-benefit analysis, severity increases costs and therefore neutralises the attractiveness of non-compliance (Yan et al., 2016). Accordingly, previous compliance research shows that a low probability of detection and low sanction severity decreases compliance (Herzfeld & Jongeneel, 2012). Therefore, if the risks of detection are high and/or

the consequences of non-compliance are severe, regulated actors are likely to comply with regulations. In light of this, it is hypothesised that:

Hypothesis 2: Deterrence is positively related to farmers' compliance with agri-food safety regulations.

Social norms (normative goal)

Social norms are the set of rules, such as values, meanings, symbols, or beliefs, shared by a group of people that influence their day-to-day practices (Etienne, 2011; Spencer-Oatey, 2008). These informal sanctions generate social pressure (negatively or positively) through shame, guilt, a pressure to belong, fear of exclusion, and a desire to maintain a positive reputation with fellow community members. Previous research on regulatory compliance shows that an individual's strong affinity with informal sanctions can decrease compliance (Siddiki et al., 2012). In this study, the importance of agri-food safety regulatory compliance decreases when there is pressure to meet community expectations that are not in line with these regulations. An individual may still choose to comply with formal rules; however, this may cause them to deviate from group norms. However, if the individual values social norms more than the regulations, non-compliance may occur. Accordingly, it is hypothesised that:

Hypothesis 3: Social norms that drive behaviour that is contrary to formal agri-food safety regulation requirements have a negative relationship with farmers' compliance.

Awareness of law (normative goal)

Awareness of law refers to the extent to which the regulated community has received and understood the requirements, outcomes, and expectations of a regulation and related issues (Yan et al., 2016). In the present study, legal knowledge entails the ability of farmers to be aware of agri-food safety regulations and their ability to understand the requirements of the regulations**.** Thus, if regulated actors are aware and knowledgeable of the regulations and what

is required of them, they are more likely to comply with regulations. In view of this, the following hypothesis is constructed.

Hypothesis 4: There is a positive association between awareness of law, as a normative factor, and compliance with agri-food safety regulations.

Provision of information, extension services, and training (normative goal)

Information, extension services, and training are fundamental to understanding compliance behaviour (Longo et al., 2019). As discussed above, information about issues related to agricultural production (i.e., climate change, food safety, and policies) positively impact on farmers' behavioural change towards compliance. Prior studies on agricultural extension have shown that lack of information and training for farmers can be a barrier to compliance. Therefore, some farmers may not follow regulations not necessarily because they do not want to follow them but because they are not provided with adequate or correct information that would enable them to make appropriate compliance decisions. In light of this, it is hypothesised that:

Hypothesis 5: There is a positive association between the provision of information, extension services, and training for farmers, as a normative factor, and compliance with agri-food safety regulations.

Legitimacy (normative goal)

Suchman (1995) defines legitimacy as a perception an actor holds about the actions of an entity being appropriate or fair. In this study, legitimacy entails farmers' assessment about whether the regulations, the regulator, and enforcement of regulations are fair, just, correct, and appropriate. Tyler (1990) and Suchman (1995) found that legitimacy can be influenced by social norms, personal values and views, assessment of performance and reliability of a regulator, perception of fairness in the enforcement of compliance decision-making, and perception of equitable treatment of all actors by the regulator (procedural justice). Prior

research shows that if regulated actors perceive a regulator, regulations, and enforcement administration as being legitimate and fair, they are more likely to voluntarily comply with regulations (see, for example, Kaine et al., 2010; Ramcilovic-Suominen & Hansen, 2012). According to Tyler (2006), if procedures are fair, the regulated actor is more willing to comply. In this current study, three aspects of legitimacy are hypothesised to influence agri-food safety compliance: perceptions of simplicity, clarity, relevance, and appropriateness of regulations; support of regulated actors by legal authorities in understanding and complying with regulations; and the actor's perception of fairness of the regulator in enforcing regulations (procedural justice). Therefore, it is hypothesised that:

Hypothesis 6a: Perceptions of agri-food safety regulations as being simple and understandable have a positive effect on agri-food safety regulatory compliance.

Hypothesis 6b: The more negative the perception of the regulator by farmers, the higher the likelihood of farmers' non-compliance with agri-food safety.

Personal values (hedonic goal)

Personal values refer to life goals and conceptions that guide an individual's behaviour (Schwartz, 1992). Research shows that people are more likely to comply with the law when what they hold as morally right is consistent with the law itself (Yan et al., 2016). For the present study, it is expected that the personal values farmers hold about food, monetary pursuit, or human life will influence how they respond to agri-food safety regulations that support the production of safe farm produce. Thus, it is hypothesised that:

Hypothesis 7: Personal values have a positive relationship with agri-food safety regulation compliance.

Table 3.5 below provides a summary of the hypothesis for this study.

Table 3:5: Summary of hypotheses

Hypothesis 1	There is a positive relationship between the rational calculation of the costs and benefits of compliance and farmers' compliance with agri-food safety regulations.
Hypothesis 2	Deterrence is positively related to farmers' compliance with agri-food safety regulations.
Hypothesis 3	Social norms that drive behaviour that is contrary to formal agri-food safety regulation requirements have a negative relationship with farmers' compliance.
Hypothesis 4	There is a positive association between awareness of law, as a normative factor, and compliance with agri-food safety regulations.
Hypothesis 5	There is a positive association between the provision of information, extension services, and training for farmers, as a normative factor, and compliance with agri-food safety regulations.
Hypothesis 6a	Perceptions of agri-food safety regulations as being simple and understandable have a positive effect on agri-food safety regulatory compliance.
Hypothesis 6b	Hypothesis 3b: The more negative the perception of the regulator by farmers, the higher the likelihood of farmers' non-compliance with agri-food safety.
Hypothesis 7	Personal values have a positive relationship with agri-food safety regulation compliance.

3.11 Chapter summary

This chapter presented a review of the literature on farmers' decision-making regarding compliance with regulations and the theoretical framework used to examine agricultural regulatory compliance in this study. Specifically, the chapter discussed farmers and food production and farmers and decision-making, provided conceptual definitions of the key terms in the study, and explained the importance of compliance and strategies for achieving compliance. The chapter also discussed the theoretical frameworks for understanding compliance behaviour and presented a review of studies that have examined the determinants of agricultural regulatory compliance. It is important to note that some of the literature used to develop this section emanated from compliance literature based in the contexts of occupational health, nursing, building, and tax reform. This literature was utilised to provide a solid and broad foundation for examining regulatory compliance among farmers, who are the focus of this study.

The literature review shows that the majority of studies on agricultural regulatory compliances emanates from Western societies, and that limited research has been conducted on compliance in developing societies such as Kenya. Also, the review shows that there are few studies that provide insights and understanding of the factors that shape farmers' compliance with agri-food safety regulations, especially those concerning food destined for domestic markets in Kenya. This study sought to address this gap by examining those factors that determine compliance with agri-food safety regulations among farmers who produce food for domestic markets in a developing country, such as Kenya. The theory that was selected to guide this study is Lindenberg's (2000) goal framing theory. The next chapter presents the research methodology used in the study.

Chapter 4

Method

4.0. Introduction

Chapters 2 and 3 reviewed the literature and presented theoretical arguments related to agriculture, agri-food safety, and regulatory compliance in the agricultural industry in Kenya and other parts of the world. This chapter describes the methodological approach adopted to address the research questions in Chapter 1. Specifically, the chapter describes the research design that was followed and provides justifications for all decisions taken to address the research questions and test the hypotheses.

The chapter comprises 10 sections. The second section outlines the aims and objectives of the study and the third section describes the study region, outlining the rationale for the choice of Uasin Gishu County in Kenya. The research process is described in the fourth section, while the fifth section discusses the philosophical stance that guided this study. The sixth section presents the methodological approaches for conducting the research and ends with a justification for selecting the mixed-method approach for this research. The seventh section presents the research methods used for the quantitative study in terms of data collection, measurement of variables, design of the questionnaire, and data analysis. The eighth section discusses the qualitative research methods, and focuses on the two methods employed, the procedures used to collect the data, validity and reliability checks, and the data analysis techniques. The ninth section presents the ethical considerations followed and the chapter concludes in the tenth section with a summary of the key issues.

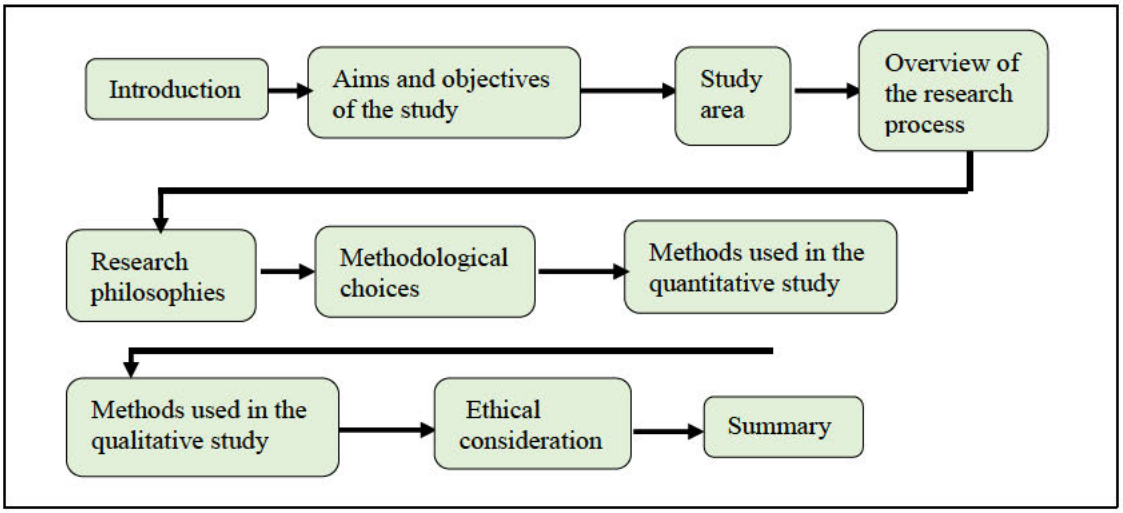

Figure 4:1: Overview of the chapter

4.1. Aims and objectives of the study

The main aim of this study was to investigate how the attitudes, opinions, and perceptions of farmers shape compliance with agri-food safety regulations and to identify strategies for improving compliance. The specific objectives were to:

1. examine the perceptions and opinions of farmers and industry insiders of agri-food safety and agri-food safety regulations and how well these regulations are complied with by farmers in Kenya.
2. identify the economic, socio-cultural, and legal factors that determine agri-food safety compliance in the context of a developing country such as Kenya.
3. provide recommendations on how compliance with agri-food safety regulations can be improved.

To address the research objectives, the study provided responses to the following research questions:

1. What are the perceptions of farmers and industry insiders regarding agri-food safety, agri-food safety regulations, and farmers' compliance with food safety regulations?

2. What are the economic, socio-cultural, and legal factors that shape agri-food safety compliance?
    a) To what extent does the rational calculation of costs and benefits impact farmers' compliance with agri-food safety regulations?
    b) To what extent does deterrence, specifically the risk of detection and sanction severity, impact farmers' compliance with agri-food regulations?
    c) To what extent does legitimacy, specifically perceptions of regulation and the regulator, impact farmers' compliance with agri-food safety regulations?
    d) To what extent do social norms impact farmers' compliance with agri-food safety regulations?
    e) Does farmers' awareness of agri-food safety laws impact their compliance with agri-food safety regulations?
    f) To what extent does the provision of information, extension services, and training for farmers impact their compliance with agri-food safety regulations?
    g) Do personal values impact farmers' compliance with agri-food safety regulations?
3. What changes (or reforms) are required in current regulations and arrangements to improve agri-food safety compliance by farmers and other key stakeholders in agri-food chain?

4.2. Study area

The data for this study were collected from Uasin Gishu County, Kenya. Uasin Gishu County is situated in the north-western part of Kenya, occupying an area of 3,345.2 square kilometres between longitudes 34°50' W and 35°37' E and latitude 0°55' N and 0°03' S. As at November 2019, Uasin Gishu County had a population of 1,163,186 with a density of 232 people per square kilometre (KNBS, 2019). The national highway from the coastal town of Mombasa to

the border town of Malaba divides Uasin Gishu County into two halves. This highway is vital for transportation of agricultural produce to Eldoret town, which is the county headquarters where the majority of markets (commercial millers, processors, and informal settlement) are located (County Government of Uasin Gishu, 2018). Figure 4.2 shows the location of Uasin Gishu County in Kenya.

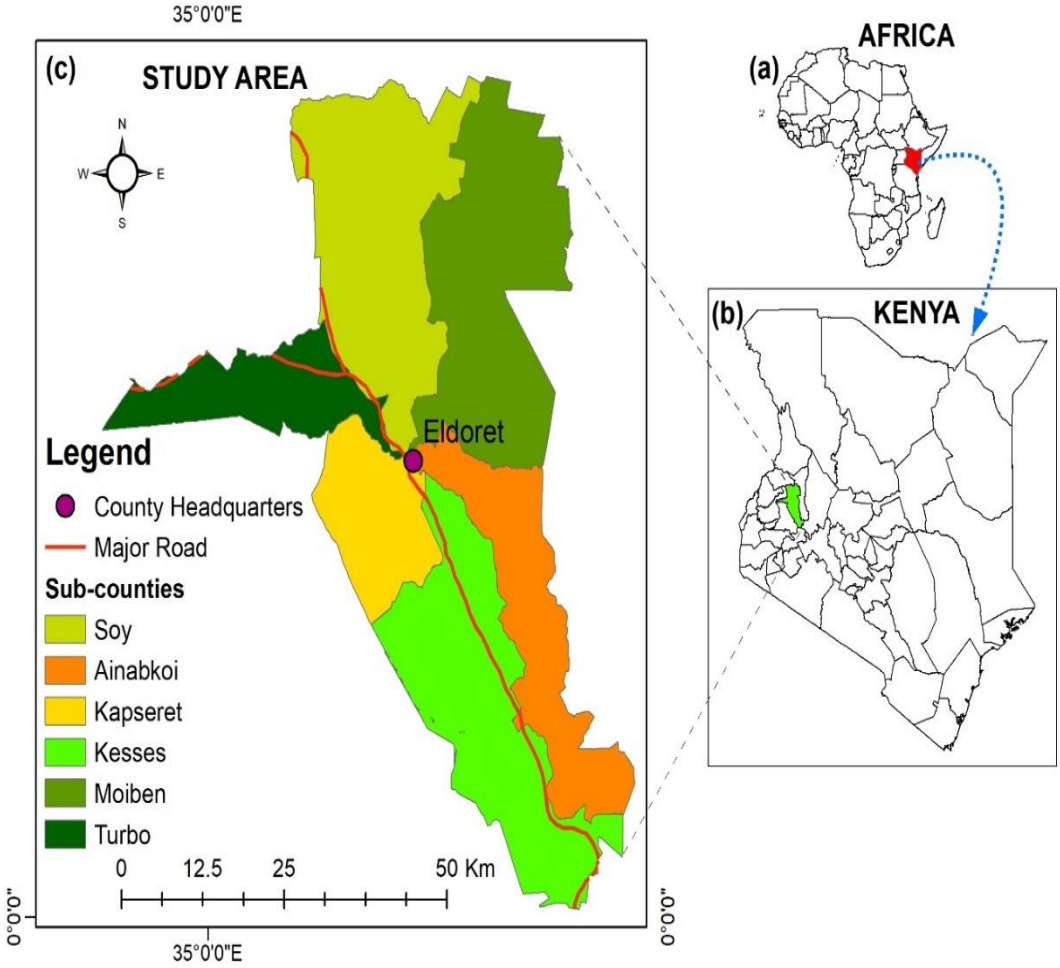

Figure 4:2: Map showing Uasin Gishu County in Kenya and its sub-counties
Source: Author

Uasin Gishu County is a major food-producing county in Kenya and is referred to as the 'bread' or 'grain' basket of Kenya. Maize and wheat are the most common food crops grown, with an annual total production of about 4.5 million bags [7] of maize and about 1 million bags of wheat

[7] 90-kilogram bags

(County Government of Uasin Gishu, 2018). The most practised farming system is mixed farming, and other crops grown in the county are beans, potatoes, passionfruit, and vegetables. The livestock sub-sector is a source of livelihood for over 160,000 households in Uasin Gishu County (KNBS, 2019). Livestock production includes cattle, goats, sheep, chicken, and pigs. Almost all farming households keep at least one cow generally for milk production but sometimes for meat (County Government of Uasin Gishu, 2018).

Approximately 141,547 (46%) of the 304,943 households in the county are engaged in some form of farming, and over 78% of the total population work in agriculture (KNBS, 2019) (See Appendix 12). Rural households generate income primarily from the sale of livestock and crops such as maize, wheat, and vegetables. Only a few households generate income from other sources such as working in government departments, especially education and health, or in private business such as transport, retail, and real estate (County Government of Uasin Gishu, 2018).

In terms of governance, the county is divided into six sub-counties (Soy, Turbo, Ainbakoi, Moiben, Kesses, and Kapseret) and 30 wards [8]. This form of governance is important in the context of socioeconomic planning, development, and resource allocation. The national government has minimal responsibility in agricultural development, which rests with counties as per the 2010 Constitution of Kenya (Republic of Kenya, 2010).

Fifty-nine percent of the land surface is used for agricultural purposes, with 60% of this being for subsistence agriculture and 40% being for commercial purposes (KNBS, 2019). The majority of farmers own and manage between 2 and 400 acres of land (County Government of

[8]The ward is the lowest electoral unit within a sub-county that is delimited for purposes of representation in the county governments of Kenya in accordance with Article 89 of the Constitution. It is usually represented by a person elected as a member of the County Assembly for five years. There are 1,450 wards across Kenya and 30 in Uasin Gishu County (County Government of Uasin Gishu, 2018; Republic of Kenya, 2010).

Uasin Gishu, 2018). Whereas the average farm holding of Uasin Gishu County is five acres, farm size tends to be larger in the rural areas. Overall, small-scale farming accounts for more than 80% of the total agricultural produce in Uasin Gishu County (KNBS, 2019).

The rationale for selecting a single county rather than several counties is because there were insufficient resources and time to study all of the counties in Kenya. Uasin Gishu County was selected for two reasons. First, maize and livestock production are prevalent and the majority of households are farmers. Second, the researcher's understanding and familiarity with the geography and culture, together with the limited resources and time, favoured the choice of Uasin Gishu County over other counties.

4.3. Overview of the research process adopted

Research is a systematic process that involves a series of steps followed to investigate a problem with a view to providing answers. It involves three interrelated stages: 1) planning (identification of philosophical stance, methodological choice, and research type), 2) execution (selecting a research method, sampling procedure, data collection method, and data analysis strategies), and 3) data interpretation and report writing (Saunders et al., 2016; Sreejesh et al., 2014). This chapter covers the first and second stages only. Figure 4.3 below graphically summarises the process followed in conducting this study.

Sequentially the two key stages of the research process begin with identification of a research philosophy (positivism, interpretivism, or both), which is followed by the selection of a research approach or methodology (quantitative, qualitative, or both) that will enable the researcher to answer the research questions. The third stage entails identification of the research type (descriptive, exploratory, correlation, explanatory, case study, ethnography, historical, phenomenology, or grounded theory). The fourth stage involves the selection of research method(s), and ends with selection of the data analysis techniques.

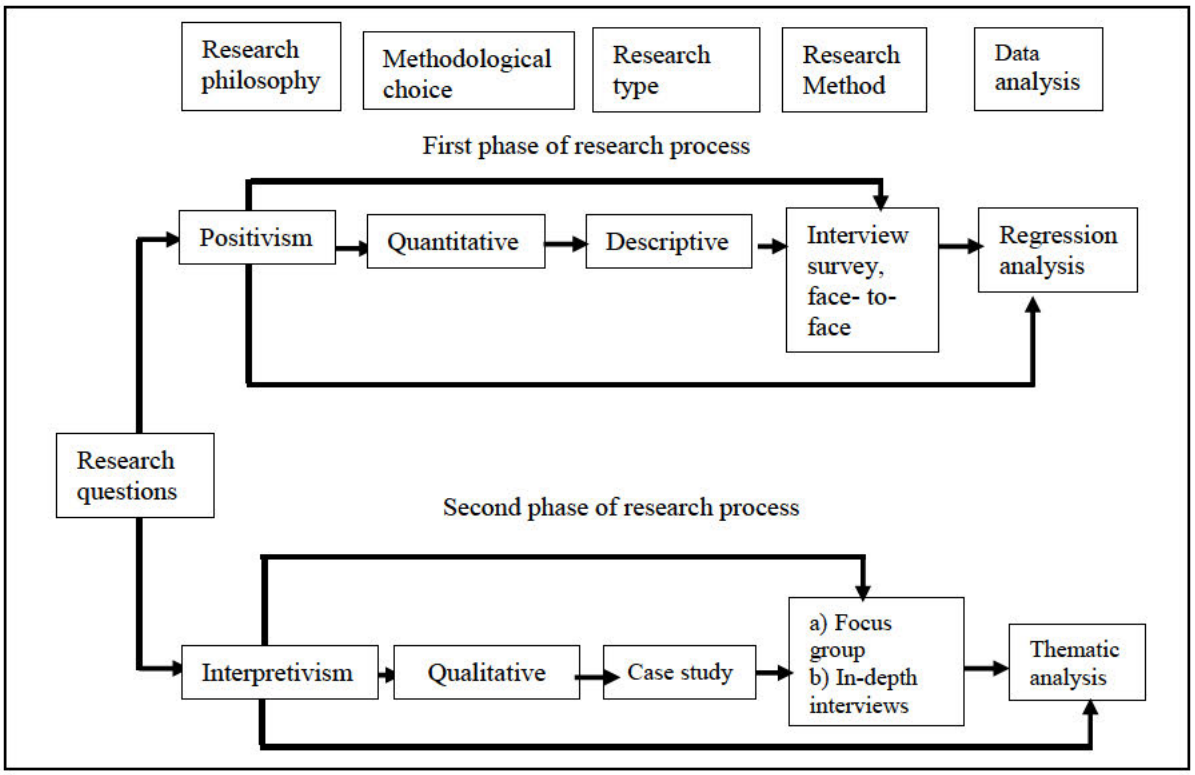

Figure 4:3: Summary of research process adopted by this study

Generally, there are several factors that determine the process of any study: the nature of the problem, the research goal, resources, time, type of data required, study participants or sources of data, theoretical constructs, and type of research questions (Bryman & Bell, 2015; Sreejesh et al., 2014). For this present study, the research questions, research goals, study participants, and approach to theory development informed the strategies and procedures adopted.

Having provided an overview of the research process adopted, subsequent sections describe in detail each stage of the process, covering the selected options and their rationale. Philosophical stances are discussed first before delving into the methodological choices, research types, research methods, and data analysis strategies used in the subsequent sections.

4.4. Research philosophies

Research philosophies are defined as "systems of beliefs and assumptions about the development of knowledge" (Saunders et al., 2016, p. 124). It is advised that researchers pay

attention to the philosophies that underpin their studies as they determine 1) how researchers make claims about reality (ontology), 2) how they know reality (epistemology), and 3) how they collect and analyse the data and interpret the results (methodology) to address the research questions (Bryman & Bell, 2015; VanderStoep & Johnston, 2009).

There are two dominant and opposing research philosophies: positivism and interpretivism. Positivism is a research philosophy is concern with the application of the methods of the natural sciences to understand social phenomena scientifically using causal explanations. At the ontological level, positivism assumes that reality is objective, and independent of the researcher. Epistemologically, this approach observes that knowledge is observable and measurable numerically (Bryman & Bell, 2015; Saunders et al., 2016). Methodologically, the approach is quantitative and concerns describing and explaining social phenomena by testing hypotheses and verifying theory through a statistical method. Although a positivist approach offers high levels of reliability, it has been criticised for having low levels of validity, being heavily reliant on experience as a valid source of knowledge, and being too descriptive (Guthrie, 2010).

Interpretivism, on the other hand, is a philosophical stance that does not advocate for the application of natural science to the study of social phenomena. The ontological orientation of interpretivism is that knowledge is subjective, holistic, and not independent of the researcher (Saunders et al., 2016). It is also value-laden and, therefore, not based on cause-and-effect relationships (Guthrie, 2010). It favours non-experimental research where the researcher does not interfere with the subjects or participants. Generally, the epistemological orientation of this approach is that a social phenomenon can be understood through perceived knowledge. Methodologically, interpretivism is concerned with the understanding and interpretation of the meaning of phenomena through non-quantitative methods. Unlike positivism, which

concentrates on testing theory, interpretivism focuses on theory building through an induction process. It is mostly associated with qualitative research approaches. The main limitation of interpretivism paradigms are their subjective nature and susceptibility to personal bias; therefore, the reliability of data is undermined to a certain extent. However, its great strength lies in the tendency to generate data with a high level of depth and validity.

The present study adopts a positivist approach to understand the compliance decision-making of farmers. The rationale for the choice of positivism is driven by the nature of the research problem and research questions. A positivist approach is appropriate because the research questions are concerned with understanding the various aspects of agri-food safety compliance practices in a developing country. To obtain such understanding, it is necessary to establish facts and collect statistics for testing causal relationships among variables and hypotheses.

4.5. Methodological choices

Quantitative and qualitative research approaches have different research strategies, and each approach carries with it striking differences in relation to theoretical, epistemological, and ontological orientations (Bryman & Bell, 2015). Quantitative research utilises the methodological principles of positivism to derive conclusions deductively by adhering to the practices and standards of the natural scientific model (Bryman & Bell, 2015; VanderStoep & Johnston, 2009). It incorporates numerical measurements in the collection and analysis of data (Bryman & Bell, 2015). The major advantage of quantitative research is that it depends on a large sample, and tends to accurately reflect the population if sampling is conducted accurately. However, its major limitation is that it lacks depth, as research participants do not provide extensive information (VanderStoep & Johnston, 2009). It is applicable to research problems that require establishment of causality and generalisation of measurable social behaviour (Bryman & Bell, 2015).

Qualitative research, on the other hand, uses the interpretivist paradigm to inductively and holistically understand social phenomena and reality as experienced by studying participants (Withrow, 2016). It emphasises understanding of the meaning of the social phenomena over numerical assessment (Saunders et al., 2016). The main advantage of qualitative research is that it provides a deeper understanding of the population under study. Its main disadvantage is that the sample size is usually small and sometimes non-random, which may affect the generalisation of findings to larger populations (VanderStoep & Johnston, 2009). It is mostly applicable to research situations where multiple social realities and perceptions may exist and where validity is dependent upon observation of phenomena in a natural setting (Bryman & Bell, 2015; Saunders et al., 2016).

While these two research approaches have been commended and criticised in equal measure, some researchers have continued to advocate for a middle ground (Withrow, 2016). Referred to as a mixed-method approach, this middle-ground approach utilises both quantitative and qualitative methods to collect and analyse data. The main advantage of the mixed-method approach is that it offers an opportunity to use one method (quantitative or qualitative) to corroborate another (triangulation), either by using one research strategy to aid the other research strategy (facilitation) or using the two research strategies simultaneously in order to dovetail different aspects of an investigation (complementarity) (Bryman & Bell, 2015).

Having considered the available research strategies, a mixed-method research approach was selected as the most appropriate strategy to address the research questions and research objectives outlined for the present study. The rationale for choosing a mixed-method approach was three-fold: triangulation, complementarity, and enhancement of the research findings. First, there was a need for complementarity to increase the interpretability and meaningfulness of the results by elaborating, enhancing, illustrating, and clarifying the results of one method

using the other method (Clark & Ivankova, 2016). For this case, a quantitative research approach was used to establish relationships among the regulatory compliance independent variables (i.e., cost-benefit analysis of compliance, deterrence, legitimacy, awareness of law and policy outcome, social norms, provision of information, extension services, and training, and personal values). Qualitative data from focus groups were then used to complement the relationship between the dependent variable and the independent variables, resulting in a rich overview of factors that shape farmer compliance with agri-food safety regulations (Punch, 2014; Saunders et al., 2016). Figure 4.4 shows the various classification of mixed-method research.

As shown in Figure 4.4, mixed-method research can be classified using two criteria: priority and sequence decision (Bryman & Bell, 2015). In terms of priority decision-making, the concern is which strategy (qualitative or quantitative) should be used for principal data

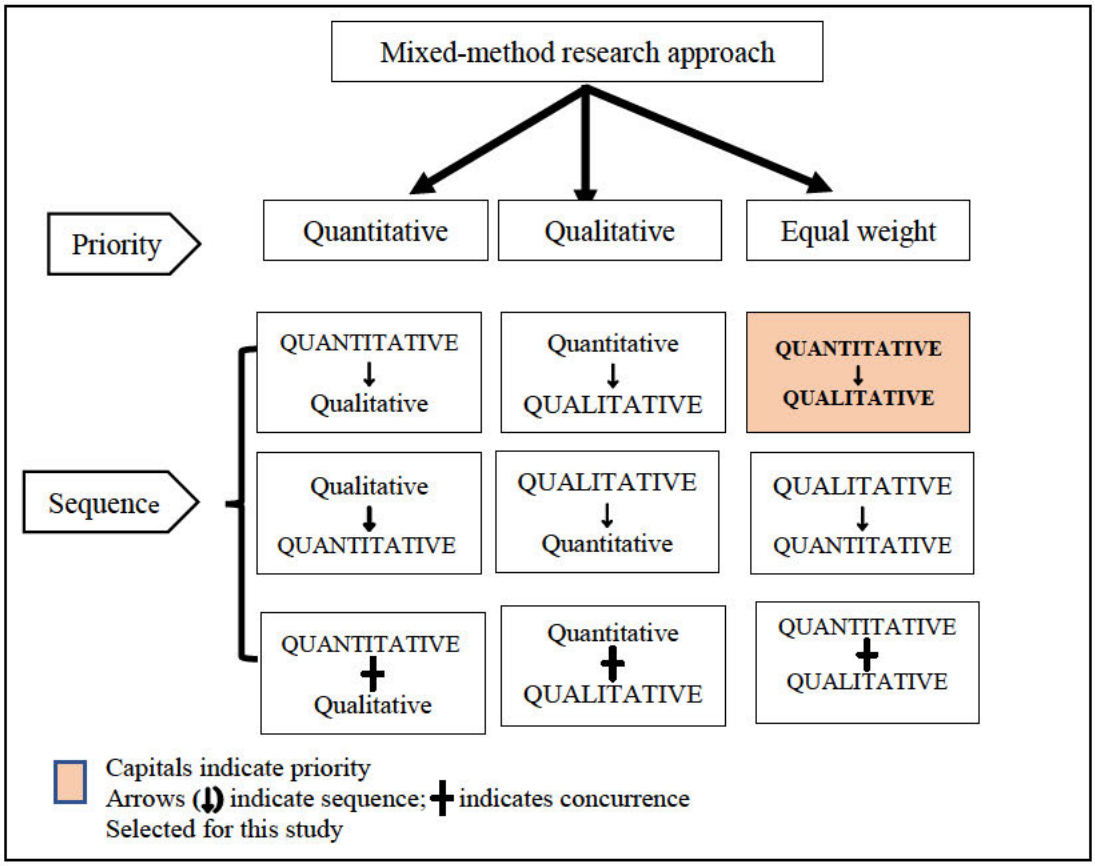

Figure 4:4: Classification of mixed-method research
Source: Adapted from Bryman and Bell (2015, p. 632) and Edmonds and Kennedy (2017)

gathering. With regard to sequence decision-making, the focus is on which method precedes the other or whether both methods should be used concurrently. These two criteria (i.e., quantitative and qualitative) can yield different types of mixed-method approaches. Second, both quantitative and qualitative approaches were used to maximise the theoretical strengths and reduce the limitations of each research approach to allow various issues that affect compliance decision-making of farmers to be brought to the fore (Edmonds & Kennedy, 2017). Last, the mixed-method approach enabled the results from the quantitative surveys of farmers to be triangulated with data from the qualitative interviews with key informants in the agri-food chain in order to assess areas of convergence and divergence for richer findings. Figure 4.5 summarises the sequence of the mixed-method research process adopted in this present study.

This study used a sequential mixed-method design that entailed collecting quantitative data first, then the qualitative data, and then separately analysing both. According to Punch (2014, p. 310), this type of mixed-method design is applicable where the first phase quantitative results

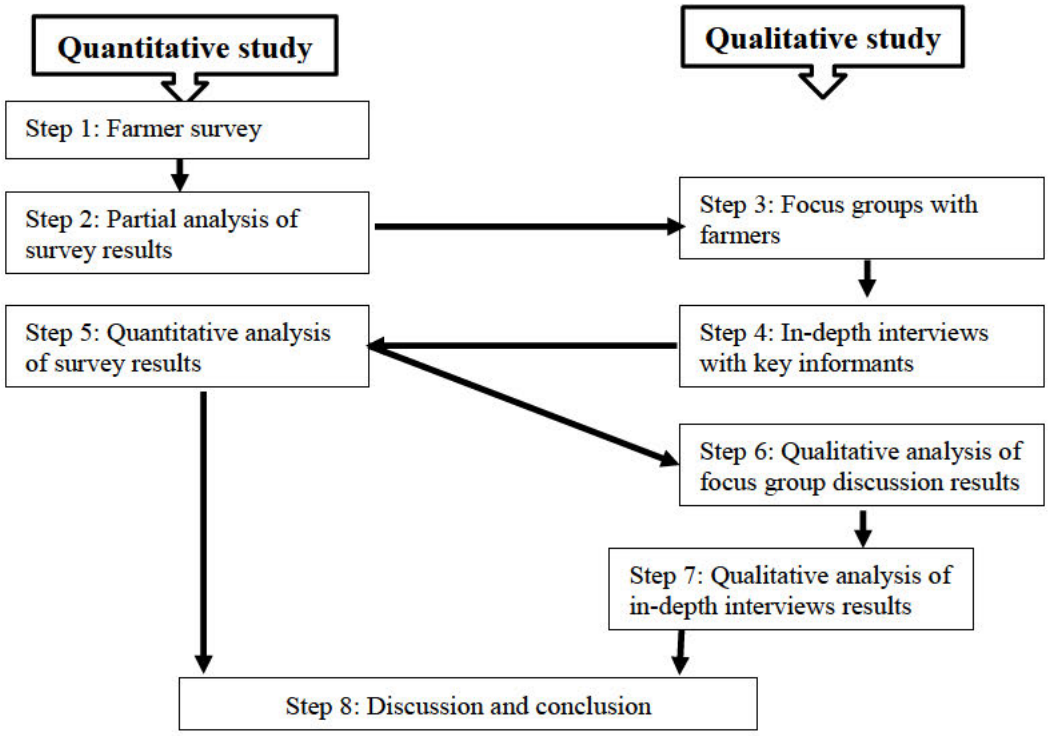

Figure 4:5: Sequential explanatory model of farmer compliance decision making research
Source: Author

guide the selection of participants for subsequent studies. Having provided a rationale for the adoption of a mixed-method approach, there is a need to identify the strategies (quantitative and qualitative) used to answer the research questions for each of the studies. These are summarised in Table 4.1.

Table 4:1: Research types and methods

	Quantitative research	Qualitative research
Research types	a) Descriptive*	Case study*
		Ethnographic
	b) Correlational*	Grounded theory
	c) Quasi-experiment	Historical
	d) Experiment	Phenomenological
Methods	Survey*	In-depth interviews*
	Questionnaire surveys	Standardised
	Direct administration	Semi-standardised*
	Mail	Unstandardised
	Online	Focus group interviews*
	Personal/ interview surveys*	Document analysis
	Face-to-face*	Participant observation
	Telephone interviews	
	Structured observation	

*Research types and methods used in this study

With a mixed-method approach, the choice of the specific research strategies for each of the studies depends on the research questions, the coherence of the selected strategies, and the time and amount of resources required to complete the study. Detailed discussion and the rationale for the choice of selected strategies are provided in subsequent sections.

4.6. Research methods used in the quantitative study

This section presents the methods used to collect and analyse the quantitative data.

4.6.1. Survey

Survey research involves the use of standardised questionnaires or interviews to systematically collect data from a sample of participants about their preferences, thoughts, and behaviours, and to statistically analyse the data to make inferences about the population (Curtis & Curtis,

2011, p. 122). Thus, a survey is consistent with the positivist approach to research. Surveys are appropriate for descriptive, explanatory, exploratory, and applied research (Saunders et al., 2016). They are also suitable for studies involving individuals as units of analysis, policy evaluations, and perceptions and attitudinal studies (Maxfield & Babbie, 2015).

The major advantage of the survey method is its versatility, reliability, generalisability, efficiency, and applicability to descriptive, exploratory, or explanatory studies of large populations and study areas (Walter, 2019). The major limitation of surveys is that they may be subject to non-response, sampling, social desirability, and recall biases, which may affect the validity of the findings (Bryman & Bell, 2015).

There are two broad categories of data collection using surveys: questionnaire surveys (direct administered, mail, or online) and interview surveys (personal – face-to-face or telephone interviews). The major advantage of the questionnaire survey is that it is easy to conduct, unobtrusive, and offers anonymity and convenience for participants in answering survey questions in their own time and at their own speed. However, its major limitation is that it does not provide an opportunity for probing and clarification and is prone to low response rates. Questionnaire surveys are mostly applied where there is an effective and appropriate mailing infrastructure, a collection of data relating to sensitive issues, and where participants have good writing and comprehension skills (Maxfield & Babbie, 2015, p. 257).

Face-to-face interviews involve the interviewer physically meeting the participants while telephone interviews entail the researcher using a mobile phone or telephone to ask a participant the questions orally and record observations. Face-to-face interviews have the advantage of producing thorough data and allowing observation of the participants' answers and behaviour (VanderStoep & Johnston, 2009). They are applicable to research areas that do not have effective telecommunication or mailing infrastructures. One major limitation of face-

to-face interviews is that they are expensive when the sample is large and sparsely distributed. The advantage of telephone interviews is that they are cheap and fast; however, they cannot be applied where telecommunication networks are unstable or non-existent (Walter, 2019).

The major advantage of an interview survey over a questionnaire survey is flexibility. Interview surveys enable the interviewer to clarify any issues and ensure immediate and direct responses from participants, which both lead to high response rates. However, interviews are time-consuming, resource-intensive, prone to social desirability response, and affected by interviewer bias (Walter, 2019). They are most appropriate where participants have low literacy levels or where the language of the questionnaire is not understood by participants (Maxfield & Babbie, 2015, p. 270).

For this present study, face-to-face interviews were the most feasible method for the survey as literacy levels are low among Kenyan farmers and many would not be able to complete a written questionnaire on their own. In addition, the postal system and internet are not reliable and few farmers in Uasin Gishu County have access to the internet or a postal address for a mail survey.

4.6.2. Measurement of variables

The strength of a survey approach depends on measurement of the variables, which are the characteristics or attributes used to describe a case (Curtis & Curtis, 2011; Edmonds & Kennedy, 2017). The variables for this study were identified in Chapter 3, and this section discusses how they were measured.

4.6.2.1 Measurement of the dependent variable: compliance

Measuring compliance is difficult as several scholars have indicated that compliance can never be absolute or 100% achieved (see, for example, Amodu, 2008; Yan et al., 2016). There are

two ways in which compliance can be measured: 1) binary or dichotomous or 2) a spectrum or gradation of behaviour. As a dichotomy, the term compliance can be measured simply as 'yes' or 'no', that is compliance or non-compliance. This approach measures compliance by counting the number of violations of some rule or standard in terms of 'yes' or 'no' and 'complied' or 'not complied.' As a gradation or spectrum, compliance is a continuous value that can be measured between two extremes such as 'high' and 'low' or a choice between 'usually' and 'never'. Therefore, the words 'compliance' and 'non-compliance' are opposites that lie at either end of a spectrum, and the level of an individual's compliance can be anywhere between these two extremes. This method allows compliance to be measured using percentages and assumes that the policy outcome may not always be achieved in totality. It can, however, be difficult to apply practically. For instance, people may adhere to only a part of a regulation.

Since the aim of the study was to seek the opinions and perceptions of farmers on factors that shape compliance with agri-food safety regulations, it was deemed fit that compliance be measured by a gradation that allowed participants to subjectively measure their level of compliance as opposed to a binary response. Agri-food safety compliance behaviour was measured by asking the question, *Do most Kenyan farmers comply with agri-food safety laws* [9]? The response to this question was a gradation of 4 = Usually, 3 = Sometimes, 2 = Rarely, and 1 = Never. The rationale for the choice of the four-response mode was that prior research showed that compliance can never be 100%, and therefore the response "All the time" was not viable (Yan, 2017). This choice was used because of the need to produce quantitative answers to farmers' compliance, attitudes, and understanding of agri-food safety issues (i.e., regulations, poisoning, compliance, and food crime).

[9]Whereas the focus of this study was on agri-food safety regulations, the questionnaire was designed using the word 'law', as most participants, especially farmers, referred to regulations as laws.

4.6.2.2 Measurement of independent variables

As shown in Figure 3.2 in Section 3.10, there are seven independent variables that affect farmers' compliance with agri-food safety regulations: financial benefit of compliance (i.e., perceived compliance costs or benefits), deterrence, legitimacy (perception of regulator or regulations), social norms, awareness of law, provision of information, extension services, and training, and personal values. These variables were operationalised in Section 3.10. Table 4.2 summarises how independent variables were measured and coded.

Table 4:2: Measurement of independent variables

Variables	Measurement
Gain goal	
1. Cost-benefit analysis	
a) Financial benefit of compliance	Assigned a value of 1 if the participant mentioned lack of finance as a barrier to compliance and 0 if not
b) Perceived compliance cost	Assigned a value of 1 if the participant mentioned cost as a barrier to compliance and 0 if not
c) Financial ability	Assigned a value of 1 if the participant mentioned existence of a financial benefit of violating law as a barrier to compliance and 0 if not
2. Deterrence	
a) Risk of detection	Assigned a value of 1 if the participant mentioned low risk of detection as a barrier to compliance and 0 otherwise
b) Severity of punishment	Assigned a value of 1 if the participant mentioned lack of punishment as barrier to compliance and 0 if not
Normative goal	
3. Social norms	Assigned a value of 1 if the participant mentioned culture or informal sanctions as a barrier to compliance and 0 if not
4. Awareness of law	Assigned a value of 1 if the participant mentioned lack of awareness of agri-food safety laws as barrier to compliance and 0 if not
5. Information, extension services and training	Assigned a value of 1 if the participant mentioned information, extension services, and training as a barrier or driver of compliance and 0 if not
6. Legitimacy	
a) Perception of regulator	Assigned a value of 1 if the participant identified negative attitude towards the regulator as a barrier to compliance and 0 if not
b) Perception of regulation	These variables were assigned a value of 1 = usually, 2 = sometimes, 3 = rarely and 4 = never
Hedonic goal	
7. Personal values	Assigned a value of 1 if the participant mentioned lack of ethical values as a barrier to compliance and 0 if not

To measure the above independent variables, two open-ended questions were posed to the participants: *What are the barriers to compliance with agri-food safety regulations among farmers?* and *What factors in your opinion do you think encourage compliance with agri-food*

safety laws among farmers? These two questions were adapted from Bartel and Barclay (2011). The main rationale for the choice of this open-ended response was the operationalisation of compliance as a multi-dimensional phenomenon as discussed in Chapter 3.

As shown in Table 4.2, four variables (i.e., social norms, awareness of law, provision of information, extension services, and training, and personal values) were measured by an item each while the remaining variables had two or three items. All the single item variables were coded by creating a dummy variable that takes on a value of 1 if the participant identified any of the items as a barrier to compliance and 0 if not. ***Cost-benefit analysis*** was measured by three items: financial benefit of compliance, perceived compliance costs, and financial ability. All these items were dummy variables and were coded by assigning a value of 1 if the respondent listed any of them as a barrier or driver of compliance and 0 if not. ***Deterrence*** was measured by two items: risk of detection and severity of punishment. The two items were assigned dummy variables with a value of 1 if the participant identified any as a barrier to compliance and value of 0 if not.

Legitimacy was measured by two items: perception of regulations and perception of the regulator in enforcement of regulations. The first item was measured by asking participants to rate the statement '*the laws (i.e., agri-food safety regulations) are clear and understandable'* on a 5-point Likert scale, with the response options being Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. The item on perception of regulator was a dummy variable that took the value of 1 if the participant mentioned the regulator as a barrier to compliance and 0 if not.

4.6.2.3 Control variables

A control variable is an independent variable that is included in the analysis in order to better understand the effects of the variables a researcher is interested in (Curtis & Curtis, 2011). It

is a variable that a researcher does not wish to examine and, therefore, it is controlled to understand the theoretical and empirical evidence of the variables of interest. In this study, four control variables were used: age, gender, education level, and location of the farmer. The selection of these control variables was based on previous compliance studies and theoretical predictions that have shown that they significantly influence compliance decisions (see, for example, Murphy et al., 2020; Yan et al., 2015).

Gender was a dummy variable that was assigned a value of 1 if the participant was a male and 0 if female. The location of the farmer was measured using the six sub-counties of the study area: 1 for Turbo, 2 for Soy, 3 for Kapseret, 4 for Kesses, 5 for Moiben, and 6 for Ainabkoi. Responses to the age question were graded as 1 for 20–29 years, 2 for 30–39 years, 3 for 40–49 years, 4 for 50–59 years, and 5 for 60 years and above. Level of education was measured by four items: 1 = No formal education, 2 = Completed primary school (8 years), 3 = Completed secondary school (12 years), and 4 = Completing/completed an undergraduate or postgraduate university degree. Religious status was coded 1= Muslim, 2 = Christian, 3 = Traditional religion, 4 = No religious affiliation.

4.6.3. Design of the questionnaire

A good survey instrument requires careful design as every question needs a clear rationale for inclusion and specific indicators (Walter, 2019). The literature on survey instrument construction suggests a number of issues to consider (Bryman & Bell, 2015), including content, format, and order of questions. The next sub-sections describe how these three issues were addressed in this study.

4.6.3.1 Question content

The first step of any effective survey instrument design is to decide, in a formal way, what needs to be known to answer the research questions (Bryman & Bell, 2015; Walter, 2019).

Research questions can be adopted from previous research on subject matter similar to the social phenomenon under study. The researcher designing their own research questionnaire offers an opportunity to be innovative, but a major disadvantage is that it requires testing to confirm its validity and reliability. Using established questions from other researchers has the advantage that it has been tested and, therefore, will have high levels of reliability and validity. It is also advantageous in that findings can be compared with previous research. For this survey, some questions were adopted from pre-existing studies that had acceptable levels of reliability (Bartel & Barclay, 2011; Yan et al., 2015), while others were developed by the researcher. The final interview schedule had six sections as follows:

a) Demographic information on i) the farmer, covering age, gender, education, and family size, and ii) the farm operation, covering production type, farm size, if the farm was the primary source of income, length of time in farming, and whether the farmer resided within the community.
b) Farmer's perception of the benefits and challenges of farming in Kenya.
c) Farmer's opinions on agri-food safety issues.
d) Farmer's attitudes towards agri-food safety regulations.
e) Farmer's opinions on factors that affect agri-food safety compliance.
f) Farmer's suggestions on how to improve agri-food compliance in the food production process. (See Appendix 4)

4.6.3.2 Question format

Another consideration for the design and development of the survey instrument is response format and scaling: open-ended and close-ended. The major advantage of an open-ended question is its ability to generate rich data; however, the major challenge is that participants may give irrelevant answers that can generate the possibility of misunderstanding and interpretation bias (Maxfield & Babbie, 2015).

Closed-ended questions, on the other hand, require participants to respond using a set of limited options that are collectively exhaustive and mutually exclusive (Maxfield & Babbie, 2015; Walter, 2019). Collectively exhaustive responses mean that all possible answers are included while mutually exclusive responses ensure possible answers do not overlap. While it is advisable that the researcher ensures that responses to survey questions are as much as possible exhaustive and exclusive, sometimes it is difficult to capture all possible responses from participants.

For this present study, the interview survey questions were semi-structured with both closed-ended and open-ended questions. Questions were logically ordered with clearly defined instructions and items were grouped by similarity, as suggested by Walter (2019). The responses to the closed-ended questions were binary or measured by Likert scales. Open-ended questions were used to collect information on factors that shape compliance and also to capture additional qualitative information of relevance. Complex, ambiguous, unclear, and technical terms were avoided to allow easy understanding of the questions (Hagan, 2008; Maxfield & Babbie, 2015).

Also, the choice and order of questions were considered and Maxfield leading words or suggestions that may influence responses were avoided. For example, the researcher focused on compliance with regulations as opposed to non-compliance, as the latter is considered sensitive and, therefore, the chances of unreliable answers were reduced. Also, following the steps recommended by Yan et al. (2015), self-referential questions were avoided and instead, questions were asked about observations of other people or an indirect approach was used (Chaudhuri & Christofides, 2013). For example, one question asked respondents their thoughts on the level of understanding of the regulations by farmers instead of asking them their level of understanding directly. Finally, the questionnaire was in both the English and Kiswahili

languages, enabling administration in either English or Kiswahili depending on the language most conducive for the participant.

4.6.3.3 Question order

Research shows that question order affects the quality of participants' responses (Bryman & Bell, 2015; Maxfield & Babbie, 2015). According to Bryman and Bell (2015), researchers should pay attention to questions that should be asked first or early in the administration of the questionnaire. Early questions should relate directly to the topic of the research and be salient and specific, while those that are potentially embarrassing and personal in nature (such as age, income, level of education, and marital status) should not be asked at the beginning of the survey as they could generate suspicion. Bryman and Bell (2015) also advise that questions dealing with opinions and attitudes should precede questions that focus on behaviour and knowledge. Similarly, Maxfield and Babbie (2015) maintain that interesting questions should precede sensitive and personal questions in the design and administration of questionnaires.

In this present study, the questions were segmented into three sections: i) social demographic questions, ii) opinions on farming in Uasin Gishu County and farmers' perceptions and opinions on agri-food safety, and iii) agri-food safety regulations and compliance with agri-food safety regulations. Although the questions were ordered according to the above sequences in the questionnaire, the first questions asked in the interview were those that focused on opinions about farming in Uasin Gishu County. Key questions addressing the agri-food safety regulations and their compliance were asked second, and the personal demographic questions were asked last. This order of administration was successful as it allowed participants to develop their interest and to comfortably participate in the study.

4.6.4. Sample size and sampling methods

This section discusses the target population, sample size, and sampling strategies adopted in collecting quantitative data for the study.

4.6.4.1 Target population

The target population refers to "the universe of all subjects the researchers are interested in studying" (Besen-Cassino & Cassino, 2018, p. 415). According to Tranter (2019 p. 120), it is critical that a researcher "delineates precisely and unambiguously who and what comprises" the target population. For this current study, the target population was farmers in the Uasin Gishu County of Kenya. Participants were therefore drawn from households that engage in any form of farming for food production in this part of Kenya.

4.6.4.2 Sample size

Determination of sample size is critical for interpretation and generalisation of the research findings (Bachman & Schutt, 2018; Maxfield & Babbie, 2015). Generally, for both the quantitative and qualitative studies, there are no absolute guidelines on how to determine sample size; however, the larger the sample size, the higher the reliability of the results (Hagan, 2006). However, in practice, the size of the sample usually depends on the degree of accuracy required, the requirement for generalisability, the funding, time and staff available, the population size and characteristics, and the anticipated sub-classification of the variables (Champion, 2006). Garson (2007) recommends sampling 20 cases per study construct or variable; however, some authors recommend a minimum sample of 100 while others advise a sample size of 200. For this study, Garson's (2007) recommendation of 20 cases for each study construct was used to determine the sample size for the farmer survey. There were eight constructs (i.e., agri-food safety compliance, cost-benefit analysis of compliance, deterrence, legitimacy, awareness of law and policy outcomes, social norms, provision of information,

extension services, and training, and personal values); therefore, allowing for 20 cases per construct required a sample size of 160 for the study (20 multiplied by eight factors).

4.6.4.3 Sampling method

There are different types of sampling methods: simple random, systematic, stratified, convenience, purposive, snowballing, and quota (Walter, 2019). For this study, the sampling was both stratified and random. Stratified sampling was used to determine the sample size for each of the six sub-counties in Uasin Gishu County (see Figure 4.2 and Table 4.3). The rationale for stratifying samples across sub-counties was to account for Uasin Gishu County's diverse population densities, ethnic composition, and remoteness. Random sampling was used in two ways: first, to select one ward by sub-county and second, to select participants from each ward. The selected wards were Tembelio in Moiben, Ziwa in Soy, Kapseret in Kapseret, Kaptagat in Ainabkoi, Cheptiret in Kesses, and Tapsagoi ward in Turbo.

Table 4:3: Distribution of sample size by sub-counties

Sub-counties	Total households engaging in any form of farming	Proportionate sample size	Sampled ward
1. Turbo	26,235	30	Tapsagoi
2. Soy	33,352	38	Ziwa
3. Kapseret	16,891	19	Kapseret
4. Kesses	24,309	27	Cheptiret
5. Moiben	22,915	26	Tembelio
6. Ainabkoi	17,845	20	Kaptagat
Total	**141,547**	**160**	

Source: KNBS (2019)

A sampling frame (the list of all farming households) was generated for each ward with the help of community administrators in the ward, and participants were randomly selected from a list of contact details of farmers accessing government services within the selected wards. From the list of all farmers from each ward, the researcher picked every fifth farmer until all the proportionate sample size was reached, as shown in Table 4.3 above. In cases where the sampled participants declined to participate, they were replaced with other participants until

the sample reached the target number. The sampled participants were contacted by telephone (mobile phone) and invited to participate in the study. Those who agreed to participate were asked to meet with the researcher for a face-to-face interview.

4.6.5. Survey procedure

Approval for the survey was sought from the UNE Human Research Ethics Committee. Following approval of the study, the researcher travelled to Uasin Gishu County in Kenya to collect data. Upon reaching Kenya, the researcher first obtained approval from the National Council of Science and Technology (NACOSTI), which is a statutory body with the mandate to manage research activities in Kenya, and then held an exploratory discussion with senior staff in the Uasin Gishu County's Department of Agriculture, Livestock and Fisheries. The discussion informed them of the purpose of research, the proposed study participants and study area, and the support being sought from them. The research was guided by an advisory committee comprising four representatives from the Uasin Gishu County Department of Agriculture and Livestock, farmer associations, and agri-food safety experts. This group reviewed the research approach and questionnaires and facilitated links to government officials and other key stakeholders. They also helped to access essential contextual data for the case study areas and provided other relevant reports. The researcher communicated with committee members through email and occasionally met with the committee to review information and confirm interpretations of the data and the emerging findings.

On completion of the above activities, the survey questionnaires were piloted with a random sample of eight participants. The purpose of the pre-test was to check the appropriateness, flow, and meaning of the questions and words used, the language applicability (i.e., Swahili and English), and the duration of administering a single questionnaire (Bryman & Bell, 2015). The pre-test participants were conveniently sampled to reflect the socio-demographics of farmer

populations in Uasin Gishu County, especially with regard to age, level of education, gender, and geographical location. The pre-test participants comprised one farmer with no formal education, a farmer with post-secondary education, a young farmer (25 years), an older farmer (62 years), a peri-urban farmer, a rural farmer, a dairy farmer, and a maize farmer. In terms of gender, seven were male and one was female. This exercise provided experience in administering the questionnaires, which enhanced the process of interviewing the main participants.

The survey was conducted between September and November 2019, which is a period of low activity for most farmers while they are waiting to harvest their crops. This ensured that all farmers in all parts of Uasin Gishu County had an equal opportunity to be included in the study. This timing was beneficial to the study as most participants had ample time to consider their responses to the survey questions. The survey administration lasted an average of 55 minutes (range 40–64 minutes) per respondent.

The survey data were collected during face-to-face interviews conducted by the researcher and three research assistants employed for this purpose. The research assistants were drawn from the communities studied and recruited from among sociology, criminology, and law students at a local university in Uasin Gishu County, Kenya. Each had a bachelor's degree and was fluent in the local language and customs of the communities in the study area. The research assistant positions were advertised within the study area and the applicants were selected through a competitive process. Applications were assessed and interviews were conducted by the researcher to select three successful candidates. This community-as-research process is a successful approach that has previously been used in surveying remote communities in Australia (Stehlik & Buckley, 2008). This method of survey administration helps to overcome the problems of finding willing participants and any language barriers in communities not

otherwise accessible by the researcher, ensuring the voices of farmers in all the communities were included in the study.

A two-day training program was organised and delivered by the researcher to the research assistants that covered all of the necessary requirements to fully equip the research assistants for data collection, including obtaining informed consent from participants and administering the survey questionnaire. The research assistants were guided by the researcher throughout the data collection process and were remunerated for their work based on the applicable daily rates in Kenya.

The interviews were conducted in government facilities and community meeting halls. The participants in the survey were the household heads registered with the government or the family member most responsible for the farm operation. Before the survey administration, the interviewer took each participant through an information sheet that explained the purpose of the research and the information required. The interviewers explained that participation was voluntary, the information provided was confidential, and participants would remain anonymous. Further, the interviewers sought informed consent from all participants. The researcher assessed the performance of the interviewers on the interview process through feedback from participants. In order to maximise and receive accurate answers to closed-ended questions, the interviewers provided participants with show cards. Each show card represented one of the responses (Bryman & Bell, 2015), and the participant selected the one that reflected their own answer.

Partial analysis of the survey data was conducted to inform the qualitative focus group interviews. All interviewers were provided with field notebooks to record all relevant observation data about the study. With the permission of the participant, interviews were audio-recorded, and the majority of the participants (143) agreed to the audio recording. For

participants who did not agree to the recording, the interviewers took extensive notes during the interview and noted relevant and useful observations.

4.6.6. Validity and reliability checks of farmer survey

Reliability and validity are important criteria for evaluating quantitative research because they ensure the objectivity of the measuring scales (Auerbach & Silverstein, 2003; Saunders et al., 2016). According to Punch (2014), validity is the extent to which results from a research instrument (i.e., survey) represent what they are intended to measure. Reliability, on the other hand, refers to the extent to which the data collection method yields consistent results if repeated (Saunders et al., 2016).

Since the study was reliant upon participants' opinions about compliance, one potential validity and reliability issue was the risk of socially desirable answers (Maxfield & Babbie, 2015). Specifically, it was possible that some participants could under-report their opinion, which would impact on the reliability and validity. To minimise this risk, the study deployed the following strategies. First, as mentioned in Section 4.6.3.2, the questions were designed using 'the other people' approach (Chaudhuri & Christofides, 2013). This is an approach that seeks the opinion of participants about what they think others rather than themselves are doing. Recent compliance research has shown that this approach alleviates social desirability bias (for example, Arias et al., 2015; Yan et al., 2015). Since actual compliance behaviours are sensitive to investigate, it is better to use perceived compliance as a proxy or lens for actual compliance. Second, some compliance questions were adopted from previous studies (Barclay & Bartel, 2015; Yan et al., 2015) with proven validity and reliability.

Furthermore, the study used thoughtful disclaimers and introductions to all sensitive questions. For example, the following statement was used: *People have different views and experiences about some farming practices, agri-food safety processes, and the regulations/law. The next*

few questions will address issues related to what you think about these issues in Kenya. This helped to assure the participants that the research aim was to understand their views about the topic. Also, trained interviewers who were native speakers of the local language were engaged to administer the questionnaire. Finally, as shown in Figure 4.5 in Section 4.5, the survey data were triangulated, supported, or confirmed by data from the focus group discussions and in-depth interviews with key insiders, informants, or stakeholders with differing viewpoints. These five techniques facilitated the creation and collection of comprehensive, accurate, and appropriate data. It also helped to alleviate (non)-response bias or unreliable information from participants in the survey.

4.6.7. Data analysis

This sub-section discusses the procedures and strategies used to analyse responses from the farmer survey.

4.6.7.1 The units of analysis and observation

A unit of analysis is the entity (i.e., who or what) that a researcher would make conclusions about at the end of the study (Sedgwick 2014). It is considered 'heart' or focus of the study (Miles et al. 2013). It is different from a unit of observation, which is the item (or items) a researcher observes, measures or collects in order to make a conclusion about a unit of analysis (Sedgwick 2014). In some studies, the unit of analysis and observation are the same. For this quantitative study, the unit of analysis and the unit of observation were the same: the farmer.

4.6.7.2 Data screening and pre-analysis

The first pre-analysis procedure was coding the open-ended responses using the themes that were predetermined earlier and described in Sections 3.10 and 4.6.2. These responses were assigned as dummy variables. The raw data, which included both closed-ended and coded open-ended responses, were then entered by the researcher in Statistical Package for Social

Sciences (SPSS) software, version 26. Next, the researcher assessed the normality, multicollinearity, and homoscedasticity of the individual items. The analyses revealed that the skewness and kurtosis values for the individual variables were within acceptable limits. Tests for multicollinearity showed that the Variance Inflation Factor (VIF) for all independent variables was around two, signifying an absence of multicollinearity. Homoscedasticity was assessed using Levine's test in SPSS, and the results indicated that the homogeneity of variance of the predictor variables was within acceptable limits (see Appendices 9, 10, and 11 for a summary of these statistics).

4.6.7.3 Descriptive statistics

Descriptive statistics were generated for each variable to understand the distribution of each variable in the questionnaire. Quantitative responses were summarised in tabular and graphical forms for easy interpretation.

4.6.7.4 Analytic method for hypothesis testing

To analyse how various independent variables were associated with compliance (dependent variable) with agri-food safety regulations in Kenya, a hierarchical multiple linear regression technique was used. This regression technique has been previously used to analyse factors that shape compliance with cybersecurity (Erin et al., 2020), tax regulations (Rechberger et al., 2010), traffic regulations (Allen et al., 2017), and public health safety regulations (Erasmus et al., 2020; Murphy et al., 2020).

The rationale for its selection was threefold. First, it is relevant to studies that have predictor variables that are determined before data analysis is conducted. As discussed in Sections 3.10 and 4.6.2, the predictor variables for this study were determined based on the goal framing theory and other theories in the literature review. Second, the need to understand the independent contribution and the incremental validity of each goal in the study necessitated the

use of a hierarchical regression. Last, there was a need to analyse the mediating relationships between different goals that have an impact upon the dependent variable. For purposes of hypothesis testing, the items that were used to measure the variables of cost-benefit analysis and deterrence were transformed into one item. Items that were used to measure legitimacy were not combined.

In line with the hierarchical multiple linear regression approach, the independent variables were entered into the regression equation in three steps. The first step involved the control variables of age, gender, level of education, religious status, and geographical location. In the second step, variables that represent the goal of deriving a gain or minimising a loss (cost-benefit analysis and deterrence) were loaded into the regression model to test for their influence on agri-food safety compliance. Finally, in the third step, variables that represent normative and hedonic goals (social norms, personal values, awareness of law, provision of information, extension services, and training, and legitimacy) were added to the model. Regression coefficients, statistical significance, and R-square were used to assess the hypotheses.

4.7 Research methods used in the qualitative study

This section details the strategies used to collect and analyse data for the qualitative study.

4.7.1. Data collection methods

Two methods were used to collect the qualitative data: focus group discussions with farmers and in-depth interviews with key stakeholders in the agri-food chain. Table 4.4 provides an overview of the two qualitative data collection methods.

Table 4:4: Overview of qualitative data collection methods

Criteria	Focus group discussions	In-depth interviews
Purpose	To complement quantitative survey results by helping to clarify and generate a deeper understanding of specific issues that emerged during the survey.	To obtain different views, perspectives, and experiences about farmers' compliance behaviour, and to increase the validity of data from the quantitative survey and focus groups meetings with farmers (Clark & Ivankova, 2016).
Category of participants	Farmers	Agri-food chain stakeholders (see Figure 4.6)
Approach	Focus group meetings	Face-to-face interviews
No. of participants	54 (see Table 4.5 for distribution per sub-county in the study area)	29
Period	18/10–25/11 2019	25/11–24/12 2019

The following sections discusses these methods in detail.

4.7.1.1 Focus group discussions

A focus group discussion is a qualitative method used to collect data on a particular issue from two or more people together (Saunders et al., 2016). While individual voices remain important, the insights that emerge from the discussions and interactions among participants make a focus group discussion a valuable tool for exploring people's knowledge, reactions, perceptions, or experiences (Liamputtong & Ezzy, 2005; Willis, 2019).

Focus group discussions serve three purposes as a research method: as a primary source, as a supplementary source, or as a multimethod source (Liamputtong & Ezzy, 2005). As a primary source, the focus group discussion is the only source of data collection used. When it is a supplementary source, a focus group discussion is used to support findings or develop questions for another source. As a multimethod source, a focus group discussion is used in conjunction with other methods, especially in-depth interviews and surveys, to generate additional information. In this present study, the focus group discussion was used to augment, refine, explain, and illustrate the quantitative survey results by clarifying and generating a

deeper understanding of how farmers think about and make decisions regarding agri-food safety regulatory compliance (Maxfield & Babbie, 2015; Punch, 2014; Saunders et al., 2016).

4.7.1.2 In-depth interviews

According to Punch (2014), interviews are a good method for accessing people's perceptions, practices, awareness, and interpretations of issues. The purpose of interviewing key stakeholders was to provide an alternative perspective of farmers' compliance with law. It was also used to enhance the validity of the quantitative survey and focus group discussions with farmers (Clark & Ivankova, 2016). A semi-structured questionnaire was used for the interviews because of the need to probe, adapt, and vary questions for diverse target participants as discussed in Section 4.7.3 (Saunders et al., 2016). All interviews were conducted face-to-face to capture behavioural cues. It was also the most viable method due to the unreliability and instability of telephone networks in the study area.

4.7.2. Design and content of the focus group and interview questions

The questions for the focus group discussions were semi-structured to allow a variety of community perspectives to be understood. The questions were drawn from the farmer survey, with emphasis on major issues arising from the survey findings. The main issues discussed were 1) the challenges of farming in Uasin Gishu County, 2) food safety issues in farming, 3) general perception and understanding by farmers of agri-food safety regulations, 4) barriers and factors that encourage farmers' compliance with agri-food safety law, 5) ways to improve compliance, and 6) crimes in the food production process (see Appendix 6).

The questions for the in-depth interviews mirrored those for the survey and focus group discussions. Overall, the questions sought the opinions of key informants on the extent of farmer's compliance with agri-food safety regulations, level of understanding of agri-food

safety regulations, frequency of attendance at agri-food safety training workshops, frequency of utilisation of extension services, and perceptions of seriousness of non-compliance with agri-food safety regulations in Kenya. The other questions focused on barriers and factors that encourage farmers' compliance with agri-food safety law, solutions to improve compliance, and crimes in the food production process (see Appendix 5). However, a major focus was on the compliance behaviour of farmers and suggestions for improving agri-food safety compliance. These open-ended questions enabled further probing of the participants to understand their opinions and perspectives on dimensions of agri-food safety practice and factors affecting agri-food safety regulatory compliance.

4.7.3. The participants

The participants in the focus group discussions were farmers living in the six sub-counties in the case study area. According to Liamputtong and Ezzy (2005), there are three important issues that should be considered concerning participants in focus group discussions: the nature of the participants (heterogeneity or homogeneity, possession of shared experiences, and familiarity or strangers), the research topic, and the skill of the interviewer (Saunders et al., 2016). With regard to heterogeneity or homogeneity, Liamputtong and Ezzy (2005) argue that if participants share a similar social and cultural background, they are likely to freely and comfortably discuss the issue under focus. Social and cultural factors that should be considered are age, gender, educational background, occupation, ethnicity, religion, and socioeconomic status.

In the present study, the participants were farmers who were familiar with each other and resided in the same geographical area (ward). As the study topic of compliance was sensitive in nature, the presence of strangers within the group discussion could limit participants' contribution. For a wide range of divergent opinions and rich insights about agri-food safety

practices and regulatory compliance, the participants were drawn from both genders and all age groups and ethnicities. Figure 4.6 below summarises the key stakeholders in the agri-food chain that were targeted for the in-depth interviews.

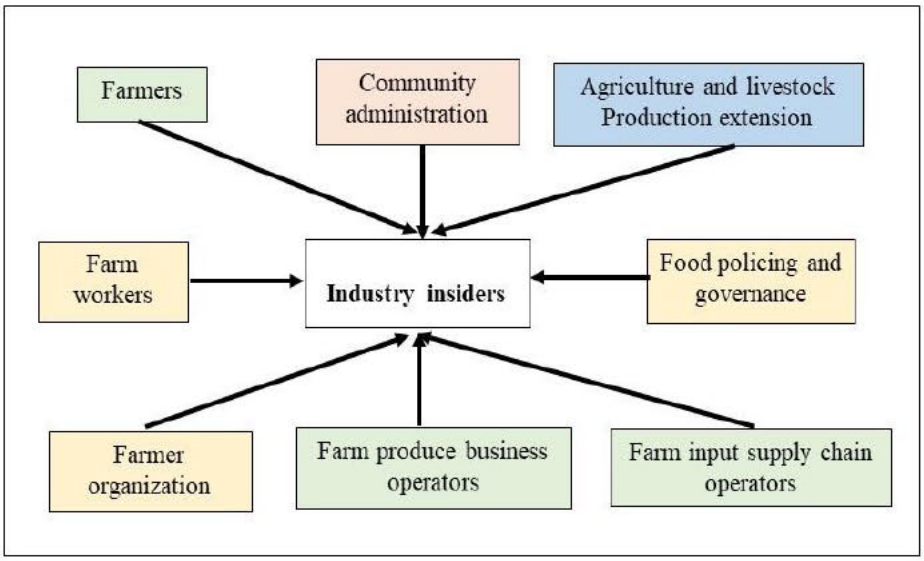

Figure 4:6: Categories of key informants that were targeted for the study

A key stakeholder in this study is any person with extensive knowledge of farming, agri-food safety regulations, food policing, and safety, or who is engaged in farm produce distribution and selling. Specifically, participants were agricultural extension officers, agri-food safety experts, and community leaders. They were selected from government departments and non-government organisations dealing with farming, agri-food safety, and agri-food safety regulations in Uasin Gishu County. The knowledge and experience of these key stakeholders provided rich alternative insights into the behaviour of farmers regarding agri-food safety regulations.

The above key stakeholders in the agri-food chain were categorised into four groups of participants. The first group were Uasin Gishu County officials from the departments of agriculture, veterinary, and livestock production. A total of nine participants were interviewed from this group: three participants in management positions and six at the policy implementation level (three at sub-county level and three at ward level). The second group

occupied formal positions of authority in Uasin Gishu County with responsibility for administration of community issues. They were a chief, an assistant chief, a village elder, and a ward administrator. The third group of participants comprised farm produce and farm-input business operators and included individuals who directly buy farm produce or sell farm input to farmers or farm workers as well as individuals who were working or had worked at any level in the agri-food chain. It also included large-scale farmers who had implemented agri-food safety practices. The fourth group comprised leaders of farmer pressure groups and agri-food safety experts. Table 4.5 below provides the profile of all the key stakeholders that were interviewed for the study.

Table 4:5: Profile of key informants

Participant	Area of expertise
#01	Large-scale farmer
#02	Veterinary officer, regular newspaper columnist, and food safety expert
#03	Public health
#04	Representative of farmers' group
#05	Extension service
#06	Extension service
#07	Extension service
#08	Extension service
#09	Extension service
#10	Extension service
#11	Extension service
#12	Extension service
#13	Business community – milk
#14	Business community – maize/livestock agent/middlemen
#15	Business community – butcher owner
#16	Policing
#17	Business community/ livestock agents/middlemen
#18	Business community/ livestock agents/middlemen
#19	Business community/ livestock agents/middlemen
#20	Governance and farmer
#21	Farmer groups/ farmer activist
#22	Community administration
#23	Community administration
#24	Community administration
#25	Community administration
#26	Farmer, farm activist, farm governance, reader in farming and farm policy
#27	Slaughterhouse operator
#28	Business community - maize
#29	Business community/ livestock agents/middlemen

All these key informants were recruited as participants of the study because of their knowledge of the specific issues pertaining to the agri-food chain (producing food, trading farm produce, food policing, and regulation). In addition, both community leaders and farm leaders were people who had lived in the area for more than 10 years and thus would have observed a change in farm-based agri-food safety practices. Their contribution provided an informative and alternative insight into farmer behaviour.

4.7.4. Number of participants

There are several factors to consider when determining the effective number of focus groups and allocating participants to a focus group in a research project. They are the nature of the research, the availability of the participants, personnel, budget, and time (Liamputtong & Ezzy, 2005; Moser & Korstjens, 2018). For the present study, it was decided to conduct six focus groups. Moser and Korstjens (2018) recommend 4–6 focus groups for grounded theory studies, and Saunders et al. (2016) argue for 3–5 focus groups for each variable under investigation. However, this formula can be cumbersome if there are many variables.

With regard to the number of participants in the focus group discussion, generally it is argued (Liamputtong & Ezzy, 2005) that a group with few participants can be challenging as it can be difficult to generate interest, maintain an active discussion, and generate rich and diversified information. On the other hand, a group with many participants may be difficult to manage, or some participants may find it difficult to contribute due to time constraints (Saunders et al., 2016). A review of the literature suggests that 4 to 12 people can form an effective focus group. Liamputtong and Ezzy (2005) advise that there should be 6 to 10 participants in a focus group and Saunders et al. (2016) recommend 4 to 12 participants per group.

For the current study, all the focus groups had between 5 and 11 participants. Cumulatively, a total of 54 farmers participated in the focus groups. Participants were aged between 32 years

and 63 years (Mean 50.33 years, SD 2.5 years). Table 4.5 summarises the profile of the participants in the focus group discussions.

Table 4:6: Demographic summaries of participants of focus group discussions

Focus group	Code	Average age	Males	Females	Total participants
Turbo	FGD #1	49	8	3	11
Moiben	FGD #2	51	7	3	10
Kapseret	FGD #3	47	8	2	10
Kesses	FGD #4	49	7	3	10
Ainabkoi	FGD #5	52	5	1	6
Soy	FGD #6	54	5	2	7
Total			**40**	**14**	**54**

Determining the sample size for the in-depth interviews is difficult (Saunders & Townsend, 2016). However, researchers recommend that qualitative data should be collected until any new data yield redundant information (Berg, 2007), which is a process referred to as data saturation. Saunders et al. (2016) recommends 5–25 semi-structured interviews for key informant interviews, while Creswell et al. (2007) suggest 25–30 interviews. On the other hand, Moser and Korstjens (2018) recommend 20–30 interviews. This study adopted Creswell et al.'s (2007) and Moser and Korstjen's (2018) recommendations of 25–30 interviews. The rationale for adopting the recommendation of these authors is that prior qualitative research has shown a sample of around 30 cases is enough for data saturation.

4.7.5. Recruitment and sampling of participants

Recruiting suitable and willing participants for qualitative studies can be difficult and relatively complex (Walter, 2019). According to Walter, there are four criteria that must be present for an individual to be considered for a qualitative study.: They must be 1) interested, 2) motivated, 3) able to participate, and 4) understand the need for participation and be willing to learn about the study. The researcher took into consideration these factors when identifying participants for the interviews.

The participants for the focus group discussions were identified in consultation with local agricultural extension officers and community administrators in the wards sampled. Purposively selected farmers were contacted by mobile phone and invited to participate in a group discussion at a specific place and time in their ward. All the participants that were approached agreed to participate.

Purposive sampling was used to select participants for the in-depth interviews. Purposive sampling is the most common qualitative sampling method and its goal is to select participants in a way that helps to answer the research questions (Bryman & Bell, 2015; Patton, 2015). Consequently, the researcher must consider the prospective interviewee's personal knowledge and experiences or position in society (Rubin & Rubin, 2012; Saunders et al., 2016). For this present study, the issues considered for purposeful selection were that they resided in the study area, they worked in Uasin Gishu County, and they had experience, knowledge, and understanding of agri-food production, agri-food safety regulations, and farmer compliance behaviour. For example, the farmers who were selected were those who had implemented agri-food safety practices and whose knowledge and experiences were significant to the study. Group 1 participants had worked the longest in the three departments.

Contact details for the Group 1 participants were sourced from the Uasin Gishu County's Ministry of Agriculture, Livestock, and Fisheries, and the contact details for the participants in the other groups were drawn from a farmers' directory, the internet, and other government agencies. All participants were initially contacted by phone or email and invited to an interview.

4.7.6. Qualitative data collection procedure

This section details the procedures that were used to collect data from the focus group discussions and key informant interviews.

4.7.6.1 Procedure for focus group discussions

The focus group discussions were conducted between 18 October and 25 November, 2019. Before each focus group discussion commenced, introductory activities were carried out. First, the researcher informally chatted with participants about farming in Uasin Gishu County. For example, the researcher asked participants, *How is 2019's food production fairing*? This proved to be an effective strategy to create rapport and trust with the focus group participants. The researcher then formally commenced the meeting, introduced himself, and subsequently allowed each participant to introduce themselves by stating their name and preferred name. The researcher then briefed participants about the nature of the research, the survey findings, and their role in the study. Next, participants were provided with an information sheet and written consent form. The researcher took them through the information sheet, paying attention to the need for consent to participate, the right to withdraw, confidentiality, anonymity of their identity, and the duration of the focus group discussion. Before participants signed the consent form (see Appendix 2), the researcher allowed them a brief time to reflect on their participation and ask questions.

The group discussions began by the researcher asking broad questions about the farming and agriculture before delving into the subject matter of the study (i.e., agri-food safety and farmers' compliance with agri-food safety regulations). While the researcher strived to follow the focus group discussion schedule, in some cases participants deviated from the sequence. When this happened, the researcher allowed the participants to continue contributing but noted the questions that had already been answered ahead of schedule. Also, the researcher used prompts such as nodding and probing to enable participants to provide detailed and nuanced answers. To ensure that all participants had an equal opportunity to contribute to the discussion, the researcher directly asked all participants for their opinion.

To minimise response bias, the questions were short, simple, and clear. Also, difficult concepts and uncommon words were avoided during discussion to ensure that the participants' responses were not influenced by others. The researcher also provided clarification where there was intense and divergent opinions or statements among participants to ensure that there was no misunderstanding. Six focus group discussions were conducted, with each group discussion taking an average of 68 minutes (range 49 to 89 minutes). Table 4.6 provides further detail.

Table 4:7: Duration of focus group discussions

Focus group	Duration and date (average of 70 minutes 42 seconds each)
Turbo	89 minutes (18 October, 2019)
Moiben	79 minutes (24 October, 2019)
Kapseret	73 minutes (17 October, 2019)
Kesses	68 minutes (20 October, 2019)
Ainabkoi	49 minutes (25 November, 2019)
Soy	51 minutes (21 October, 2019)
Total	7 hours 4 minutes 11 seconds

All focus group discussions were moderated by the researcher and were conducted in Swahili. The use of the Swahili language as opposed to English was because most participants were comfortable with the Swahili language (Bryman & Bell, 2015). Further, all of the focus group discussions were conducted either in a government facility or in community meeting halls located across Uasin Gishu County. The focus group discussions were captured using digital recorders and notebooks. Transcripts in the original language (i.e., Swahili) were translated into English by the researcher using Microsoft Word to convert them into soft copies.

4.7.6.2 Procedure for in-depth interviews

The interviews were conducted from 2 November to 24 December 2019. Each interview was scheduled on a day and time most convenient to the interviewee. The researcher began the interview by introducing himself and briefing the participant on the purpose and aims of the research, the purpose of the interview, and the progress of the research (survey interviews and focus group discussions). The purpose of this introduction was to establish trust and enable the

participant to feel at ease. The interviewees were then handed a copy of the participant information sheet and consent form (see Appendices 1 and 2).

The information sheet was then explained, and the interviewee informed about how information will be used, the confidentiality and anonymity of the responses, the voluntary nature of their participation, and that they could withdraw at any time without an explanation. Permission was sought from the participants to record the interviews. The researcher tailored the questions to the experience, knowledge, and expertise of each interviewee and ended interviews by thanking the interviewee for their time and contribution. As shown in Table 4.7, of the 30 participants approached, 29 agreed to participate in this study.

Table 4:8: In-depth Interview participants and durations of interviews

Participant groupings	Categories	No. of persons interviewed	Total hours of interview time (average 40 minutes each)
Group 1	Agricultural extension services staff	9	5 hours 34 minutes (9–11 December 2019)
Group 2	Community leaders	4	1 hour 56 minutes (2–4 December 2019)
Group 3	Farm produce and farm-input business operators	11	7 hours 51 minutes (26 November–15 December 2019)
Group 4	Farmer leaders, food safety writers, and public health officer	5	3 hours 24 minutes (26 & 27 November and 19 & 24 December, 2019)
Total number of individuals interviewed		29	

The majority of interviews took an average of 40 minutes, and the range was between 31 and 47 minutes. All interviews were conducted in English either in the offices of the key informants or at community meeting halls. Where the interviewee agreed to have the interview recorded, the researcher took notes of the key points as a back-up for interesting insights. For the interviews where the participants did not consent to a recording, there was comprehensive note-taking during the interview to ensure no data were lost.

4.7.7. Qualitative data analysis

This section presents the strategy and procedure used to analyse the data from the focus group discussions with farmers and in-depth interviews with key stakeholders.

4.7.7.1 Analytic techniques for qualitative data

Thematic analysis, which is commonly used for qualitative data, was used in this study to analyse the data collected. Liamputtong and Ezzy (2005) describe thematic analysis as a process of identifying themes by reading and re-reading the collected data; that is, by close reading, coding, and interpretation of the qualitative data (Willis, 2019). Thematic analysis was used because of its flexibility and compatibility with other approaches and its suitability for examining the perspectives of the different research participants on the same subject (Braun & Clarke, 2006; Nowell et al., 2017). In this study, it was used to analyse the perspectives of different officials along the agri-food chain. Additionally, this method of analysis was chosen as it allowed coding to be done deductively based on established themes from the review of the literature and theoretical frameworks.

Moreover, thematic analysis has been used in studies that suggest practical transformations to society or policy development (Bryman & Bell, 2015). Given that the focus of this study is to understand the factors that hinder farmers from complying with the law or encourage them to violate the law, thematic analysis was considered appropriate because of its applicability to policy development. Last, consideration was given to grounded theory, which is a method of analysis that is similar to thematic analysis. However, in this study, codes and themes were developed prior to data analysis, which is not the case for grounded theory analysis, where the aim is to develop theories from the data. Therefore, thematic analysis was considered the most appropriate for identifying the themes, comparing them with the themes in the theoretical framework, and addressing the research questions for this current study.

Thematic analysis can be deductively or inductively driven (Saunders et al., 2016). Deductively driven thematic analysis entails a researcher determining codes and themes prior to data analysis. It involves the researcher using the existing literature and the research questions to develop codes and themes that are deemed significant for study. On the other hand, in inductive-driven thematic analysis, codes and themes are determined during data analysis. It entails a researcher reviewing the raw data and developing codes and themes according to recurring issues and new perspectives observed in the data (Miles et al., 2013).

For the present study, the thematic analysis was deductively driven. Consequently, the codes and themes used to organise and analyse the interview responses were determined prior to data analysis from the research questions and the literature reviewed in Chapter 3. Some of the codes that were used to categorise the responses were poverty, corruption, procedural justice, and awareness of information. The themes for this study were all the independent variables that were discussed in Sections 4.6.2 and 3.10, (cost-benefit analysis of compliance, deterrence, legitimacy, awareness of law and policy outcomes, social norms, provision of information, extension services, and training, and personal values).

As in the quantitative study, the unit of analysis was the farmer. However, the units of observation were farmers (organised into groups), individual farmer, farm workers, food traders, community leaders, agricultural and livestock extension officers, leaders of farmer organisation, farm input supply chain operators, public health officer, veterinary officer and leaders of unions of professionals in food safety, and veterinary chiefs (see figure 4.6).

4.7.7.2 Analytical procedure

To analyse and interpret the qualitative data thematically, the six steps proposed by Braun and Clarke (2006) and shown in Figure 4.7 were used.

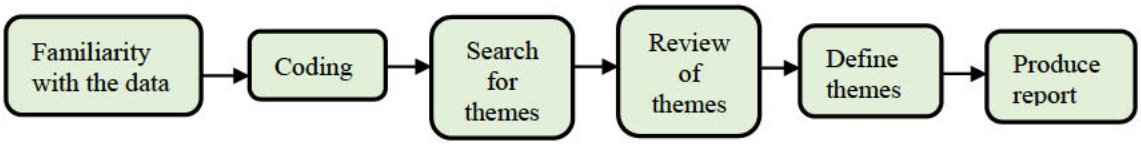

Figure 4:7: Sequences of qualitative data analysis
Source: Adapted from Braun and Clarke (2006)

As shown in Figure 4.7, the first stage of analysing qualitative data is familiarisation with data. In this study, the researcher began the qualitative analysis by immersing himself in or becoming acquainted with the raw data (Miles et al., 2013). According to Saunders et al. (2016), researchers can become acquainted with data by listening to recorded interviews, transcribing data, and reading interview transcripts and field notes to identify patterns and meanings, and taking notes as the data are collected. For the current study, familiarity with the data was achieved in three ways. First, after each focus group discussion or in-depth interview, the researcher immediately cross-checked the raw data by listening to the audio-recording and reading the field notes. Second, all the recorded interviews were then transcribed, and for those not recorded, field notes were typed in Microsoft Word. Last, the researcher read and re-read the data, noting the salient ideas, thoughts, and interpretations. Mind maps were also produced to help interpret the data.

Having become familiar with the data, the researcher began the second process of coding using the predetermined codes, assigning and reassigning codes to interview responses to organise, compress, and assemble the data into a single thread. In this study, coding was largely semantic led (i.e., word-by-word or phrase-by-phrase). The interview responses were coded as many times as possible. In the third step, the codes were compared and collated to create preliminary themes and sub-themes, that were deductively driven from the research questions and the literature reviewed. In this study, as mentioned above, the themes were all the independent variables that were identified in Section 3.10. The fourth step was review of the themes. This involved checking if the themes were coherent and fit the coded extracts and the entire data

set. The researcher discussed this with the supervisors for coherency. Interview responses that did not seem to fit existing themes were re-analysed and re-coded. Those sub-themes that seemed related or conveyed the same ideas were combined. Those that had insufficient data were discarded.

The fifth stage entailed defining and cross-checking the adequacy and coherency of the interview responses to the themes selected, and the findings were written up in the final stage. Qualitative analysis also involved a selection of vivid and compelling extracts of interview responses to support the findings. The findings of the focus group discussions are presented in Chapters 6 and 7 and those of the in-depth interviews with key informants are discussed in Chapter 7.

4.7.8. Validity and reliability checks for the focus group discussions and in-depth interviews

As discussed in Section 4.6.6, validity and reliability in quantitative research aim to achieve objectivity and universality; however, in qualitative research, validity and reliability aim to achieve justifiability, acceptability, and transferability of interpretations and theoretical constructs (Auerbach & Silverstein, 2003).

Several researchers have argued that it is difficult to achieve reliability in qualitative research due to the non-standardisation of research methods (Bryman & Bell, 2015; Saunders et al., 2016). However, they agree that there are many innovative ways of ensuring that qualitative data and its interpretations are acceptable and trustworthy. These include peer debriefing, member checking or participant validation, disconfirming evidence, an extended stay in the field, and triangulation (Bryman & Bell, 2015; Kuckartz, 2014). Kuckartz (2014) defines peer debriefing as regular meetings and exchanges between the researcher and competent individuals or experts in the field of study about the approach adopted and the initial results,

and drawing attention to any phenomena or facts that may have been overlooked. Member checking, on the other hand, entails discussing the results with the participants themselves in order to gain qualified feedback regarding the research results (Saunders et al., 2016).

Disconfirming evidence involves comparing participant responses with predetermined themes for divergence and convergence. An extended stay in the field involves the researcher prolonging their fieldwork to work on emerging issues, incomplete findings, or conflicting results. Triangulation entails combining different methods or source data to gather diverse perspectives about the phenomenon under study (Bryman & Bell, 2015; Kuckartz, 2014). Other strategies for achieving credibility and trustworthiness in qualitative studies are informing the reader of the research process, stating the reasons that underpin the choice of strategy or method, and supporting findings with relevant or specific evidence, such as quoting participants directly or including excerpts from field notes (Saldana et al., 2011; Saunders et al., 2016).

In this study, to ensure the reliability and validity of the findings, peer debriefing, data triangulation, informing the reader of the research process, and use of quotes to illustrate findings were applied. In terms of peer debriefing, the researcher consulted an advisory committee comprising representatives from Uasin Gishu County's agriculture and livestock departments, farmer associations, and agri-food safety experts. This group reviewed the research approach and confirmed the interpretations of the data and the emerging findings. Data triangulation involved focus group discussions with farmers and in-depth interviews with different stakeholders within the agri-food chain (see Section 4.7.3). The latter involved diverse participants in order to capture views from a variety of sources (see Figure 4.6 and Table 4.7). Furthermore, the researcher continuously compared the qualitative data with public records and reports, especially official Kenyan Government agricultural sector statistics, World Bank and

UN agency (especially FAO) reports on agriculture and food in Kenya, and regular newspaper articles (see, for example, Hoffmann, 2021; Mwere, 2019).

In line with Saldana et al. (2011) and Saunders et al. (2016), the process followed for the qualitative research was outlined in Section 4.4. In addition, the duration of the fieldwork, the number of participants involved in the qualitative study, and the average time for the interviews and focus group discussions were presented in Tables 4.5 and 4.6, and 4.7. According to Saldana et al. (2011), provision of this information (research process, duration, and number of participants) enhances the credibility and trustworthiness of qualitative research. Last, to support the researcher's interpretations and assertions, the participants are directly quoted in the presentation of the results, which provides illustrative examples for readers and confirms the fieldwork.

4.8 Ethical considerations

According to Punch (2014), ethics in research involve constant questioning of both the aims and means of research, drawing on firsthand understanding of the actors and circumstances of the research situations as they unfold. For this study, the research approach, survey questionnaire, and interview guides for the focus group discussions and key informant interviews were first submitted to the UNE Human Research Ethics Committee (UNE HREC) for approval before the data collection commenced. This research approval ensured that the privacy, rights, and dignity of participants were respected and that they consented to participation before the interviews. The following ethical principles guided this study.

a) Maximum disclosure was given to all participants. All were informed of the purpose of the research, the time and information required for participation, the freedom to participate, and the confidentiality of the information provided.

b) Informed consent was sought from all participants. They were informed about the nature and objectives of the study so that they could knowledgeably decide whether or not to participate.

c) Confidentiality was observed in the data collection, analysis, and report writing. The researcher did not use any of the participants' real names in the data collection, data presentation, or report writing to protect the participants' identities. Data collection instruments, field notes, and transcripts of interviews used serial codes that did not identify the participants. All identifiable information was removed during the transcription and report writing. In cases where the removal of identifiable information led to loss of meaning, pseudonyms or vague descriptors were used. Reference numbers (for example, #participant 001 for survey, FGD#1 for focus group discussions, and KI #1 for in-depth interviews) were used to represent quotes that were sampled to support the findings.

d) All data were kept secured and will be destroyed after five years in accordance with UNE HREC's standards.

4.9 Chapter summary

This chapter described the research process used for this study. Generally, the study adopted a mixed-method research design that involved a survey of 160 farmers, six focus group discussions, and 29 key informant interviews. The chapter started with a description of the study area and a rationale for the selection of Uasin Gishu County in Kenya for the fieldwork. The study was largely deductive, and was informed by both positivism and interpretivism. A description of the methodological choices and justification for the mixed-method approach was provided. The processes followed to collect and analyse the quantitative and qualitative data were outlined. The chapter concluded with a discussion of the ethical principles followed and the limitations of the study.

Up to this point, the thesis has presented the research problem, the literature review, and the research design and methodology. The next two chapters present the findings of the study. Chapter 5 presents the findings of the survey, while Chapter 6 covers the findings of the focus group discussions and key informant interviews and discusses the convergent and divergent findings in the perspectives of the farmers and the key informants.

Chapter 5

The Quantitative Analysis[10]

5.0 Introduction

This chapter presents the findings from the quantitative study. The research questions are answered through analysis of the data gathered from 160 individual farmers who participated in the survey (see Appendix 4 for the interview schedule). In addition, this chapter addresses the hypotheses developed in Chapter 3. The statistical tools used to answer the two overarching research questions are descriptive statistics (i.e., means, standard deviation, graphs, and frequency tables) and inferential statistics (i.e., hierarchical multiple regression analysis).

The results are presented in seven major sections. Following the first section is the demographic profile of the survey sample, and the third section addresses research question one, presenting the results of the opinions of the participants regarding agri-food safety, agri-food safety regulations, and farmers' compliance with agri-food safety regulations in Kenya. The fourth section addresses research question two and presents the results of the analysis of the factors that influence farmers' compliance with agri-food safety regulations. The fifth section presents the results of the participants' opinions about strategies for improving farmers' compliance with agri-food safety regulations, and the sixth section discusses the results of hierarchical regression and correlation analyses that were used to test the hypotheses. The final section provides a summary and conclusion.

[10]Sections 5.4 and 5.5 have been accepted for publication as Bunei, E., Barclay, E., & Kotey, B (forthcoming 2022). Factors influencing farmers' compliance with agri-food safety regulations in Kenya. *International Journal of Rural Criminology*.

5.1 Profile of the farmer survey sample

This section presents the socioeconomic and demographic characteristics of the survey participants and the profile of their farms. It provides foundational data and statistics about the participants whose responses were used to test the hypotheses. The first sub-section presents the demographics of the survey participants and the second sub-section provides the socioeconomic characteristics of the participants' farms. These foundational data were compared to the statistics for Uasin Gishu County and the 2019 national census of Kenya.

5.1.1 Demographic profile of survey participants

The demographic characteristics were measured by seven variables: gender, age, educational background, ethnicity, religious background, marital status, and source of income. The findings are summarised in Table 5.1.

Overall, 114 (71%) of the survey participants were male and 46 (29%) were female. This distribution is slightly different from the national statistics, in which male farmers represent 82% of those identifying as having farming as their primary occupation (KNBS, 2019). In terms of age, more than half of the participants (59.9%) were aged between 31 and 50 years (Mean 48.59 years, SD 11.17 years), 45 (28.8%) participants were aged between 41 and 50 years, 32 (16.7%) were between 51 and 60 years, 10.9% were between 20 and 30 years, and 11.5% were aged 60 years and more. The youngest participants were aged 21 years and the oldest was 81 years.

With regard to levels of education, the greater proportion of the participants had primary or secondary levels of education, which is equivalent to Year 9 and Year 12, respectively, in Western countries. Sixty-two respondents (39.7%) indicated that they were educated to secondary level, 49 (31.8%) noted that their level of education was primary level, and 38

(24.5%) had completed college or university education. Only six participants reported never having attended school, of which 83% were mostly elderly farmers (60 years and above).

Table 5:1: Social-demographic characteristics of survey participants

Variable	Categories	Frequency	Percentage (%)
Gender	Male	114	71
	Female	46	29
	20–29	17	10.6
	30–39	51	31.9
Age (years)	40–49	46	28.8
	50–59	27	16.9
	60+	19	11.9
Education	Not gone to school	8	5.0
background	Primary school completed (6 years)	51	31.9
	Secondary school completed (12 years)	62	38.8
	Completing/completed an undergraduate or postgraduate university course	39	24.4
Ethnic	Kalenjin	148	94.3
identity	Kikuyu	6	3.8
(N=157)	Luhya	2	1.3
	Others	1	0.6
Marital	Single	14	9.1
status	Married	130	84.4
(N=154)	Divorced	3	1.9
	Widowed	7	4.5
Religious	Muslim	2	1.3
background	Christian	144	94.7
(N=152)	Traditional	3	2
	No Affiliation	3	2
Sources of	Farming only	48	30
income	Farming and other sources of income	112	70
	Off-farm work e.g., transport and retail	93	83
	Working in the civil services	12	10.7
	Teaching (primary or secondary school)	7	6.3

In terms of ethnicity, almost all participants were from the Kalenjin community (94%), and the remaining 6% were from other ethnic groups, particularly Kikuyu and Luhya. The recent census data revealed that Kalenjin is the predominant ethnic group in Uasin Gishu County (KNBS, 2019). Most of the farmers who participated in the survey were married (84.4%), 14 (9.1%) were single, 7 (4.5%) were widowed, and 3 (1.9%) indicated that they were divorced. Regarding religion, most participants identified themselves as Christian (94.7%), two

participants were Muslims, 5% reported that their allegiance was to a traditional belief or had no specific religious affiliation, and eight participants did not identify their religion. These findings are not surprising as Uasin Gishu County is a cosmopolitan county and most agriculture is practised by the Kalenjin community. The dominant religion in the rural areas of Uasin Gishu County is Christianity (KNBS, 2020). The urban part of Uasin Gishu, which is mostly the town of Eldoret, is multi-cultural and multi-religious and less agriculture is practised. These urban centres provide the main market for agricultural produce.

Last, almost a third of the research participants (30%) indicated that farming was their sole source of income. The remaining 112 (70%) had other sources of income, of which a greater percentage (83%) were engaged in off-farm work such as transport and retail, 12 (10.7%) were working in the civil services (especially health and administration), and 7 (6.3%) were teachers in either primary or secondary school.

5.1.2 Profile of the participants' farms

Participants were asked to provide basic information on the physical and economic characteristics of their farms and farming. These characteristics were important for determining farm output and covered farm size (acres), number of livestock, type of farming, number of employees, monthly farm income, and market destination of farm produce. Table 5.2 summarises these statistics.

Farm size ranged between one and 200 acres (Mean 21.15, SD 10.71 acres). Almost a third of participants reported that they farmed between 2 and 5 acres, 37 (24.7%) farmed less than two acres, and 19% farmed between 6 and 10 acres. Only 13 (8.6%) participants had farms greater than 20 acres. According to the County Government of Uasin Gishu (2018) integrated plan, the

average farm size in the county ranges from 4.94 to 24.71 acres for small-scale farming and 123.5 acres and above for large-scale farming.

Table 5:2: Demographic characteristics of farms of survey participants

Variable	Categories	Frequency	Percentage (%)
Farm size (acres) (N=152)	Less than 2 acres	45	28
	2–5 acres	49	31
	6–10 acres	30	19
	11–20 acres	23	14
	More than 20	13	8
Farm type (N=160)	Maize	114	71
	Sheep	46	29
	Cattle (Dairy)	17	10.6
	Goats	51	31.9
	Other	46	28.8
Farm animals (No.) (N=86)	0–5	45	45.9
	6–10	31	31.6
	11–15	7	7.1
	16–20	4	4.1
	Above 20	11	11.2
Full-time farm employees (N=49)	One full-time worker	23	14.4
	Two full-time workers	15	9.4
	Three full-time workers	3	1.9
	More than four full-time workers	8	5.0
Monthly farm income (N=151)	KES 0–20,000	82	54.3
	KES 20,001–40,000	23	46.9
	KES 40,001–60,000	15	30.6
	KES 60,001–100,000	3	6.1
	KES More than 100,000	8	16.3
Market destination (N=155)	Informal market	37	23.9
	Formal market	41	26.5
	Both formal and informal markets	77	49.7

In terms of agricultural land use, the majority of participants (88%) reported that they were engaged in maize production. This finding is similar to the 2019 national census, which showed 80% of farming households in Kenya engage in maize farming, which is slightly lower than for Uasin Gishu County, where 89% of farmers are maize farmers (KNBS, 2019). The second main type of agricultural production was dairy farming (55%), and other livestock production included sheep, goats, pigs, and poultry, with just over half (55%) rearing cattle, goats or sheep. In terms of the number of farm animals, 45.9% of the farmers had between 1 and 5 animals

(Mean 11.15 animals, SD 6.15 animals), 32% had 6 to 10 animals, 7 (7.1%) reared 11 to 15 animals, and slightly more than 11% had more than 20 animals. These findings are similar to the 2019 national census statistics that revealed that 71% of farmers in Kenya raise cattle, 27% raise sheep, and 40% are goat producers (KNBS, 2019). The 2019 national census indicates that in Uasin Gishu County, 86% of farmers rear cattle, 42% are sheep farmers, and only 6% rear goats.

Regarding farm labour, slightly more than two-thirds of participants (69.4%) indicated that they did not have any full-time farm workers but usually engage casual farm workers during peak farm activities. Of those with full-time employees, 46.9% reported that they had one full-time farm worker and 30.6% had full-time farm employees. Only three participants had three full-time farm workers, and eight farmers had more than four full-time farm labourers. Dairy farmers (51%) and large-scale crop farmers (90%) were more likely to have full-time employees. Regarding farm income, 54.1% of participants indicated that their monthly farm income ranged between KES 0 and 20,000, 44 (29.1%) reported a farm income ranging between KES 20,001 and 40,000, and 10 (6.6%) participants received between KES 40,001 and 60,000 income. Only four (6%) of the participants earned more than KES 100,000.

Last, when participants were asked to indicate where they sell their farm produce, almost half of the survey participants (49.75%) indicated that they sell in both formal or informal markets, 41 (26.5%) sell mostly to formal markets, and 37 (23.9%) sell their farm produce to informal markets. As described in Chapter 2, the majority of Kenyan farmers are small-scale farmers who practise farming primarily for domestic food production and have some surplus for commercial purposes. Informal markets for farm produce include livestock agents, grain traders, neighbours, butchers, and local hotels. Formal markets are mostly government or private grain millers, milk processors, schools, and hospitals; however, formal markets mostly

cater for large-scale farmers. A large portion of farm produce is sold informally. The following section presents the study findings with regard to agri-food safety and agri-food safety regulations.

5.2 Perceptions of agri-food safety, agri-food safety regulations, and farmers' compliance in Kenya

This section presents the findings for the first objective of the study, which was to examine the perceptions and opinions of farmers in Kenya on agri-food safety, agri-food safety regulations, and farmers' compliance. This section has three sub-sections. The first sub-section presents participants' opinions about agri-food safety, the second sub-section covers opinions regarding agri-food safety regulations, and the last sub-section provides data on the perceptions of participants of farmers' compliance with agri-food safety regulations.

5.2.1 Perceptions of agri-food safety and agri-food safety hazards

Farmers' compliance with agri-food safety regulations depends on how they perceive the problem of agri-food safet bny. Accordingly, three questions were posed to participants. The first centred on the general perception of farmers about agri-food safety, the second focused on the opinion of farmers on the threats posed by the six major agri-food safety hazards, and the third question was on perceptions of food poisoning.

5.2.1.1 Perceptions of agri-food safety

Participants' subjective opinions about agri-food were elicited in three steps. First, participants were asked what they thought were the best things about Uasin Gishu County. Second, they were asked what they thought were the major challenges or problems for agricultural production in Uasin Gishu County and Kenya at large. Third, they were asked to rank these challenges in order of severity starting with the most severe to the least severe.

As shown in Figure 5.1, the main qualities about Uasin Gishu County identified by the participants were good climate (68%), good quality land, soil, and topography (31%), and ready markets for farm produce (19%). Other qualities mentioned were good people and peace in their community (8%) and good roads (3%). Surprisingly, safe and quality food was not mentioned as one of the good things about Uasin Gishu County.

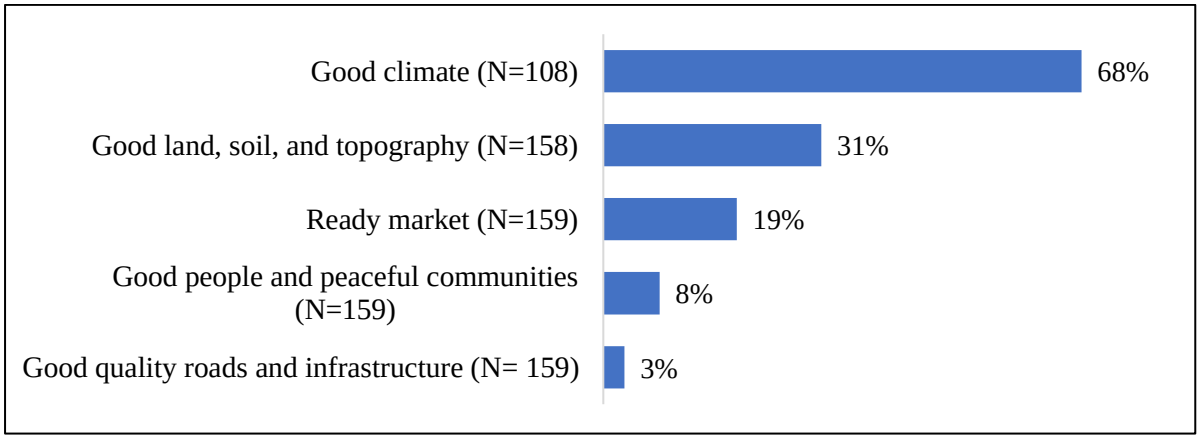

Figure 5:1: Participants' opinions on the positive qualities of Uasin Gishu County

Furthermore, the results from the survey revealed that the major challenges of the agricultural sector in Kenya involve market volatility, especially price fluctuations (identified by 75.6% of participants), and the least difficult challenge was considered to be competition in the marketplace (11.9%). The cost of production was mentioned by 68.8% of the participants, while lack of government support was identified by 51.3%. Another challenge impacting on the agricultural sector in Kenya is pests and diseases (35%). Food safety as a challenge to the agricultural sector in Kenya was mentioned by 39.4% of survey participants (Figure 5.2). However, 25 participants (15.6%) indicated that food safety is not a challenge for their farming operation. Interestingly, almost half (45%) of the survey participants had no opinion on whether agri-food safety was a challenge to farming.

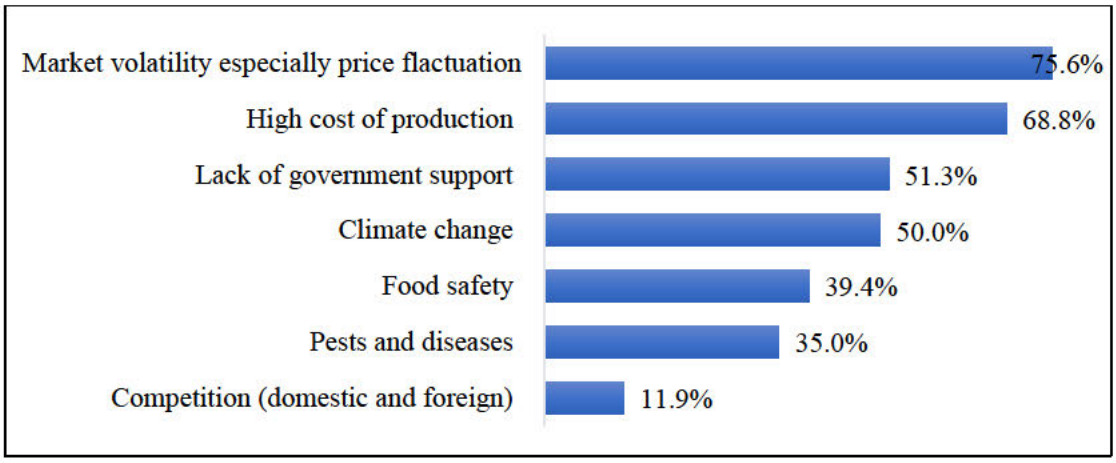

Figure 5:2: Perceived challenges facing agriculture in Uasin Gishu County

When participants were asked to rank the challenges in order of severity, the results were varied. Marketing and pricing of farm produce was considered the most challenging issue and competition (whether domestic or foreign) was considered the least challenging. Other challenges were the cost of production (35%), climate and weather (31%), lack of government support (26%), and pests and disease (26%). The phenomenon under study, food safety, was second last (14%). Figure 5.3 summarises the findings of participants' ranking of agricultural challenges in Uasin Gishu County.

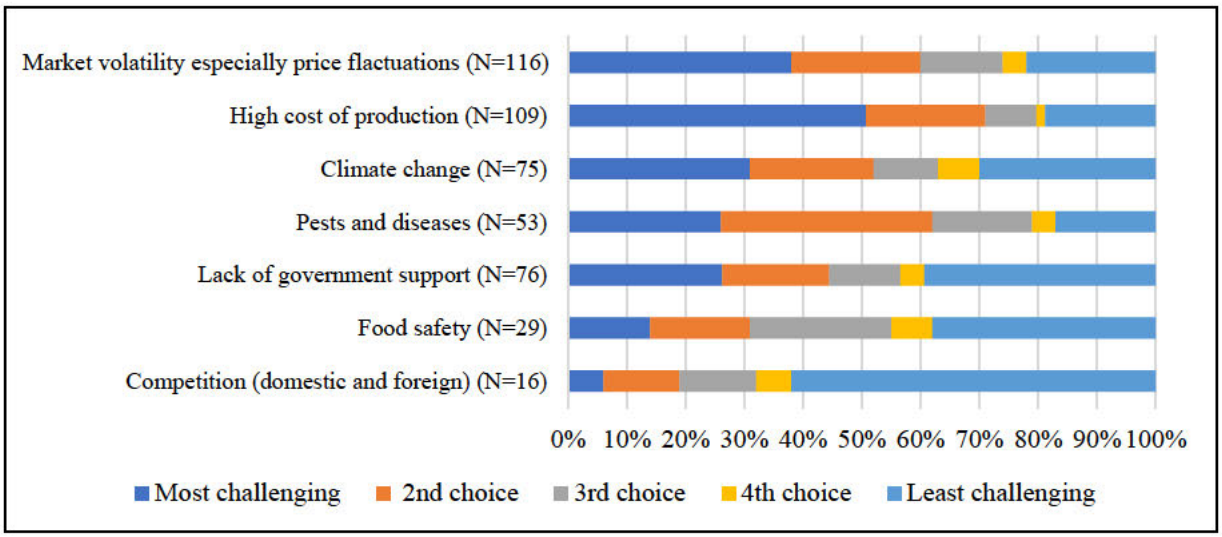

Figure 5:3: Participants' ranking of farming challenges in Uasin Gishu County

Cross tabulations were conducted to understand the interrelationship between farm size and perceptions of agri-food. Table 5.3 summarises the results, which revealed that opinion on agri-food safety increased with farm size: 65.1% of participants with less than 2 acres had no

opinion on whether agri-food safety is a challenge to farming compared to 60.9% of participants who farmed 11-20 acres considering food safety to be a challenge to the agricultural sector.

Table 5:3: Farm size and farmers' perceptions of agri-food safety as agriculture challenge

Farm size (acres)	Perceptions of agri-food safety as agriculture challenge			
	No opinion	**Yes**	**No**	**Total**
Less than 2	28 (65.1%)	12 (27.9%)	3 (7.0%)	43 (100%)
2–5	25 (49.0%)	22 (43.1%)	4 (7.8%)	51 (100%
6–10	12 (40.0%)	9 (30.0%)	9 (30.0%)	30 (100%)
11–20	3 (13.0%)	14 (60.9%)	6 (26.1%)	23 (100%)
More than 20	4 (30.8%)	6 (46.2%)	3 (23.1%)	13 (100%)
Total	**72 (45.0%)**	**63 (39.4%)**	**25 (15.6%)**	**160 (100%)**

Given that small-scale farmers make up the largest percentage of farmers in Kenya, these results confirm that the government needs to focus their efforts on supporting these farmers to improve agri-food safety and livelihoods. Concern for agri-food safety is growing with globalisation, so small-scale farmers need to be supported to improve food safety, secure livelihoods, and promote economic development.

5.2.1.2 Perceptions of the threat of agri-food hazards

Participants were asked to rate the threat of six agri-food hazards in Kenya (i.e., the misuse of farm chemicals, the use of contaminated water, the use of rotten maize as animal feed, the sale of contaminated farm produce, the use of chemical containers for storing milk, and the application of manure as fertiliser on crops) on a 4-point Likert scale ranging from Not threatening (1) to Very threatening (4). However, for the purpose of analysis and presentation, the scales were reduced to three categories. The 'Threatening' and 'Very threatening' responses were combined and 'Neutral' and 'Not threatening' were maintained. The rationale for combining some responses was to facilitate interpretation. Table 5.4 summarises the statistics for participants' perceptions of the threat of agri-food hazards.

Table 5:4: Perceptions of the threat of agri-food hazards

Agri-food safety hazards	Mean	SD	Not very threatening	Neutral	Very threatening
Misuse of farm chemicals	2.83	0.94	14%	10%	76%
Use of contaminated water	2.53	1.08	28%	11%	62%
Rotten maize as feed	3.07	1.03	14%	9%	78%
Sale of livestock that do not meet health requirements	3.46	0.84	6%	4%	90%
Re-use of chemical containers	3.01	1.13	17%	8%	75%
Manure as fertiliser	2.43	0.99	18%	41%	41%
Average	**2.89**	**1.00**	**16%**	**14%**	**70%**

*N = 160
** Percentages of some of the responses do not add to 100% due to rounding

As shown in Table 5.4, most participants (90%) rated the sale of contaminated farm produce, especially sick livestock, as a threat to agri-food safety. Others rated the misuse of farm chemicals (76%), the use of rotten maize as animal feed (78%), the re-use of chemical containers for food storage (75%), and contaminated water (62%) as threats to agri-food safety. Less than half (41%) of the participants thought that manure was a threat to agri-food safety. The mean score of all the participants' perceptions of agri-food safety concerns was varied, with the lowest being 2.43 and the highest 3.46. The overall mean score was 2.89, suggesting that participants viewed these agri-food issues as threats to food safety.

5.2.1.3 Perception of food poisoning and contamination

This sub-section presents the results of participants' reports of incidences of agri-food poisoning in the previous two years in the study area. Community members' perception and reactions to these incidents affect how they would respond to a similar problem in the future. Forty-six (30%) of survey participants indicated their awareness that incidents of food poisoning and contamination had occurred within the preceding two years, and 114 (70%) participants indicated that there had been no food poisoning incidents during that period in the study area. Of the food poisoning incidents that had occurred, only four were directly linked to

the way crops are grown or farm animals are fed. All the other food poisoning incidents (42) were linked to how farm produce was handled, prepared, and cooked. For example, participants blamed the unhygienic handling of the slaughtering of livestock as the main cause of food poisoning. Further, 31% of food poisoning incidents were directly linked to the consumption of contaminated food in community celebrations such as weddings and funerals, while the remaining incidents were not linked to any event.

Of the 46 food poisoning incidents, 39.1% were related to the consumption of contaminated meat, 19.6% to contaminated vegetables, and 4.3% to rotten maize. The remaining 37% were not traced to any particular food. Participants cited the failure of farmers to follow information on labels in the application of farm chemicals and the wilful sale of contaminated farm produce, especially sick animals and vegetables where the pre-harvest or withdrawal period was ignored, as the major causes of agri-food poisoning. Figure 5.4 shows these statistics.

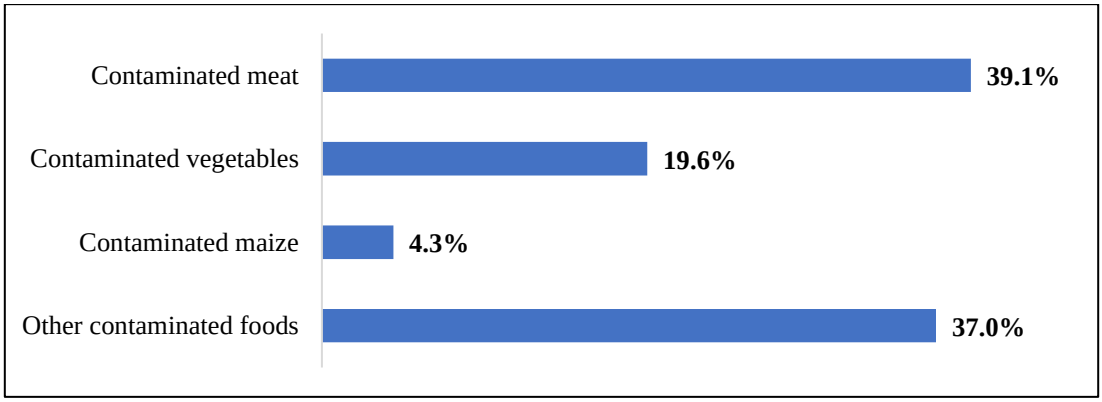

Figure 5:4: Participants' opinions on the sources of food poisoning (N=46)

When participants were asked about food poisoning incidents in the previous two years, almost half (48.8%) indicated that poisoning occurred sometimes, while 15 (34.9%) maintained food poisoning rarely occurred, and 14% believed that incidences of food poisoning usually occur.

5.2.2 Perception of agri-food safety regulations

Four questions examined participants' perceptions of farmers' knowledge and awareness of agri-food safety regulations in Kenya. The first question focused on the general awareness of specific agri-food safety regulations, the second question was about farmers' level of understanding of agri-food safety law, and the third question asked participants which agri-food safety regulations they thought were necessary and fair. The last question sought the opinion of the farmers on the clarity and relevance of agri-food safety regulations.

5.2.2.1 Participants' perceptions of other farmers' level of understanding of agri-food safety regulations

Slightly more than half of the participants (50.6%) believed that farmers are fairly knowledgeable about agri-food safety regulations, 67 (41.9%) believed that farmers lack knowledge of agri-food safety regulations, and only 12 (7.5%) thought farmers are very knowledgeable about these regulations. Cross tabulations were conducted to explore whether the perceptions of farmers' level of understanding of agri-food safety regulations was associated with the education background and age of the participants. Tables 5.5 and 5.6 summarise the findings.

Table 5:5: Education background and farmers' level of understanding of agri-food safety regulations

Education background	Farmers' level of understanding of agri-food safety regulations			
	Very Knowledgeable	Fairly Knowledgeable	Not very Knowledgeable	Total*
Not gone to school	2 (40%)	0 (0%)	3 (60%)	5 (100%)
Primary school completed	1 (2%)	19 (41%)	26 (57%)	46 (100%)
Secondary school completed	5 (7%)	43 (62%)	21 (30%)	69 (100%)
Completing/completed an undergraduate university course or equivalent	4 (10%)	19 (48%)	17 (43%)	40 (100%)
Total	**12 (8%)**	**81 (51%)**	**67 (42%)**	**160(100%*)**

* Percentages do not add to 100% due to rounding

Table 5:6: Age and farmers' level of understanding of agri-food safety regulations

Age	Farmers' level of understanding of agri-food safety regulations			
	Very knowledgeable	Fairly knowledgeable	Not very knowledgeable	Total*
20–29	0 (0%)	10 (63%)	6 (38%)	16 (100%)
30–39	1 (3%)	20 (50%)	19 (48%)	40 (100%
40–49	5 (9%)	30 (56%)	19 (35%)	54 (100%)
50–59	2 (6%)	17 (53%)	13 (41%)	32 (100%)
60 and above	4 (24%)	2 (18%)	10 (59%)	17 (100%)
Total	**12 (8%)**	**80 (50%)**	**67 (42%)**	**153 (100%*)**

* Percentages do not add to 100% due to rounding

The results revealed participants with post-secondary qualifications were inclined to think that farmers were fairly knowledgeable about agri-food safety regulations (62%), while 57% of participants who had studied to primary school level thought farmers were not knowledgeable about these regulations in Kenya. In terms of age, more than half of the participants aged less than 60 years thought Kenyan farmers were fairly knowledge about agri-food safety regulations, and 59% of participants aged 60 years and above were inclined to think elderly farmers were not very knowledgeable of agri-food safety regulations in Kenya. These findings indicate that the younger and more educated the participants, the more positive they were about Kenyan farmers' knowledge about agri-food safety regulations.

5.2.2.2 Participants' awareness of agri-food safety regulations

Closed-ended questions measured farmers' awareness of specific agri-food safety regulations. Specific regulations were simplified with wording such as 'milk law' to allow participants to recall or understand the law about which they were being asked. As shown in Figure 5.5, the results showed variations in Uasin Gishu County farmers' level of awareness of different regulations. While some claimed a high level of awareness of some regulations, others indicated low awareness of other regulations. A high proportion of participants indicated awareness of agri-food safety regulations on milk processing (78%) and the use of farm

chemicals and drugs (59%), and almost half of participants (48%) were aware of regulations on the handling of carcasses and dead and sick livestock. Forty-six percent were aware of regulations dealing with the use of fertilisers and animal feed, and 29% of participants were aware of farm produce transportation and storage safety regulations.

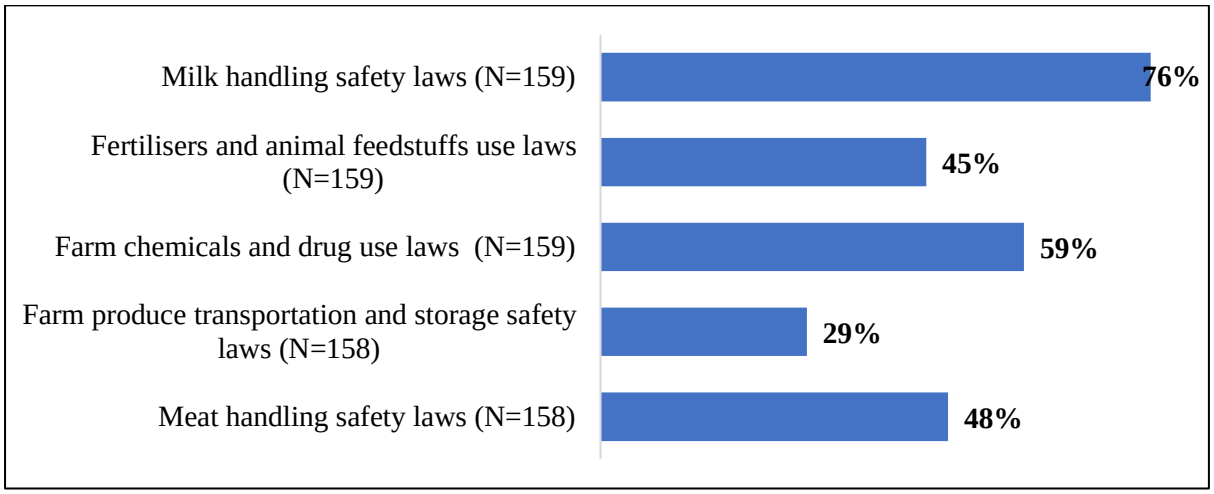

Figure 5:5: Farmers' level of awareness of different agri-food safety regulations in Kenya

Participants traced farmers' awareness of milk safety regulations to strict enforcement of regulations by the milk regulator (i.e., Kenya Dairy Board), aggressive public education campaigns, and intense informal and formal training for farmers, which had raised farmers' awareness of the usefulness of these regulations. The public education training provided by the Kenya Dairy Board is either annual or on-going, and it mostly targets farmers, consumers, and milk traders. Some of the on-going methods used to educate the public on milk regulations and the impact of non-compliance include training in group settings, the delivery of food safety information via formal milk buyers, and educational advertising via television and radio. At the time of data collection, there was an active campaign on national television and radio stations by the Kenya Dairy Board, and many farmers referred to this promotion. Regarding annual training, the milk regulator usually participates in agricultural shows and field days, which gives them an opportunity to educate the public, especially farmers and consumers, on the importance of complying with agri-food safety regulations.

Cross tabulations were carried out to understand the effect of participants' age and education level on their perceptions of farmers' awareness of different agri-food safety regulations. Tables 5.7 and 5.8 summarise the results. Participants with post-secondary school qualifications were more likely than those with no formal education to be aware of the different agri-food safety regulations. In terms of age, younger participants (aged between 30 and 49 years) were more likely than older participants (aged 50 years and above) to be aware of the different agri-food safety regulations.

Table 5:7: Education background and participants' level of awareness of different agri-food safety regulations in Kenya

Education background	Milk safety regulations	Meat safety regulations	Farm produce transportation and storage safety regulations	Farm chemicals and drug use regulations	Fertilisers and animal feedstuffs use regulations
Never gone to school	3 (2%)	2 (3%)	2 (4%)	3 (3%)	3 (4%)
Primary school completed	31 (25%)	11 (24%)	11 (24%)	25 (27%)	20 (27%)
Secondary school completed	60 (48%)	23 (51%)	23 (51%)	43 (46%)	31 (42%)
Completing/completed an undergraduate university course or equivalent	31 (25%)	17 (22%)	9 (20%)	23 (24%)	19 (26%)
Total*	**125 (100%)**	**76 (100%)**	**45 (100%)**	**94 (100%)**	**73 (100%)**

*Some percentages do not add to 100% due to rounding

Table 5:8: Age and participants' level of awareness of different agri-food safety regulations in Kenya

Age (years)	Milk safety regulations	Meat safety regulations	Farm produce transportation and storage safety regulations	Farm chemicals and drug use regulations	Fertilisers and animal feedstuffs use regulations
20–29	10 (8%)	4 (5%)	2 (4%)	11 (12%)	8 (11%)
30–39	30 (24%)	12 (16%)	9 (20%)	23 (24%)	19 (26%)
40–49	44 (35%)	31 (41%)	17 (38%)	30 (32%)	25 (34%)
50–59	29 (23%)	18 (24%)	8 (18%)	19 (20%)	13 (18%)
60+	12 (10%)	11 (14%)	9 (20%)	11 (12%)	8 (11%)
Total*	**125 (100%)**	**76 (100%)**	**45 (100%)**	**94 (100%)**	**71 (100%)**

*Some percentages do not add to 100% due to rounding

Participants were also asked if agri-food safety regulations were necessary, current, and fair. Most participants (91.9%) agreed that the agri-food safety regulations are necessary but only

37.5% thought that these regulations are fair. Furthermore, when participants were asked to identify the agri-food safety regulations that appealed most to them, 60% mentioned the regulations on safe handling of milk. The reasons for the high endorsement of regulations in this area included the aggressive enforcement and education by the milk regulator in Kenya (i.e., Kenya Dairy Board).

Survey participants were also asked to rate four statements regarding the clarity, understandability, relevance, and certainty of agri-food safety regulations in Kenya on a 5-point Likert scale: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Disagree. For the purposes of analysis and presentation, these scales were reduced to three categories. The responses for Strongly Disagree and Disagree were combined, and the responses for Strongly Agree and Agree were combined. Neutral was retained to enhance clarity in reporting. As shown in Table 5.9, 44% of participants agreed that agri-food safety regulations were clear and understandable, 40% agreed that farmers had easy access to information about food safety laws, and 36% believed that farmers are uncertain about future regulations. Less than a quarter (23%) of participants believed that agri-food safety regulations are outdated and no longer appropriate.

Table 5:9: Perceptions of agri-food safety regulations

Perceptions of regulations	Mean	SD	Strongly disagree/ disagree	Neutral	Strongly agree/agree
These laws are very clear and understandable.	2.88	1.27	38%	18%	44%
These laws are outdated and are no longer appropriate.	2.71	1.29	39%	38%	23%
Farmers have easy access to information about food safety laws.	2.71	1.02	46%	14%	40%
Farmers feel uncertain about future regulatory restriction.	3.13	0.93	20%	44%	36%
Average	**2.86**	**1.13**	**36%**	**29%**	**36%**

*N = 160
** Percentages of some of the responses do not add to 100% due to rounding

5.2.3. Perceptions of compliance and enforcement of agri-food safety regulations

This section focuses on farmers' perceptions of the seriousness of non-compliance with agri-food safety regulations. Understanding the perception of seriousness is crucial to understanding non-compliance by farmers. Participants were presented with four questions. The first question asked whether there was pressure on farmers to comply with agri-food safety regulations in Kenya, the second question focused on the opinion of the participant regarding the compliance levels of farmers, the third sought participants' overall perception of the degree of seriousness of non-compliance with agri-food safety law, and the last question focused on the participants' opinions on the likelihood of punishment for non-compliance.

5.2.3.1 Perceptions of compliance with agri-food safety compliance

Of the participants, 42.8% believed that farmers rarely comply with agri-food safety regulations, 64 (40.2%) indicated that farmers sometimes comply, and 11% believed that farmers never comply with agri-food safety regulations. Only 6% thought that farmers usually comply with agri-food safety regulations. Participants were also asked to rate the seriousness of non-compliance. The degree of seriousness of non-compliance was measured on a 5-point scale: Very serious, Serious, Don't know, Somehow serious, and Not serious. As shown in Figure 5.6, 41.3% and 36.9% of participants believed that non-compliance with agri-food safety regulations is a serious or very serious problem, respectively, in Kenya, 17 participants (10.6%) believed that non-compliance with agri-food safety regulations is somewhat serious, and only 12 participants (7.5%) believed that non-compliance with agri-food safety regulations in Kenya is not serious.

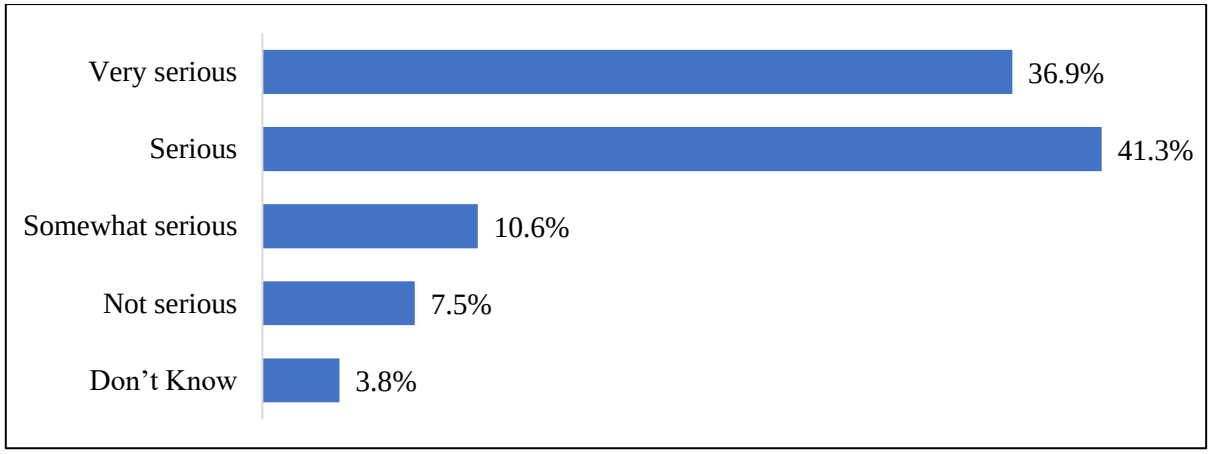

Figure 5:6: Perceived seriousness of non-compliance with agri-food safety regulations (N=160)

5.2.3.2 Perceptions of enforcement of agri-food safety regulations

The level of regulatory enforcement and severity of punishment for non-compliance does influence the way farmers respond to regulations. Lack of enforcement and weak regulations can foster non-compliance. To assess the opinion of farmers on these important deterrent measures, two questions were asked. The first question asked participants about pressure on farmers to comply with regulations, and the second sought participants' opinions on the likelihood of a farmer being punished for violating agri-food safety regulations in Kenya.

Overall, the majority of participants (80%) indicated that there was no pressure for farmers to comply, which indicates that enforcement of regulations is weak or lacking. The second question was assessed on a 5-point Likert scale ranging from Extremely likely to Extremely unlikely. Of all the participants sampled, 45% indicated that it was unlikely for farmers to be penalised if found to be non-compliant, 19% thought that it was extremely unlikely for farmers to be penalised if found to be non-compliant, 16% believed that it was somewhat unlikely, 12% believed it was somewhat likely, and 8% noted that it was extremely likely that offenders would be punished. Figure 5.7 summarises the participants' responses regarding the likelihood of punishment if a farmer is found violating agri-food safety regulations.

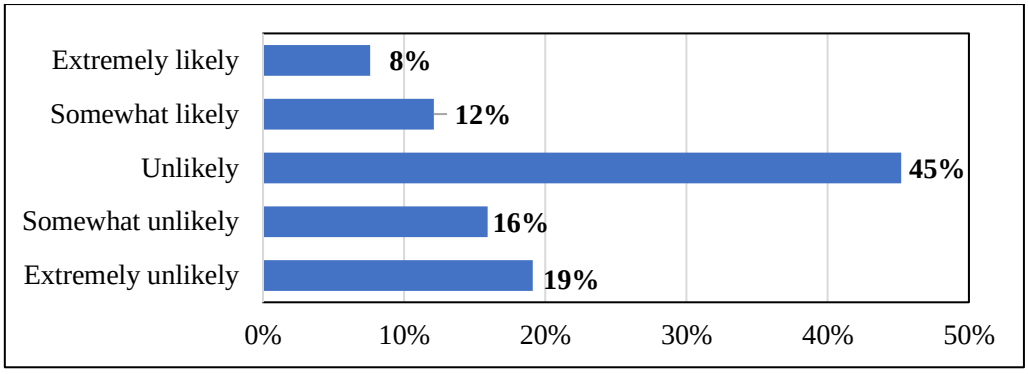

Figure 5:7: Perceived likelihood of farmer being penalised if detected being non-compliant (N=148)

5.3 Factors that influence farmers' compliance with agri-food safety regulations

This section presents the results of the second objective of the study that investigated factors that impede or facilitate non-compliance with agri-food safety regulations by farmers. Drawing on the regulatory compliance literature, especially that focusing on agricultural regulations, two open-ended questions were posed to participants: *What are the barriers to compliance with agri-food safety regulations among farmers?* and *What factors, in your opinion, do you think encourage compliance with agri-food safety laws among farmers?*

As shown in Table 5.10, the main factor identified by 58.8% of survey participants as influencing compliance with agri-food safety regulations is provision of information, extension services, and training to farmers about agri-food safety and agri-food safety regulations. A similar number of survey participants (76; 48%) believed that awareness of the law and legitimacy of those regulations are the top factors that influence compliance among farmers. However, 38 (23.8%) survey participants maintained that personal morals influence farmers' compliance with agri-food safety law.

Table 5:10: Drivers of agri-food safety compliance

Factors	Frequency	Percentage
Cost-benefit analysis	55	34.4
Financial benefit of compliance	29	19
Compliance costs	5	3
Financial ability	49	31
Deterrence	50	31.4
Risk of detection	29	19
Severity of punishment	34	21
Social norms	44	27.5
Awareness of law	76	47.8
Lack of information, extension services, and training	94	58.8
Legitimacy	76	47.8
Personal values	38	23.8

Fifty-five participants (34.4%) claimed that farmers carry out a rational calculation of the costs and benefits of compliance. Of these, 31% blamed financial stress, especially poverty, for non-compliance, 19% cited the perceived benefit of non-compliance, and five survey participants (3%) added that compliance costs discouraged farmers from complying with agri-food safety regulations. With regard to deterrence measures, 31.4% of the participants thought deterrence measures contribute to compliance, of which 19% cited the high risk of detection and 21% believed that the threat of severe punishment encourages farmers to comply with agri-food safety regulations. Last, 44 survey participants (27.5%) claimed that social norms contribute to the way farmers make decisions regarding compliance with agri-food safety regulations.

Applying a goal framing approach, almost two-thirds of participants (66.9%) believed that farmers comply with agri-food safety regulations when there is economic gain (gain goal), and almost all participants (92.5%) claimed that the normative goal of acting appropriately (i.e., social norms) influences agri-food safety compliance. Last, almost half of the participants (48.1%) indicated that hedonic goals affect how farmers respond to agri-food safety regulations.

5.4 Strategies to improve compliance with agri-food safety regulations in Kenya

This section presents the findings for the third objective of the study, which was to recommend how compliance with agri-food safety regulations can be improved in Kenya. Participants were asked three questions. The first question asked their opinion on what improvements could be made in the design or implementation of agri-food safety regulations, the second question sought participants' opinions on the most appropriate intervention for enhancing food safety among farmers, and the last question asked participants their opinion on who should have the primary responsibility for implementing agri-food safety regulations in Kenya.

Concerning the first question, more than half of the participants (63.1%) believed that farmers' compliance with agri-food safety regulations in Kenya could be increased by changing the way the regulations are implemented and enforced, 19.4% indicated that more effort should focus on how regulations are designed, and 28 participants (17.5%) expressed no opinion on whether improvements in the design and implementation of agri-food safety regulations could enhance farmers' compliance.

When participants were asked about the intervention approach that could deliver the best results in enhancing farmers' compliance with agri-food safety regulations, more than half (59.4%) indicated a collaborative approach involving farmers, government, and consumers, 33 (20.6%) thought that the best strategy that would enhance farmers' compliance would be for government to take the lead, and 18 (11.3%) believed that voluntary intervention is the best approach for improving compliance among farmers. Only three participants (1.9%) thought that market-driven strategies such as price premiums for farm produce from farmers who have complied with regulations would be the best strategy to improve farmers' compliance with agri-food safety regulations. Table 5.11 presents participants' responses to this question.

Table 5:11: Suggested methods of implementing agri-food safety regulations in Kenya

Methods of intervention	Frequency	Percent
Collaborative approach (farmers, government, and market forces)	95	59.4
Government-driven approach	33	20.6
Voluntary approach (farmer-driven)	18	11.3
Market-driven approach (consumer-driven)	3	1.9
Other approaches	10	6.3
Total	**160**	**100.0**

Participants were also asked which group in society should have primary responsibility for agri-food safety regulations in Kenya. Sixty-six participants (41.3%) believed that it should be everyone's responsibility, slightly more than 30% reported that farmer cooperatives should take the lead, 36 (22.5%) believed that the government should be primarily responsible, and only 2.5% reported that food safety pressure groups [11] should have primary responsibility for the management of agri-food safety regulations. Five participants observed that other organisations such as non-government organisations should have the primary responsibility for agri-food safety regulations. Table 5.12 summarises these statistics.

Table 5:12: Who should have the primary responsibility for agri-food safety regulation

Primary responsibility	Frequency	Percent
Everyone	66	41.3
Farmer cooperatives	49	30.6
Government	36	22.5
Food safety groups	4	2.5
Others i.e., non-government organisations	5	3.1
Total	**160**	**100.0**

Overall, these survey findings reveal that more effort needs to be channelled into improving the way regulations are implemented and enforced. They also suggest that improving food

[11]Pressure groups are organisations that subscribe to a specific public issue or cause such as workers welfare, consumer protection, environmental conservation or animal welfare (Balyer & Tabancalı, 2019; Givarian, 2016). They pursue their cause by pressuring government to adopt a certain direction that is in line with their interests. They are sometimes referred to as Civil Society Organisations. In this study, participants referred to trade unions and farming associations.

safety behaviour among farmers requires the collective responsibility of all stakeholders in the agri-food chain, including farm input suppliers, farmers, food traders, consumers, and government. Thus, government should devise compliance strategies that target different stakeholders and that will ultimately improve farmers' compliance with agri-food safety regulations.

5.5 Hypothesis testing

The main objective of this study was to investigate the factors that shape farmers' compliance with agri-food safety regulations in order to identify strategies for improving compliance. This was achieved through the conceptual model in Figure 3.2 and the subsequent research hypotheses developed in Chapter 3.

The following hypotheses were tested for this section.

Hypothesis 1: There is a positive relationship between rational calculation of the costs and benefits of compliance and farmers' compliance with agri-food regulations.

Hypothesis 2: Deterrence is positively related to farmers' compliance with agri-food regulations.

Hypothesis 3a: Perceptions of agri-food safety regulations as being simple and understandable have a positive effect on agri-food safety regulatory compliance.

Hypothesis 3b: The more negative the perception of the regulator by farmers, the higher the likelihood of farmers' non-compliance with agri-food safety.

Hypothesis 4: Social norms that drive behaviour that is contrary to formal agri-food safety regulation requirements have a negative relationship with farmers' compliance.

Hypothesis 5: There is a positive association between awareness of law, as a normative factor, and compliance with agri-food safety regulations.

Hypothesis 6: There is a positive association between the provision of information, extension services, and training for farmers, as a normative factor, and compliance with agri-food safety regulations.

Hypothesis 7: Personal values have a positive relationship with agri-food safety regulation compliance.

To test the hypotheses, a hierarchical regression analysis was conducted that predicated agri-food safety compliance from 13 explanatory variables. In order to improve reliability and obtain meaningful scores for testing the hypotheses, the response to the questions on factors that influence compliance was reverse coded so that the higher values reflected a more favourable approach to non-compliance. The independent variables were selected based on the stated hypotheses, the literature reviewed, and the theoretical frameworks that guided this study. The descriptive statistics of these variables are presented in Sections 5.1, 5.2, and 5.3. Tests of the relevant assumptions (i.e., normality, linearity, and multi-collinearity) revealed that all requirements had been satisfied. Appendices 9, 10, and 11 summarise the statistics from testing the assumptions for the explanatory and dependent variables. The demographic factors were employed as control variables and were the first set to be entered into the hierarchical regression model. They were gender, age, level of education, religious status, and farming experience.

The variables were entered into the regression model in the following order. Demographics were entered first and the gain variables, comprising the costs and benefits of compliance and deterrence (risk of detection and severity of punishment), were entered in the second step. The normative variables comprised step three. This order was based on the literature reviewed and the theoretical frameworks that guided this study. The regression results are summarised in Table 5.13.

Table 5:13: Summary of hierarchical regression analysis for variables predicting agri-food safety compliance

Variables	Model 1 β	Model 2 β	Model 3 β
Demographic factors			
Gender	0.046	0.052	0.047
Age	-0.054	-0.022	0.012
Education background	0.037	0.071	0.040
Religious status	-0.086	0.010	0.046
Farming experience	-0.009	-0.017	0.009
Gain goal			
Cost-benefit analysis		0.131	0.151
Deterrence		0.318*	0.274*
Normative goal			
Social norms			-0.020
Awareness of law			0.146
Information, extension services, and training			0.279*
Perceptions of regulator			0.009
Perceptions of regulations			0.195***
Hedonic goal			
Personal values			0.088
R	0.118	0.254	0.451
R2	0.014	0.065	0.203
Adjusted R2	0.000	0.018	0.125
R2 change	0.014	0.051	0.138
F change	0.405	1.383	2.594
Significant	0.119	0.217	0.003

Model 1: Demographic factors
Model 2: Demographic factors+ gain goal
Model 3: Demographic factors+ gain goal+ normative goal + hedonic goal
*p<.05; **p<.01; ***p<.001

In the first regression analysis, all the demographic factors were not significant. These factors accounted for 1.4% (R^2 = 0.014, adjusted R^2 = 0.000, F statistics = 0.405) of variance in agri-food safety compliance. When the gain variables were introduced in Model 2, a significant main effect was observed for deterrence (β = 0.318, p <0.05), indicating that compliance increased as risks of detection and severity of punishment increased. The cost-benefit of

compliance or violation of law was not significant. Therefore, Hypothesis 2, which predicted that deterrence is positively related to compliance with agri-food regulations, is accepted but Hypothesis 1, which is related to the rational calculation of benefits and costs of compliance, is rejected. Cumulatively, gain and demographic factors explained 6.5% of the variance in agri-food safety regulation compliance ($R^2 = 0.065$, adjusted $R^2 = 0.018$, F statistics = 1.383).

When the normative and hedonic factors were added to the regression analysis in the third step of the hierarchical regression analysis, variance increased by 13.8 % ($R^2 = 0.208$, adjusted $R^2 = 0.018$, F = 2.674). Two normative factors were significant predictors of agri-food safety compliance. First, farmer extension services and training ($\beta = 0.274$, $p < .05$) had a positive effect on farmers' compliance levels and decision-making behaviour, which means Hypothesis 5, which predicted that the closer the extension officers or food safety inspectors work with the farmers, the higher the agri-food safety regulatory compliance, is supported. This result shows that persuasive strategies such as training and provision of information can help to secure compliance.

Second, a significant effect was observed that the more the regulations are clear and understandable ($\beta = 0.191$, $p < .05$) the higher the likelihood of compliance. Consequently, Hypothesis 3a, which predicted that perceptions of agri-food safety regulations as being simple and understandable have a positive effect on agri-food safety regulatory compliance, was supported. Overall, the explanatory variables accounted for 20.8% of the variance in agri-food safety regulatory compliance, of which demographic variables accounted for 1.4%, gain factors explained 5.1%, and normative and hedonic variables explained 15.7%.

Table 5.14 below summarises the results of the hypotheses testing. Of the eight hypotheses tested, three were supported and five were not supported. The hypotheses that were supported

by hierarchical regression were those that focused on deterrence, education and training, and perceptions of regulations.

Table 5:14: Summary of hypotheses tested

Hypotheses		p-Value	Results
H1	Cost-benefit analysis → Agri-food safety compliance		Not supported
H2	Deterrence → Agri-food safety compliance	p<.05	Supported
H3	Social norms → Agri-food safety compliance		Not supported
H4	Awareness of law→ Agri-food safety compliance		Not supported
H5	Training and extension service→ Agri-food safety compliance	p<.05	Supported
H6a	Perception of regulations → Agri-food safety compliance	p<.05	Supported
H6b	Perception of regulator → Agri-food safety compliance		Not supported
H7	Personal values→ Agri-food safety compliance		Not supported

5.6 Summary and conclusions

In this chapter the findings regarding perceptions of farmers about agri-food safety, agri-food safety regulation, compliance, and enforcement of agri-food safety regulations in Kenya were presented. The factors that influence farmers to comply or violate agri-food safety regulations in Kenya were also discussed.

The quantitative analyses revealed several interesting findings about Uasin Gishu farmers' perceptions of agri-food safety, agri-food safety regulations, and farmers' compliance with agri-food safety regulations. First, few farmers considered agri-food safety to be a challenge. Perceptions varied with the size of farm operations, with small-scale farmers less likely than large-scale farmers to consider agri-food safety to be a challenge. Second, farmers, especially young farmers (below 60 years) with post-secondary education, were perceived to be fairly knowledgeable about agri-food safety regulations. Further, more farmers were aware of regulations relating to milk safety, meat and farm input than other types of regulations. This applied especially to farmers with post-secondary school education.

The majority of farmers perceived agri-food safety regulations in Kenya as being necessary but few saw them as fair, clear, and understandable. Others were of the view that agri-food safety regulations are outdated and no longer appropriate, while some farmers shared that they have limited access to information on these regulations in Kenya. In terms of farmers' compliance with agri-food safety regulations, many participants reported that farmers rarely comply with agri-food safety regulations and believed that this is a serious concern. The findings also revealed that there is no pressure on farmers to comply with agri-food safety regulations, as the likelihood of farmers being penalised for breaching the regulations is remote. Cumulatively, these findings suggest weaknesses in the implementation and governance of these regulations, and that more effort is required by the government to improve compliance in the region.

Participants identified seven factors that affect agri-food safety compliance in Kenya: the cost of compliance, financial ability, financial benefit of compliance, low risks of detection, lack of punishment, the strength of social norms, and personal values. Other factors identified were legitimacy (i.e., perception of regulations or the regulator as being fair), awareness of the law, and provision of information, training, and extension services for farmers. The regression analyses provided support for three factors that influence farmers' compliance with agri-food safety regulations: deterrent measures, farmers' perception of regulations, and the role of training and extension services for farmers. From a goal framing approach, support was observed for the gain and normative goals while no support was observed for the hedonic goals.

The above findings shed light on agri-food safety practices and regulations and their enforcement and compliance in Kenya. Interestingly, the findings reflect those of farmers from Western nations. The next chapter presents the qualitative findings of two studies that examined the opinions of farmers and other industry insiders in greater depth, with the aim of enriching the quantitative study and further exploring the goal framing theory.

Chapter 6

The Qualitative Findings[12]

6.0 Introduction

This chapter presents the results of the qualitative study that involved focus group discussions with farmers and face-to-face interviews with key stakeholders in the agri-food chain regarding farmers' compliance with agri-food safety regulations. In total, 54 farmers organised in six focus groups [13]and 29 key stakeholders [14] participated in the study. The aims of the qualitative study were twofold: first, to build on the findings from the survey data analysis, and second, to develop a deeper, wider, and complementary perspective of farmers' behaviour regarding agri-food safety and compliance with agri-food safety regulations. Key stakeholders or informants were individuals who are knowledgeable in the field of agri-food safety and related issues (regulations and compliance) and who occupy formal positions of authority in the county in terms of administration of farming issues or trading in farm produce.

The qualitative data were analysed thematically in six stages. The themes and sub-themes were based on the literature, the survey findings, and the theoretical framework that guided the study (i.e., the goal framing theory and the routine activity theory), and were confirmed by the interview data. The themes and sub-themes are illustrated by samples of vivid and compelling quotes from the participants. Additional explanations are added in square brackets to phrases in the participants' quotes that are not clear. Unique identifiers are used to represent focus

[12]Bunei, E. Barclay, E., & Kotey, B. (2021). Routine activity theory and farm produce sale in Kenya: An analysis of non-compliance with agri-food safety laws. *Crime Prevention and Community Safety, 23*, 400–415. https://doi.org/10.1057/s41300-021-00127-9.
[13]See Appendix 6 for interview schedule that was used to collect data from the focus group discussions.
[14]See Appendix 5 for interview schedule that was used to collect data from key informants.

group (FGD#) and in-depth interview (KI#) participants to ensure anonymity and confidentiality.

The chapter has five sections. The next section that presents the findings of the first research question, which was *What are the perceptions, attitudes, and experiences of farmers and industry insiders in terms of agri-food safety, and agri-food safety regulations, regulators and compliance?* The third section reports the findings of research question two, which focused on the economic, socio-cultural, and legal factors that shape farmers' compliance with agri-food safety regulations. The fourth section presents the qualitative findings on changes (or reforms) necessary to improve compliance with agri-food safety regulations, especially with farmers and other key stakeholders in the agri-food chain in Kenya, and the final section concludes the chapter with a summary of the key findings.

6.1 Perceptions of agri-food safety, agri-food safety regulations, and farmers' compliance in Kenya

The findings in this section relate to the first research question, which concerned the opinions of farmers and industry insiders on agri-food safety, agri-food safety regulation, and farmers' compliance.

6.1.1. Perceptions of agri-food safety concerns in Kenya

In the focus group discussions, the challenges cited by the majority of the participants were similar to those identified in the survey. The main challenges cited were climate change, the high of cost of production, the lack of accessible markets, low prices, price fluctuations, and pests and disease. A few participants also mentioned theft of farm produce. One participant remarked the following:

> *We produce but we do not have anywhere to sell. Look, for example, milk, it is ridiculous that the government wants us to produce milk but the price is very low.*

Commercial processors take some time to pay us. The only reliable market where we can get money quickly is informal buyers, especially milk traders. However, their price is not good. (FGD#1)

The main agricultural challenge mentioned by the key informants was government support for farmers (58.6%), and the least cited challenge was poor infrastructure (20.7%). Food safety was the third most cited challenge among key informants (44.8%). This was in contrast to the findings in the survey where food safety was not so prominent. Few focus group participants could identify food safety as a problem in farming. Some linked food safety to problems of post-harvest handling of farm produce, while others thought food safety was a compliance issue. One focus group participant noted:

We know that there is a problem of food safety but somewhat, a little knowledge, like some people do not follow required procedures or laws. (FGD#3)

Participants were asked to identify the main agri-food safety concerns in Uasin Gishu County. The most cited concern was the sale of contaminated farm produce (46% of focus group participants and 52% of key informants). Other concerns were aflatoxin contamination (19% of focus group participants and 34% of key informants), the misuse of chemical containers for storing milk (10% for both focus group participants and key informants), the non-observance of pre-harvest or withholding periods after drug or chemical administration prior to sale of produce (4% of focus group participants and 38% of key informants), and the use of contaminated animal feed (4% of focus group participants and 7% of key informants). These qualitative findings support the quantitative findings presented in Section 5.2.1.2 of Chapter 5.

The sale of sick livestock or stock under medication, commonly referred to by participants as *okoa*, was the most reported violation of agri-food safety regulations (by 17% of focus group participants and 31% of key informants). This was followed by the sale of milk from cows

where the withholding period had not expired after drug or chemical administration (13% of focus group participants and 14% of key informants), the sale of contaminated maize (especially maize with a high level of moisture content and rotten maize) (7% of both focus group participants and key informants), and the sale of vegetables where the pre-harvest period following chemical administration had not elapsed (7% of focus group participants and 3% of key informants).

One key informant (a modern farmer who campaigned for change in the way farmers operate) mentioned three agri-food safety issues.

> *There are a lot of concerns that revolve around agriculture in this country. First, due to the unexpected high rainfall in the region, a lot of the maize harvested is rotten. Many farmers/farm families find it hard to dispose of the rotten grain and it is consumed either in the households or as animal feed. Secondly, many vegetable producers may spray the vegetables but fail to adhere to guidelines given for pre-harvest periods. Thirdly, in terms of animals for slaughter or milk sold to the market, many producers do not adhere to guidelines for withholding the animals or milk after either deworming or other forms of drug administration. (KI#26)*

Yet another added:

> *Some of the issues that are of concern to me as a milk trader are so many. But the main one is the containers they use, the non-adherence with the required withdrawal period after drug administration, and the sale of milk from cows which have just given birth. (KI#13)*

Other key informants remarked:

> *Some farmers do not take into consideration what they feed their livestock. Take, for instance, some farmers feed cattle with rotten maize or anything that is condemned from the farm. (KI#16)*

Some participants openly admitted that they ignore the safety regulations. One participant said:

There are 72 hours to be waited after deworming, but we milk and sell to town (FGD#1).

And another added:

Some of us [farmers] give rotten maize to cows (FGD#3).

However, some participants observed that farmers have few options other than to continue using chemicals. One explained:

There are a lot of chemicals that are used in farming. Everything is chemicals. When a cow becomes sick, it is chemicals. When it is dewormed, it is chemicals, and when we go to an Agrovet it is only chemicals. The world has become chemicals. (FGD#4)

Whereas some interview participants observed that the use of contaminated farm produce, especially maize, as animal feed was a key agri-food safety concern, other participants disputed that the issue of rotten maize was a major agri-food safety issue.

The issue of rotten maize is not a problem so much. Because if someone has shelled 300 bags, it may be only three bags [that are rotten]. (KI#14)

The focus group participants were also asked about food poisoning incidents in the study area linked to the consumption of farm produce in the two years preceding the study. Food poisoning incidents were reported in five of the six focus groups. In total, seven food poisoning incidents had occurred, of which three were directly linked to the breaching of agri-food safety regulations. In particular, it related to breaching the requirement to delay sale of farm products for a specific period following drug or chemical administration. The remaining four food poisoning incidents were not directly linked to breaches of agri-food safety regulations but were related to non-adherence to public health regulations in the preparation of food. More precisely, the non-adherence to agri-food safety regulations when slaughtering animals for private celebrations.

Of the three incidents related to breaching agri-food safety regulations, one had to do with consuming contaminated meat, and the other two concerned consumption of contaminated vegetables. One incident was linked to a farmer who had sprayed vegetables and then sold them before the recommended waiting period had elapsed. One participant explained:

> *It was April this year (2019), someone sprayed vegetables. Instead of waiting for the recommended period, he sold. The consequence was a disaster, people had diarrhoea, some were admitted [to the hospital]. It even affected the school children. (FGD#3)*

Another participant added:

> *It happened this year [2019], last term [May-July]. A secondary school bought vegetables which were contaminated. It affected the whole school including 20 teachers. Up to now [October 2019], the community is still angry. (FGD#1)*

Further, interview participants mentioned examples of mild food poisoning incidents where the people affected just suspected poisoning. Other participants maintained that there was a tendency to blame certain food items, especially meat, for food poisoning. As one focus group participant explained:

> *The biggest problem is you go into hospital and you are given simple medicine, but you are not told what is wrong. If you are given medicine and you become okay, did you really know why you were sick? Me, I want to be given a report that this is the reason why you are sick. I want to be told; I am sick because I consumed meat maybe three days ago. (FGD#1)*

6.1.2. Perceptions of farmers' knowledge of agri-food safety regulations

When key stakeholders were asked to rate farmers' knowledge of agri-food safety regulations, 80% of key informants believed that most farmers lack knowledge about agri-food safety law. Words commonly used by the key informants to refer to the level of farmers' awareness of

agri-food safety regulations included "*not serious*", "*not aware*" and "*moderate knowledge*". One key informant remarked:

> *Most farmers are not aware of those laws you are saying*. (K#I1)

Another said:

> *Farmers are not fully aware of the existence of such laws.* (KI#7)

While another key informant added:

> *Most farmers do not take it (regulations) seriously. Many are not even aware of the existence of such regulations. (KI#9)*

These findings are in stark contrast to what farmers reported in the survey [15], where slightly more than half of the survey participants indicated that farmers are generally knowledgeable about agri-food safety regulations. This disparity in perceptions points to a disconnect between farmers and government officers. It could also be a response bias where farmers presented themselves in a good light (Maxfield & Babbie, 2015).

While many key informants observed that farmers are not aware of agri-food safety regulations, some claimed awareness among some farmers who consider the regulations to be impediments to their farming. One key informant explained:

> *In the first place, many farmers are not aware of the laws. They consider the laws as oppressive, e.g., the Kenya Dairy Board Regulations and public health laws and regulations. (KI#26)*

In the focus group discussions, the participants reported that some farmers are fairly knowledgeable about agri-food safety regulations while others claimed that farmers who are educated or live close to town have a better understanding of agri-food safety laws.

[15] See Section 5.2.2.2

A key informant identified two categories of farmers with different attitudes: those who are profit-oriented and those who produce food for home consumption.

> *They are two categories of farmers. Those profit-oriented will see regulations as an impediment while those who produce for home consumption follow the law for health purposes. (KI#21)*

When farmers were asked to identify an agri-food safety law that they liked, the responses from the focus groups were varied, but there was a general consensus that agri-food safety regulations are necessary as they protect human health. One farmer remarked:

> *I like the law to do with the appropriate use of drugs and chemicals, although we do not have a clear copy of the laws. Chemical use needs to be regulated. (FGD#2)*

The focus group participants supported regulations concerning milk safety and chemical use. Some of the reasons given for increased farmers' awareness of milk safety regulations included strict enforcement, aggressive public education campaigns, and intense informal and formal training. Consistent with the survey [16], the focus group participants mentioned how the milk regulator in Kenya (i.e., Kenya Dairy Board) has been educating farmers and consumers about milk safety on television and the radio. One focus group participant remarked:

> *Kenya Dairy Board is good. At least, they teach us on the TV. They also chase us when we do not use recommended containers. (FGD#1)*

6.1.3. Perceptions about farmers' compliance with agri-food safety regulations

The key informants were asked for their opinions on the farmers' levels of compliance with agri-food safety regulations. A large proportion of the key informants (70%) believed that the majority of farmers *never* comply with agri-food safety regulations in Kenya. This finding is

[16] See Section 5.2.2.2

slightly inconsistent with the survey findings reported in Chapter 5, where 43% of survey participants indicated that farmers *rarely* comply with regulations. When key informants were asked to rate the seriousness of non-compliance, 60% thought that non-compliance with agri-food safety is a *serious* problem, while only 41.3% of participants in the survey indicated that non-compliance is *serious*.

The interview participants were also asked if there was pressure on farmers to comply with agri-food safety regulations. Seventy-five percent of focus group participants believed that there is no pressure on farmers to comply with the safety regulations. One focus group participant remarked:

> *There are some regulations like those of the dairy board; they can even chase someone till they catch that person. But there are some regulations…which you see people violating and you ask yourself, "where are the people who are supposed to ensure people follow regulations and yet everyone is seeing it". (FGD#1)*

6.1.4. Perception of non-compliance with agri-food safety regulations being a 'crime'

The focus group participants and key informants were asked if non-compliance with agri-food safety regulations (by farmers) should be regarded as a crime. Forty-seven (76%) of the focus group participants and almost all key informants (98%) considered non-compliance with agri-food safety regulation to be a crime (i.e., food crime). Among those who did not see non-compliance as a crime, a few observed that agri-food safety non-compliant behaviours is more of a regulatory offence. Others, especially the focus group participants, did not consider some violations of agri-food safety regulations as a crime for two main reasons. First, some focus group participants maintained that these breaches by farmers are more the result of cultural practice that they have always lived with. Second, some focus group participants thought that any non-compliance with agri-food safety regulations that is considered normal practice,

beneficial, and has not resulted in any harm should not be considered a crime. One focus group participant said:

> *Some non-compliance cannot be called a crime. Crime is what is harmful but we have been doing some of these things forever. So, if the government comes and says this is illegal, should we just accept it? (FGD#1)*

Another focus group participant added:

> *Crime is what is harmful but some things are not bad, we have been doing them. If I keep my milk to ferment, it is not a crime. So, what has been cultural and not harmful, should not be called a crime. (FGD#6)*

In terms of what constitute crimes in the food production process, both the focus group participants and the key informants tended to consider any agri-food safety non-compliant behaviour as a food crime from a social-legal perspective. More precisely, participants observed that any action that violates formal agri-food safety regulations or social norms that guide how farm produce and farm animals are handled, stored, transported and used is a crime. Such activities include omissions or commissions by anyone in the agri-food chain while growing crops or rearing animals for food that can lead to harm (i.e., physical, social, or economic) to farmers, consumers, farm animals, farmworkers, and the environment.

Participants categorised non-compliance with agri-food safety standards (formal or informal) as a crime based on three lenses: harm, intention, and deterrence. Concerning harm, participants viewed any violation of food safety regulations, regulations, or social norms that have a serious impact on humans (i.e., death and illness), the environment or farm animals as food crime. In particular, the impact of the misuse of chemicals on the eco-system and farm workers and the way farm animals are mishandled on the farms and during transportation were defined as crimes. One focus group participant said that non-compliance with agri-food safety regulations:

Is a crime because you make people sick, you can kill or destroy the eco-system. (FGD#3)

And another added that

It is crime because it can lead to disease or human death. (FGD#5)

One key informant said:

It is crime. If you do things which can harm another person, you need to be arrested. (KI#11).

Yet another one said:

Anything that can lead to the death of human beings (whether deliberate or not) is a crime. (KI#21)

In terms of intention, participants viewed any activity committed deliberately and with the intention of seeking gain, especially economic gain, as a crime. Some of the formal agri-food safety practices outrightly defined by both farmers and key informants as a crime were tampering with the quality, characteristics, or composition of food for financial gain. Furthermore, both farmers and key informants considered that any violation of agri-food safety that leads to the deception of consumers also constitutes food crime. In particular, the deliberate selling of contaminated farm produce and farm inputs as safe and of good quality was considered food crime. One focus group participant said:

Selling a sick cow because of your selfish goal of personal gain is bad; someone should be arrested. (FGD#5)

One key informant, a vet officer, added the following in relation to the definition of non-compliance as a crime through the lens of intent.

If someone does something [violate agri-food safety regulations] knowingly, that should be a crime. For example, a farmer transporting farm produce knowingly in an unsuitable condition. (KI#6)

Last, through the lens of deterrence, the participants, especially the key informants, observed that non-compliance with agri-food safety regulation is a crime because if it is not controlled or checked, it can lead to repeated offending or could become normal practice. Thus, certain practices must be clearly defined as a crime and attract harsh punishments to deter reoccurrence. One key informant, a modern farmer, remarked:

> *Non-compliance should be considered a crime since if it's not checked, it can have a ripple effect in terms of loss of life, work time, or disability. Also, if allowed to continue, it can create a cycle of abuse [it can become normalised]. (KI#21)*

The above quotes indicate that the violation of agri-food safety regulation can be influenced by social and place-based factors such as culture and food practices that impact on how farming communities view violation of formal agri-food safety regulations.

Further analysis of the participants' responses revealed that the farmers tended to perceive violations of agri-food safety regulations as food crime from a public health perspective (i.e., the potential for causing illness and death to a consumer). It is interesting that farmers also viewed themselves as potential consumers of food produced by other farmers who violate agri-food safety regulations. The key informants, on the other hand, leaned towards defining food crime from both legal and socio-legal perspectives to include not only public health risks but also social harm to food producers (i.e., farmers, farm workers), farm animals, and the environment.

While some focus group participants viewed farmers as perpetrators of food crimes, few saw themselves as victims of food crimes committed by other key stakeholders, especially rogue farm input traders. On the contrary, key informants viewed farmers as both victims and perpetrators of food crime. The perpetrators were defined as including rogue farm input suppliers and farm service providers.

For the purpose of analysis, agri-food safety non-compliant behaviours identified by participants were categorised into two groups: food crimes by farmers and crimes against farmers. Table 6.1 summarises these broad categories and sub-categories of food crimes identified by participants

Table 6:1: Summary of various agri-food safety non-compliant behaviours defined as food crime

Category of food crimes	Examples
1. Food crimes perpetrated by farmers	a) Food adulteration b) Deliberate sale of contaminated farm produce c) Non-adherence with drug use procedures especially withholding/pre-harvest periods d) Use of contaminated animal feed e) Non-disclosure of information about farm produce quality f) Allowing or consuming contaminated farm produce g) Using contaminated containers to store or carry farm produce
2. Food crimes against farmers	a) Sale of fake farm inputs such as counterfeit chemicals b) Services provided by people presenting as experts without the relevant qualifications or authority

A. Food crimes committed by farmers

As shown in Table 6.1, participants identified seven sub-categories of food crimes committed by farmers. These illegal farm practices occur within the production, storage, packaging, transportation, and sale of farm produce and are associated with the misuse of farm chemicals, animal feeds, and food containers. They are also related to the incorrect disposal of farm produce and the nondisclosure of information about farm produce at point of sale.

In all focus groups and among many key informants (69%), the deliberate sale of unfit, uncertified, or contaminated farm produce was identified as the most prevalent food crime in the study area. Contaminated farm produce involves the sale of sick animals or animals under medication (*okoa*), milk from a medicated cow, vegetables where the pre-harvest period has not elapsed, maize with aflatoxins, and maize with moisture content beyond the recommended

levels. The sale of *okoa* was identified as the most prominent form of food crime (25%). Others were the sale of contaminated milk (13%) and cereals, especially maize (6%). One key informant said:

> *For me, trading in uncertified food or feed products is criminal.* (KI#26)

And one focus group participant said:

> *Selling milk from a cow that has been recently dewormed is illegal. This is bad and anyone who does this should be arrested. (FGD#4)*

Another participant, a maize trader, agreed.

> *Sometimes you agree with a person [farmer] and when you reach his home, the maize has mould or is mostly rotten. This should be considered illegal. (KI#28)*

Use of contaminated farm inputs, whether deliberate or not, was another agri-food safety non-compliant behaviour identified as constituting food crime. Specifically, the sale of animal feed that is either contaminated or has false biological or nutritional components was perceived as criminal. Eight key informants identified non-compliance with agri-food safety regulations such as feeding livestock contaminated feed or grazing them in prohibited areas, such as roads and sewerage lines, as food crime. Some of the food identified as not appropriate for animals was rotten maize and aflatoxin-infected feed. One key informant said:

> *It is crime to use inputs that are injurious to human life. Anyone that uses dangerous farm inputs such as contaminated animal feed should face the law. (KI#20)*

Furthermore, some participants saw the failure of the farmer to disclose drug use history or the physical characteristics of farm produce to consumers or food traders as food crime. One key informant, a milk trader explained:

> *There is the issue of the withdrawal period. It is hard to know unless the farmers tell you. Farmers need to disclose the history of drugs to us [traders]. If a farmer fails to*

disclose this information, it should be considered a crime. You will find some [farmers] not telling if they have followed recommended withdrawal period. (KI#13)

Another agri-food safety non-compliance behaviour considered criminal is tampering with the true state of farm produce by adding substances or poor-quality products to food items for economic or technical benefits. The study found 34.5% of key informants identified milk adulteration as a major food crime. Generally, this involves adding water to milk to increase the quantity. One key informant said:

For me, when a person adds water to milk, that is bad and that is a crime. He needs to be arrested and charged for endangering our lives. (KI#2)

However, some participants defined certain farm practices not necessarily proscribed by law as food crime. For example, one key informant, a milk trader, identified the mixing of milk from cows that have recently calved with those that have passed the colostrum period as an illegal practice that should constitute food crime.

Some farmers mix milk from cows who have recently given birth with good milk. And they do not tell us. This should be illegal. (KI#13)

Further, some key informants maintained that milk adulteration tends to occur beyond the farm gate and rarely involves farmers, but rather rogue traders seeking to gain and increase their profit. One key informant remarked:

Although it is a crime to add milk water, it does not mostly occur on farm premises. It mostly occurs after milk has exited the farm gate. (KI#6)

Another agri-food safety non-compliant behaviour identified as constituting food crime is the non-adherence to the appropriate use of drugs and farm chemicals in terms of concentration and expiry dates or non-compliance with pre-harvest or withholding periods, all of which can have serious health implications for human beings. This withholding period allows chemical

compounds to break down into safe forms and prevents harmful residues in farm produce and possibly food poisoning. One key informant remarked:

> *One farm practice that I consider a crime is non-compliance with withdrawal periods for food after the application of pesticides or other forms of chemical treatment on livestock (KI#7).*

Another key informant, a veterinary officer added:

> *There are many issues that I consider illegal but one which I think is not proper is the non-observance of the withdrawal period. It is a crime because it has the capability of causing a long-term impact on the human body. (KI#6)*

Two key informants thought the use of contaminated containers to store or carry farm produce, particularly the use of chemical containers to store and transport milk, is a food crime. One key informant, a farm leader observed:

> *To me, it is illegal to use a container that can contaminate or affect the composition of food in terms of taste or structure. For example, any farmer or trader that uses farm chemical containers for food storage or transportation should be arrested. (KI#26)*

Six key informants also described the process of consuming or allowing other people to consume contaminated farm produce as a punishable crime. One key informant, a meat trader, said:

> *Allowing villagers to eat a sick animal is a crime.* (KI#15)

Another added:

> *Allowing people to consume unwholesome or contaminated food, especially milk and meat, should be considered as criminal activity. (KI#6)*

Other agri-food safety non-compliant behaviours identified by key informants as constituting food crimes are transporting farm animals knowingly in an unsuitable condition, online

diagnosis of animal diseases, and use of unprofessional people as veterinary doctors for animal treatment or crop management. One participant, a chairperson of one of the professional associations of different experts in agri-food chain in Kenya, reported.

> *Crimes in food production are diverse. Apart from the normal ones of farmers not following rules on drugs, use of recommended containers, and sale of okoa, there are some other serious issues which are criminal if you were to ask me. First is the use of a quack veterinary officer [an individual who has not trained as a doctor but pretends to be]. Farmers have lost animals because of quacks. Another one is online diagnosis and treatment of disease. You find a farmer just searching for information on the internet on how to treat cows. Lastly, farmers allow anyone to their farms. This should be outlawed. (KI#16)*

B. Food crimes against farmers

Key informants considered two farm practices to be food crimes against farmers. The first practice is selling counterfeit animal feed or farm chemicals to farmers (i.e., feed containing contaminated, substandard, or fabricated biological or nutritional components). In particular, four key informants thought that selling contaminated or substandard farm inputs, especially animal feed, to farmers is criminal. Others considered the sale of counterfeit or unregistered chemicals as another category of food crime. One key informant said:

> *Selling substandard pesticides to farmers is criminal. Anyone found selling them should be arrested and face the full force of law. (KI#20)*

Another key informant, a government official said:

> *For me, it is crime when one deliberately sells to farmers feeds [animal feeds] that do not have true nutritional components. You will find the label on animal feeds indicating false information. Unfortunately, some farmers believe in them. It is sad, some do not even know if they have been sold fake animal feeds. (KI#16)*

The second practice that two key informants noted is that unqualified persons providing services to farmers without the relevant authority is illegal and a food crime. Their rationale for considering this activity as a crime was that it involves deception that can lead to farmers receiving incorrect information on animal health and agri-food safety.

> *Pretending to be an expert in farm activity should be considered a crime. You will find someone pretending to be a veterinary officer. Do you think that person will offer good advice? This is illegal and should be considered a crime of food because you are endangering the lives of other people. (KI#16)*

These different perceptions and definitions between farmers and key informants of what agri-food safety breaches constitute a crime have several implications for policy formulation and implementation. First and foremost, regulators and governments need to have a broader view of crime in food production and extend food crime beyond the primary concerns for public health, such as food adulteration, to include illegal activities in farm input supply that cause farmers to violate agri-food safety regulations, whether intentionally or not. Second, the narrow definition of non-compliance with agri-food safety regulation as a crime observed in the farmers' responses epitomises a need for better education of farmers. Third, defining non-compliance with agri-food safety regulation to include the sale of contaminated farm inputs and counterfeit chemicals via the internet indicates that crimes in the agri-food chain are broad and therefore regulators need to expand their scope of formulation and enforcement of agri-food safety regulations.

Lastly, the finding that farmers are also victims of food crimes suggest that they may innocently violate agri-food safety regulations through rogue actors in the agri-food chain. Therefore, regulators need to increase their enforcement strategies to include farms and farm produce markets as well as farm input markets. This approach will not only enhance consumer

protection but also secure the livelihoods of farmers, many of whom are struggling to survive in an ever-changing environment (legislative, climatic, physical, and economic).

6.2 Factors that influence farmers' compliance[17]

Several factors were identified by the focus group participants and key informants as influencing the farmers' response to agri-food safety regulations. These were the costs of compliance, poverty, culture, lack of information or knowledge of the regulations, lack of enforcement and non-punitive penalties, economic opportunities, farmers' perceptions of government, and their personal ethical values. These factors were organised into themes and sub-themes are summarised in Table 6.2.

Table 6:2: Summary of factors influencing farmers' compliance with agri-food safety regulations

Theme (Overarching goal)	**Sub-themes (Sub Goals)**	**Focus groups**	**Key informants**
1. Gain goals (*save and generate money*)	a) Avoid compliance costs	(16, 30%)	(8, 28%)
	b) Loss aversion, securing income and generating profit	(39, 72%)	(7, 24%)
	c) No reward for complying	(7, 13%)	(6, 21%)
	d) Opportunities to generate income	(10, 19%)	(6, 21%)
	e) Small fines for non-compliance	(20, 37%)	(12, 41%)
	f) Low risk of detection	(15, 28%)	(9, 31%)
	g) Financial constraints	(28, 52%)	(7, 24%)
2. Normative goals (*conform with social norms or formal rules*)	a) Acting according to social norms	(24, 44%)	(7, 24%)
	b) Acting according to formal regulations		
	• Awareness of the law	(7, 13%)	(17, 59%)
	• Perception of government	(17, 31%)	(5, 17%)
3. Hedonic goal (*feeling of guilt*)	Feeling of guilt about causing harm to another person	(16, 30%)	(1, 3%)
4. Goal constellation (*interplay between the goals)*	a) Dominant goal	(23, 43%)	(1, 3%)
	b) Effect of normative goal on gain goal	(10, 19%)	
	c) Simultaneous impact of hedonic goal on gain and normative goals	(6, 11%)	
	d) Effect of normative goal on hedonic goal	(5, 9%)	

[17] A portion of this section was presented as a conference paper at the 21st Annual European Society of Criminology Conference (8–10 September 2021), online.

As shown in Table 6.2, all the factors that influenced farmers' compliance with agri-food safety regulations were analysed based on the three goal frames outlined by the goal framing theory (gain, normative, and hedonic goals). A fourth theme was introduced that focuses on the interplay between the goals, revealing the dominant goal and how the goals impact on each other. The sub-themes in this study refer to sub-goals, situations, or circumstances that inform or shape farmers' thoughts, beliefs, knowledge. or decisions to choose certain goal(s) (Lindenberg, 2000; Lindenberg & Steg, 2007), and more importantly, which goal dominates the decisions made. These themes and sub-themes are discussed in detail in the next sub-sections.

6.2.1. Gain goal

The gain goal relates to maximisation of benefits, especially economic benefits (Etienne 2011). Importantly, it involves assessment of the costs and benefits of violating or complying with the law. A person pursuing this goal will seek to improve or gain benefits such as earning more income, making a profit, saving money, and avoiding costs or losses. In this study, gain goals were evidenced as *saving or generating money*. Words used by the participants to refer to a gain goal included "*reduce*", "*avoid*", "*recover*", "*get something*", or "*rescue*". As shown in Table 6.2, seven sub-themes that motivated farmers to violate or comply with agri-food safety regulations for economic gain were identified.

6.2.1.1 Avoidance of compliance costs

Compliance costs are incurred by regulated actors to meet the requirements of a regulation or standard in a given regulatory environment (Winter & May, 2001; Yan et al., 2015). In this study, compliance costs comprised all direct and indirect costs necessarily incurred in complying with agri-food safety regulations while farming and selling farm produce. They include the cost of drugs or chemicals, vet fees, and purchase of equipment to ensure safety

(e.g., hermetic [18] grain bags and aluminium milk containers) and the labour costs incurred while ensuring agri-food safety. These costs increase the fixed or variable costs of production. In this qualitative study, 30% of the focus group participants and 28% of the key informants directly mentioned that compliance costs influence farmers' compliance decisions. For example, one key informant said:

> *For me, the main factor that makes most farmers not follow the law is the cost of complying. (KI#1)*

Another key informant remarked:

> *Farming is costly and adding regulations means adding costs. So, some farmers avoid this [compliance] to save money or avoid expenses. (KI#24)*

Analysis of the responses of the focus group participants supported the assertions of the key informants that compliance costs can discourage farmers from adhering to food safety regulations. More precisely, participants discussed three costs that discourage compliance by farmers, especially small-scale farmers. They are the use of aluminium milk containers and hermetic grain bags, the treatment of sick livestock, and the disposal of dead livestock.

With regard to the use of aluminium milk containers, three focus group participants explained that these containers are expensive, which discourages some farmers from following agri-food safety regulations. For example, one focus group participant remarked:

> *Although I use aluminium containers, most of my fellow farmers do not use them and the reason is that aluminium containers are expensive and heavy. (FGD#2)*

Another interesting case that demonstrated avoidance of operational costs is the use of hermetic (gunny) bags. Some focus group participants reported that the cost of the recommended gunny

[18]These are airtight bags that prevent air/water from getting into stored grain. It is mostly recommended to reduce aflatoxin contamination (Republic of Kenya, 2019).

bags that help to prevent the development of excess moisture content or rotting of grain (especially maize) are quite expensive when compared to normal gunny bags. The following quote illustrates the rational calculation of a small-scale farmer regarding non-use of the hermetic gunny bags.

> *For the issue of maize, we use unsafe gunny bags because we are not able to buy the hermetic bags that cost Kenya Shilling (KES)*[19]*250 each. If you do the mathematics, you lose. For example, if you require 20 safe bags, you will need KES 5000, but if you buy the 50 unsafe gunny bags at KES 20, it will cost you KES 1000. You will have saved 4000 [gain goal]. (FGD#1)*

Yet another focus group participant said:

> *There is advice from agriculture that when preserving maize, powder chemicals are not safe; instead use hermetic bags. But these bags are expensive. (FGD#6)*

With regard to livestock treatment and the disposal of dead stock, the focus group participants claimed that some farmers prefer to sell the sick livestock to avoid the costs of continued treatment. As one participant explained:

> *When cows fracture a leg, farmers have no choice, it is costly to treat a cow, especially those which are physically injured. So, it is better to sell. (FGD#4)*

A key informant added:

> *I have seen some of the farmers whom I have bought cows from telling me that they sell their sick livestock because it is costly to treat or keep a sick animal. (KI#18)*

Another key informant, a veterinary doctor who has worked with farmers for over 35 years, summed up how non-compliance provides opportunity for farmers to save costs.

[19]At point of writing this thesis, one Australian dollar was approximately equivalent to KES 84.55

Most farmers see no economic sense to invest in farmer activities or structures that eat into their profit or income. Non-compliance provides the greatest opportunity to save costs [gain goal]. (KI#6)

6.2.1.2 Loss aversion, securing income, and generating profit

Seventy-two percent of the focus group participants and seven key informants (24%) discussed the relationship between loss aversion, securing income, and generating profit and the breaching of agri-food safety regulations by farmers. Loss aversion is the general tendency to avoid losses (Engström et al., 2015). The interview participants used the phrase "*to get something"*, "*save",* or "*recover"* to mean loss aversion or securing or generating a gain. Agri-food safety regulations that are often breached for the purpose of loss aversion, securing income, or generating profit are related to the prohibited sale of contaminated farm produce, especially sick livestock, livestock under medication, maize that has a high moisture content or is rotten, milk from cows under medication, or vegetables that have been sprayed and the recommended withholding period has not expired. One focus group participant said that:

Adhering to some agri-food safety requirement is good but it is challenging, you lose[money]. (FGD#6)

Other interview excerpts that demonstrate loss aversion, pursuit of profit, and breaching of food safety regulations include the following.

What do you want me to do with rotten maize, and it has rained till it has made maize rot? If I bury, who will compensate me? (FGD#1)

If this cow was insured, I would have gotten something from insurance. But it will mean that I will lose, there is nothing I will get. So, it is better I get something by selling than to lose. (FGD#1)

A key informant who has campaigned for modernising farming in Kenya added the following in support of loss aversion:

> *My observation is that a farmer milking seven cows will usually stagger the deworming so that one cow is dewormed every day, or every two days, as the case may be. The belief is that if you were to withdraw milk from seven cows for 24 or 72 hours (1 to 4 days), it would mean a big loss by not selling 100 to 400 litres of milk (assuming each cow produces 15–50 litres in total per day). So, by the farmer staggering the deworming days, he is able to sell all the milk, since the 15 litres from one dewormed cow is mixed with the 80 or so litres from the other 6 cows, thereby neutralising the effect of the milk from the dewormed cow. (KI#26)*

Of the agricultural products (i.e., maize, milk, livestock, and vegetables) that were the focus of this study, the sale of livestock under medication particularly captured the gain goal. The term *okoa,* explained earlier, is a Swahili word with connotations of salvaging costs or loss (gain). It means to salvage money from a sick cow by selling it to at least get something. One focus group participant said:

> *Okoa means salvaging the cost or rescuing money. It is the curse of money. It is better to get KSHS 3000 than to lose all of it. (FGD#4)*

Another focus group participant described how loss aversion and the need to generate income drive some farmers to violate the regulations prohibiting the sale of sick livestock.

> *This is the clear picture of how we arrive at selling okoa. Okoa is the last solution and not the first option for the farmer. There are expenses you have incurred in trying to treat the animal. For example, you have used KES 2000 for injection, another injection 3000, and it is heading to KES 7000 and the signs of livestock recovering is dim. So, you tell yourself, the cow is going to die. Someone comes and says let me give you KES*

3000, so you say, it is better I okoa [recover] the expenses than to lose it all. So, you sell [sick livestock] to recover the costs you have already spent. (FGD#4)

One focus group participant added that some farmers opt to sell sick livestock to avoid incurring the costs of disposing of a dead animal.

The recommended way of disposing a dead livestock is burying or burning. However, this involves a cost….so a farmer will prefer to sell a sick animal to receive Kenya Shilling KES 1000, because if it dies, he will need to hire people to dispose of the carcass, so he had better sell it and get something for it [gain]. (FGD#6)

A key informant (veterinarian) supported the observation of some focus group participants:

Although sick livestock will not fetch good returns, some farmers sell okoa to recover some cash instead of losing everything in case the animal dies. (KI#06)

6.2.1.3 No reward for complying

Closely connected with the goal of loss aversion and income generation is the perception that there is no reward for complying with agri-food safety regulations. This was highlighted by 13% of the focus group participants and 21% of the key informants, who observed that there is no incentive or reward for farmers who choose to comply. These include rewards such as quality-based pricing or a price premium on farm products grown or raised in accordance with the law (Hoffmann & Jones, 2018). One focus group participant said:

Let's reward people who do good [comply with agri-food safety regulation] and others will be motivated. (FGD#4)

While a key informant added:

Whether you follow the law or not, at the market the products are the same. (KI#21)

Another key informant (a government officer) agreed:

There is no incentive to produce safe farm products. For example, in the market, the maize price is the same whether you followed law or not. In fact, it is more profitable

[gain goal] to one who did not follow law. There should be a price premium or differentiated pricing for those farmers who decide to follow law. (KI#11)

And yet another key informant (a veterinarian) said:

There is no one to compensate the farmer when he or she decides to comply. Farmers destroy their animals at their own costs. (KI#06)

6.2.1.4 Low risk of detection

Twenty-eight percent of focus group participants and 31% of key informants claimed that the low risk of being caught by patrols and inspections provides motivation for farmers to choose non-compliance. More importantly, participants noted that without inspections and enforcement of regulations, farmers may be motivated to continue violating regulations, knowing that the probability of being caught is low. Participants (particularly those from the focus groups) noted that enforcement is particularly wanting on farms, transportation routes, and in farmer markets. One focus group participant stated:

We have a good market where you just go with your milk, and you sell without struggling [gain goal]. I mean there is no one testing whether my milk has come from a cow that I have given medicine. The only thing you need to be careful is milk that smells of drugs. (FGD#1)

Another added:

If somebody will check milk from the farm gate to the market with a lactometer, paraffin test, alcohol test, and all other relevant tests, there would be no milk in the market! If all this is done, people will behave [compliance] all the way to farms. Farmers will not sell [gain goal]. (FGD#1)

6.2.1.5 Low penalties for non-compliance

There was also a perception that low punitive measures or punishments encourage non-compliance with agri-food safety regulations. Lenient punishment signals that violating

regulations is lucrative, and encourages violators to repeat the offence and others to commit the same offence. In this study, 37% of focus group participants and 41% of key informants observed that the lenient punishment contributes to non-compliance by farmers. One focus group participant remarked:

> *For me, the biggest challenge is lack of enforcement. If there is no enforcement in terms of severe penalty, people may violate law knowing that they may not lose much [gain goal]. (FGD#4)*

Stakeholders' views also supported the responses of the focus group participants. One key informant said:

> *There is no punishment. If punishment was harsh [gain goal], it could have made some of them [farmers] comply with the law. (KI#06)*

Another key informant agreed that lack of severe punishment was the reason farmers continue to violate agri-food safety regulations.

> *As a key stakeholder in the livestock business, another issue that has encouraged some farmers to flout some regulations is the issue of fines. Some fines are too low that one can pay easily [gain goal]. (KI#15)*

While some participants reported that farmers are arrested for violating the agri-food safety regulations, some believed that they are rarely prosecuted and punished. One focus group participant said:

> *I have not seen a farmer who has been prosecuted. Never have I seen a farmer being arraigned in court. I have only seen some farmers being chased for not using metallic containers to carry milk. (KI#6)*

Another FGD participant added:

There is no severe punishment [gain goal]. You hear a person has been arrested today and tomorrow, he is back in the village. It is business as usual. Worse, you would not hear how the case proceeded. (KI#26)

6.2.1.6 Opportunities to generate income

A factor that supported the gain goal was the impact of economic opportunities. More specifically, the existence of illegal markets encourages the gain goals of generating income or saving money. In this study, 10 focus group participants (19%) and six key informants (20.6%) observed that illegal markets contribute to the breaching of agri-food safety regulations by farmers.

One aspect of illegal markets that was identified to support the gain goal is rogue traders. Smith et al. (2017) define rogue traders as individuals who breach regulations by deliberately placing, supporting, or conspiring to market illegal food for profit. One participant said:

Someone [trader] has come, would I not take (money)? [gain goal]. (FGD#2)

Another focus group participant remarked:

There is a time I shelled maize. I sorted my maize into grade1, grade 2, and rotten maize. When I was selling good maize to a certain maize trader, she told me that she has a market for rotten maize. She asked, "can you give [sell] me this rotten maize?" I said, "this is good as it will help me have space". I gave [sold] her the rotten maize. (FGD#1)

One key informant (a maize trader) argued that farmers themselves persuade traders to buy contaminated farm produce.

When we go to buy good maize from them, some farmers ask us if we have an order for rotten maize [gain goal]. (KI#14)

6.2.1.7 Financial constraint

Discussions with interview participants indicated that farmers' financial capacity is also an important condition for compliance, and financial stress may contribute or motivate farmers to violate the law, with the goal of saving money or avoiding costs. Financial capacity refers to the economic ability of farmers to pay the costs associated with agri-food safety regulations (Yan et al., 2016). In this study, two aspects of financial ability (i.e., poverty and farm size) were identified by the interview participants as motivating farmers in Kenya to avoid costs or generate income by violating agri-food safety regulations.

More than half of the focus group participants (52%) and almost a quarter (24%) of key informants alluded to poverty as a reason that some farmers violate agri-food safety regulations. Words used to depict poverty were "*hungry"*, "*poor farmers"*, "*only option"*, "*economically constrained"*, or "*lack of money"*. One focus group participant summarised:

> *If someone [farmer] is poor or hungry and this is the only option available, do you think they will leave the money [gain goal] which has come to their doorstep? They will not [follow the law by refusing to sell contaminated farm produce]. (FGD#3)*

Another focus group participant added:

> *I am incapacitated in the form of finance, I cannot throw away milk when I need money [gain goal]. (FGD#1)*

Another key participant (an agronomist working with the government) observed:

> *I think the greatest barrier that makes most farmers not comply with this law [agri-food safety regulations] is financial constraint. Most farmers are willing [to comply with law], but the amount of money required may be out of reach to them or because of various competing expenses. For example, the safe way of drying maize especially when it is raining, is through the use of dryers. How many people [farmers] will afford this*

[purchase or hire of maize dryers]? Thus, some farmers may not prioritise complying with the law to avoid costs or save money. (KI#7)

Six percent of focus group participants and two key informants claimed that the small size of farm operations contributes to farmers breaching agri-food safety regulations. A key informant said:

The majority of farmers in Kenya are small-scale. This smallness of operations greatly impedes their daily decisions including compliance with the law. When it comes to the priority of spending [gain], complying comes among the last things to consider. (KI#6)

One focus group participant discussed how capital costs such as changes to farm structures or equipment to ensure food safety can disproportionately affect small-scale farmers.

Not all people can ensure food safety. For example, the issue of milk; you need to spend a lot of money such as constructing milking shade, buying aluminium containers, and having cold storage. To ensure all these, it requires money, and yet you may be a farmer who is struggling. (FGD#2)

Overall, the opinions of the focus group participants and key informants corroborate the quantitative finding that the gain goal is significantly related to agri-food safety compliance. The sub-themes of avoidance of costs, loss aversion, and small fines for non-compliance captured the argument that the need to save money or generate income motivates farmers to violate agri-food safety regulations. The next section discusses how the motivation to act appropriately and culturally contributes to compliance.

6.2.2. Normative goal

Normative motivation is concerned with acting appropriately or acting according to the expectations of a group to which an actor belongs (Etienne, 2011; Lindenberg, 2000; Lindenberg & Steg, 2007). In this present study, the normative motivation of acting in

accepted/appropriate ways manifested in two ways (sub-themes): acting according to social norms and acting according to formal rules. These sub-themes are discussed below.

6.2.2.1 Acting in accordance with social norms

Overall, 44.4% of focus group participants and 24.1% of key informants mentioned how social norms influence farmers' compliance decisions. The impact of social norms on the normative motivations of acting appropriately (complying with agri-food safety regulations) was examined by analysing participants' comments in regard to acting appropriately 1) according to culture, 2) according to the expectations of significant others, and 3) in accordance with normalised social practices. These are discussed below.

A. Acting appropriately according to culture

Culture is the set of informal rules, beliefs, values, symbols, meanings, or practices shared by a specific group of people that influence their day-to-day behaviour (Spencer-Oatey, 2008). In this study, culture was examined in terms of how beliefs about food, food animals, and human life impact on farmers to cause them to behave in socially and culturally appropriate ways.

Analysis of the interview responses showed that some food beliefs place pressure on farmers to act in socially appropriate ways. Eleven percent of focus group participants (20.4%) and six key informants (21%) supported this observation. Of the four agricultural products (i.e., milk, meat, maize, and vegetables) that were the focus of this study, participants reported that the beliefs and practices around milk and meat production were the most likely to affect compliance. One focus group participant remarked that:

> *It is bad to throw milk out; it is like bewitching the cow*. (FGD#5)

Another one added:

> *A Nandi person cannot allow milk to go to waste*. (FGD#1)

and yet another one said:

Maize is not burnt; it is a sin. (KI#1)

Three focus group participants and one key informant reported that informal practices that emanate from beliefs about livestock production (norms regarding food animals) impede compliance with agri-food safety regulations. One key informant remarked:

> *Some farmers have difficulty in complying with some regulations. For example, the requirement that a cow or any livestock is buried is against the beliefs of some communities. Therefore, the farmer would rather engage an illegal livestock dealer to come and take [buy] a sick cow than to wait till it dies and face the dilemma of going against cultural practices. (KI#17)*

The above beliefs about food production (especially milk) and farm animals explain why some farmers sell milk from injected, drugged, or dewormed cows. Thus, the normative goal to act in socially and culturally appropriate ways (i.e., following beliefs about food and food animals) leads to the violation of formal agri-food safety regulations.

The participants noted that societal values about human life also influence how farmers respond to agri-food safety regulations. More specifically, four focus group participants mentioned that societal values that call for doing good to fellow human beings motivate farmers to comply with agri-food safety regulations, especially those that seek to protect human life. For example, one focus group participant said:

> *In our community we do not give another person a bad thing. (FGD#4)*

While another participant added:

> *In Kalenjin, before doing anything, you ask yourself, "is it going to kill another person?" If the answer is "yes", you do not do it. (FGD#3)*

And yet another said:

In our culture, our people never added water to milk. Adding water to milk was a big mistake because it was a taboo. (FGD#4)

B. Acting according to the expectations of significant others

The focus group participants also identified social pressures or repercussions from significant others as impacting on compliance with regulations. More precisely, three focus group participants claimed that some farmers violate agri-food safety regulations because of the fear of stigmatisation from significant others such as fellow farmers, family members, or community members. One participant explained:

Fear is the matter of all ... Some farmers fear because they do not want to be condemned by society. (FGD#4)

Another participant added:

As a farmer, you do not become strict. If you become strict you will become bad in society. When the cow is sick or has a fractured leg, villagers want to consume it. If you tell them it is against the law to consume, you become bad. (FGD#5)

One key informant (dairy farmer) shared an experience in which community members were not happy with following agri-food safety regulations for disposing of dead livestock.

There is a day my cow died. I buried my cow as recommended by government. But the community was not happy with me. "Watu walinipiga" [community members fought me]. They told me "you are wasting money". (KI#20)

C. Acting in accordance with normalised social practises

Analysis of the interview responses also revealed how social practices can generate pressure to behave appropriately. Twenty percent of focus group participants supported this observation that some practices (in this study, violation of agri-food safety regulations) have become common occurrence to an extent that they are normalised. Participants used phrases such as

"*we have always been doing like this*", "*these are common things*", "*we have never had any problem*", "*everyone is using it*", and "*everyone is doing it*" to denote normal practices.

Of the five agri-food safety concerns of focus in this study, the sale of *okoa* and use of farm chemical containers to transport and store milk were viewed by the participants as *normal* practice. One participant said:

> *That is the issue here. I have grown up seeing people using these containers! (FGD#2)*

Another focus group participant added:

> *Everyone is using it. People see it [re-use of farm chemical containers] as common. (FGD#6)*

Yet another participant echoed:

> *Other people are doing it [selling okoa]. I see other people doing. Then you ask yourself, why should I not do it? (FGD#5)*

One focus group participant said that he had just sold *okoa* to a trader:

> *These things [sale of okoa] are normal. You did not see the pick-up[truck] when you were coming, someone was transporting okoa. (FGD#5)*

Furthermore, two key informants observed that farmers' practices are often a reflection of the society. In other words, farmers are not unique, and their actions reflect common practices. This implies that farmers are conforming to society. One focus group participant said:

> *We like a law that says we sell farm produce that is hygienic, but when you go to town, you see farm produce in the open air or on the ground being dried. My maize is even better than that. So, why tell me to follow the law? (FGD#1)*

One key informant added:

They are busy telling us not use plastic containers for food/milk storage on our farms. But when you go and buy food in town, they give it to you in plastic containers. So why criminalise what a farmer uses [plastic containers]? (KI#1)

6.2.2.2 Acting according to formal regulations

Discussion with participants indicated that normative goals to act legally are affected by two factors: awareness of law and policy objectives and perception of government. These factors are discussed below.

A. Awareness of law and policy objectives

In agricultural regulatory compliance, training on the requirements of law and policy outcomes and how to comply with them is vital for achieving compliance. In this study, 13% of focus group participants and 59% of key informants claimed that lack of awareness of agri-food safety regulations contribute to farmers not acting according to the law. One participant said:

The problem is, we do not know those regulations. Do we even know if they exist? (FGD#4)

One key informant (a non-government officer) added:

As a key stakeholder who has worked with farmers, one of the factors which, in my opinion, is the greatest obstacle to most farmers from following laws or regulations, (not only agri-food safety regulations) is the lack of information. The majority of these farmers get to know these regulations when they are arrested. It is even worse for remote farmers located far from major cities. I give credit to Kenya Dairy; they have made great strides in enabling most farmers to know and understand some regulations. Other regulators rarely visit farmers. (KI#4)

Another key informant stated:

> *Some farmers are not aware. They lack information – many people do not know especially the regulations you are mentioning. They mostly know regulations concerning milk. (KI#7)*

While the proportion of focus group participants (13%) who observed that lack of awareness of law influenced compliance was less than the proportion for the survey (47.8%), it was apparent in all of the focus group discussions that lack of awareness of the regulations is not the key issue hindering compliance by farmers, but rather other factors are at play. In this study, one factor that became apparent was the disconnect between awareness of policy and knowledge about the purpose of policy and the beneficial outcomes of complying with such policy (i.e., consumer protection, economic development, and income generation). More specifically, 19% of focus group participants reported that farmers lack information or training about policy outcomes. As one participant remarked:

> *We know all things we are supposed to do, but what I know and what I do are two different things. For vegetables, when I go to the other side of the community, they spray today and sell tomorrow. They know very well that he or she has sprayed. So, we have two sets of farmers. They are those who know or those who do not know. (FGD#1)*

Some key informants supported the claims by the focus group participants that agri-food safety regulations are intended for good outcomes; however, there is a problem in getting those who are expected to follow the law to understand their importance. One key informant explained that:

> *If farmers are made aware of diseases that can be transmitted through milk, maize, or meat, I think they will easily comply with the law. Why is it now that farmers have known the link between cancer and chemicals on the farm? It is because they have listened to, or watched in the media. If the regulator or Ministry of Agriculture will just*

spend time on ensuring that farmers understand all these regulations, agri-food safety, farming, environmental protection, among others. (KI#7)

Another added:

For me, I blame the lack of extension services. If farmers were trained or made aware of the reasons why they need to follow the law, they will follow without any resistance. Look, for example, the regulations that Kenya Dairy wanted to introduce banning the sale of milk informally. When you look at the intention of this regulation, the objective was good, but most farmers protested that it was going to kill their business, and yet the regulator wanted to guarantee that the milk is safe. (KI#11)

Whereas some focus group participants acknowledged that they sometimes receive training (i.e., animal and crop husbandry) from the government, especially the Ministry of Agriculture, Livestock and Fisheries, rarely are extension services provided on agri-food safety.

Government has good intentions, but the problem is that people are not trained. They sit and discuss and come up with ideas but if the idea originates from government, people are likely to dismiss them as not theirs. It is better if people suggest first. Government needs to come to us, and tell us, "this is the problem". Then we will work together to bring solutions. (FGD#3)

Furthermore, some focus group participants reported that they got to know of the regulations only through the media, especially television, when regulators were enforcing the regulations, which mostly occurs in the urban centres. One focus group participant remarked:

We only get to know some of these regulations when they arrest us. Some of us who are lucky to have TV, we might hear in the news when they are discussing the new law to be implemented. (FGD#2)

Lastly, two key informants identified farmers' mindsets as a barrier to compliance with regulations. In particular, participants observed that farmers do not take the time to embrace the regulation, which is a situation that also impedes compliance. One key informant remarked:

> *The biggest impediment to a total change in how agriculture is conducted is the mindset of the farmer. Some of them have not fully embraced change, preferring to do things the way they have done or been exposed to. (KI#8)*

Yet another key informant expressed the following:

> *In my opinion, the barrier that hampers not only compliance levels of farmers but also another challenge is laxity or unwillingness of farmers to accept or embrace new things. It usually takes some time for any human being, including farmers, to accept change. So, if a new law is introduced; a lot of groundwork needs to be done. Farmers have to be convinced that the law would not be an impediment but support their business. Those who introduce new law should work first on convincing farmers. (KI#5)*

Participants' opinions on the lack of awareness of policy outcomes or purpose strengthened the findings from the quantitative study, indicating that introducing laws or regulations, just like any innovation, requires government to first educate, train, and provide information to farmers. Thus, governments need to work alongside farming communities to increase their receptiveness to new laws or regulations. Agricultural extension and other methods of training or creating awareness of regulations in areas such as their rationale and benefits as well as the consequences, sanctions, and penalties of non-compliance have been found to significantly impact on the attitudes of farmers, making them more receptive to government interventions (Foorthuis, 2012; Gunningham, 2010). One focus group participant remarked:

> *We need to be told or taught why this regulation is good. We need to be told what this is wrong and why? To be told that some of things we have been doing is wrong or are condemned is not appropriate. (FGD#4)*

B. Perception of government

As discussed in Chapter 3, if regulated actors perceive the design, implementation, and enforcement of regulations as fair, consistent, correct, or appropriate, the chances of compliance increase. In this study, some of the phrases used by the interview participants to describe government in general and regulators specifically were "*they are not serious*", "*they have let us down*", and "*they are in the city*". To explore how perceptions of government influence motivations to act in accordance with formal rules, participants' responses were explored through two perspectives: fairness and trust in government.

With respect to fairness, the Kenyan Government was viewed as being unfair in the way it designs agri-food safety regulations. A third of focus group participants and three key informants supported this observation. Unfairness of government was based on three issues: appropriateness, relevance, and clarity of regulations; lack of consideration of the different capacities of farmers to comply; and lack of farmers' involvement in law making. These issues were perceived to affect the motivation of farmers to wilfully comply with agri-food safety regulations.

To begin with, some participants claimed that some agri-food safety regulations are not practical or appropriate, while others reported that they are not simple and clear. However, others reported that some farmers understand most of the agri-food safety regulations in terms of big names such as 'milk law', but their understanding of the specifics of the law is problematic. One focus group participant explained:

> *We want basic guidelines so that even the people who have not gone to school or those who cannot even read basic things can understand. (FGD#4)*

A key informant (an agronomist, who works with the government within Uasin Gishu County) said:

Regulations should be simple in their language. They should also be accessible. It should be understandable to farmers. (KI#7)

Other participants claimed that some agri-food safety regulations favour large-scale farmers with the means to invest in agri-food safety infrastructures. However, some participants mentioned that some food regulations exclude small-scale farmers from participating in mainstream formal markets, such as supermarkets and government institutions. One participant said:

Some regulations are not fair, practical, and not appropriate for some of us who produce small quantities. (FGD#3)

Another agreed:

I am a small-scale farmer. I cannot sell one litre to a milk processor. So, I opt to sell to milk traders who collect milk from farmers like me who are not able to produce five litres. (FGD#2)

And yet another expressed reservation about a new law that was being formulated at the time of this study.

Look at the new law that they want to introduce on the prohibition of the sale of milk locally. Imagine, they want to prevent me from selling milk to my neighbour or local markets. Yet the processors require me to have many litres. But I have one cow which gives milk for my family and I sell the excess like three litres. (FGD#6)

Furthermore, the focus group participants observed that agri-food safety regulations should be fair to both producers and consumers. More importantly, they claimed that if government wants farmers to produce safe agricultural products, they need to develop laws or regulations that do not threaten their livelihoods. One focus group participant said:

The government should help all of us [producer and consumer]. If they want me to protect the consumer, they should come up with regulations that motivates me to produce not only more but also safe food. (FGD#1)

Another participant remarked:

The government has told me to follow the law [when producing maize]. But on the other side [selling maize], you are not giving me a good price. How then do you expect me [farmer] to protect you [consumer] when government does not protect me [farmer]? (FGD#2)

Also, government was seen as unfair for failing to effectively involve farmers in the formulation of law. The participants mentioned that if they were involved in formulating the regulations, they would be more receptive to the regulations.

If you call people together and teach people about law, like a village; anything is possible. I mean let people participate and know why they need to follow law. (FGD#2)

On the issue of trust in the government, the participants indicated that trust in the government affects farmers' motivation to act appropriately. Specifically, the issue of enforcement of regulations, lack of law enforcers and extension officers, and corruption within law enforcement are key factors that weaken normative motivation to act appropriately. Regarding lack of enforcement, 31% of focus group participants indicated that if the government does not enforce regulations, farmers' motivation to act appropriately decreases. One focus group participant remarked:

Two people need to be there for a problem to occur. The government is supposed to implement the law and I am supposed to follow. But if the regulator is not there to educate or tell me that this is unlawful, I will not be motivated to comply. (FGD#1)

Another focus group participant said:

Even if regulations are made the size of this house, and there is no one who is saying you have violated the law, it is useless. (FGD#4)

A key informant agreed:

There is no enforcement. If the government could become serious and ensure that these good regulations are followed, no farmer would fail to follow. (KI#6)

One focus group participant explained how the absence of government affects their response to regulations.

You see why we are doing all these is because there is no government [normative goal]. If somebody can take milk and it is sampled, problems can be found. Somebody just wakes up and says I want to do this. And you do in the way you have thought. There is no better guideline than government because they have information of what should be done. But where is the government? (FGD#4)

Another said:

Enforcement of regulations is poor. These people [law enforcers] only become active whenever there is a problem like an outbreak of illness or when they want money. All the other times, farmers are on their own. (FGD#2)

Lack of trust in government to enforce regulations is compounded by its failure to deploy enough human resources (law enforcers and extension officers) to help farmers understand and comply with agri-food safety regulations. Thirteen percent of focus group participants and 14% of key informants supported this claim. One focus group participant revealed that the shortage of veterinary officers has made it difficult to access advice as frequently as needed.

In the past, there were extension officers who were going to the field to train farmers, but we are no longer getting this service. (FGD#3)

One key informant, the head of a professional association of experts in livestock production, supported the views of the farmers that the shortage of extension services has contributed to the breaching of agri-food safety regulations by farmers. The key informant also mentioned that lack of funding has contributed to poor policing of farms.

> *There is a problem of human resources. This problem started when the government privatised veterinary extension services back in the early 1990s. Since then, farmers have been required to contribute to their veterinary extension services. Also, there is minimal funding from the government. All this has contributed to a situation whereby farmers are not adequately policed as few vet officers cannot adequately carry out surveillance (KI#16).*

Trust in government is also affected by corruption in law enforcement. Fifteen percent of focus group participants and 21% of key informants, especially non-government key informants, reported that corruption is a major factor that encourages violation of agri-food safety regulations. One focus group participant said:

> *Some farmers view compliance as unnecessary and consider the view that there is the possibility that you can opt not to comply and fail to be caught by police, or even if you are caught, you can escape – courtesy of corruption! (FGD#4)*

A meat trader stated:

> *I blame corruption. It is not possible for a sick livestock to pass so many regulatory bodies on the way to town. (KI#19)*

However, some participants categorically stated that the government should not be blamed. One focus group participant remarked:

> *I do not blame the government. One should do the right thing at the right time*. (FGD#5)

Another agreed:

People [farmers] have been trained on why they should not use farm chemical containers. However, they still use. Do you blame government for that [non-compliance]? (FGD#3)

6.2.3 Hedonic goal

According to the goal framing theory, the hedonic goal is concerned with how a person feels after violating or complying with regulations. It is concerned with feelings such as fun, joy, comfort, happiness, fear, shame, guilt, discomfort, or anger (Lindenberg, 2000). In this study, it was identified that *feelings of guilt* for putting the life of another person in danger by violating agri-food safety regulation increase farmers' compliance. Almost a third of the focus group participants (30%) mentioned that farmers who are concerned about the impact of violating agri-food safety regulations upon others are more likely to follow food safety regulations. In particular, the focus grou participants reported that farmers who hold strong beliefs that it is unethical to sell contaminated produce are less likely to violate agri-food safety regulations. One focus group participant said that:

It is supposed that another person eats what you eat. (FGD#4)

and another remarked that:

For me, I cannot allow some people to suffer because of me. (FGD#3.

Yet another participant said:

If you have sprayed vegetables, you must tell the person that I have sprayed. For me, I will not sell. (FGD#2)

Another FGD participant stated:

When you are selling contaminated farm produce, you could be killing a fellow human being. I do not think you will sleep well [I don't think your conscience will allow you to live a normal life because what you have done is wrong]. (FGD#3)

However, some participants observed that individuals with no sense of guilt are more likely to violate agri-food safety regulations.

> *If a person wants to do a good thing, he/she will do it, but if they want to hide something, no matter how bad it is, they will. It is their conscience. (FGD#4)*

A milk trader supported the view that the hedonic goal of reducing guilt greatly influences the compliance decisions farmers make when selling farm produce, especially on disclosure of the quality and safety issues.

> *The unfortunate part of our business is that we rely on farmers to tell the truth [i.e., if milk is good]. For example, unless the farmer tells you he has injected the cow or given it some medicine, it is hard for me to know. (KI#13)*

6.2.4 Goal constellation/interplay between the goals

The last theme that emerged from the focus groups and key informant interviews was how two or more goals interact to provide justification or shape how farmers respond to regulations. Four sub-themes emerged: 1) dominant motivation, 2) effect of normative motivations on gain goals, 3) simultaneous impact of hedonic motivations on gain and normative goals, and 4) effect of normative motivations on the hedonic goal. These themes are discussed below.

6.2.4.1. *Dominant goal*

Analysis of the responses of the participants revealed that the dominant motivation when compared to the other motivations (i.e., hedonic and normative goals) was gain, as 43% of focus group participants supported the observation that whenever two or more goals were at play, gain motivations took precedent. One participant remarked:

> *When things are difficult, I sell. I need the money!* (FGD#3)

and another said:

> *I cannot throw away milk [normative motivation] when I am looking for money [gain motivation]. (FGD#1)*

Another participant remarked regarding *okoa*.

> *The issue of okoa is bad. It is dangerous. Someone knows the cow had been injected with veterinary drugs; but proceeds to sell it because of money. You see the risk here. Money [gain motivation] has become more important than human life [normative and hedonic motivation]. (FGD#6)*

Further, some participants observed that the normative goal of acting in accordance with social norms is no longer a strong motivation for non-compliance, having been overtaken by the gain goal. More precisely, 11% of focus group participants and one key informant observed that social norms no longer motivate non-compliance. Rather the greatest motivators are poverty and the need for income. One focus group participant said:

> *Culture is there but it is not the problem [normative goal]. The overriding problem is a lack of money [gain goal] and poverty. (FGD#2)*

6.2.4.2. *Effect of normative goal on gain goal*

Discussion with participants indicated that normative goals strengthen gain goals. For example, one focus group participant pointed out how the gain goal (need for money) is reinforced or strengthened by the normative goal of acting appropriately as per cultural traditions. One focus group participant said:

> *You know it is psychologically torturing to a Nandi person seeing a cow dying. It is even painful to bury it [normative goal]. So, it is even better for it (sick cow) to be removed from you, so that you do not see it suffering. So, in those situations, it is better for any person to take it [selling, gain goal]. (FGD#4)*

The above observation confirms the findings of the quantitative survey that the gain goal is significantly linked to the relationship between agri-food safety compliance and normative goals.

6.2.4.3. *Simultaneous impact of hedonic goal on gain and normative goals*

Two aspects discussed by the participants indicated how hedonic motivations simultaneously affect gain and normative motivations. First, 15% of focus group participants claimed that with an increase in illness and disease linked to the consumption of contaminated farm produce, more farmers are following agri-food safety regulations. Specifically, most focus group participants mentioned the increasing incidence of cancer and the link to farm chemical use. One participant explained how he was motivated to grow crops in a safe way (complying with agri-food safety regulations) rather than endanger the life of another person.

> *I have thought about diseases that are being linked to what we do or use on farms, especially chemicals. For example, the issue of cancer has become an issue of concern. I have thought that it is better that you grow crops in a safe way [hedonic motivation] than sell [gain motivation] and kill people [hedonic motivation]. (FGD#4)*

Participants also discussed how an individual's actions in selling contaminated farm produce can affect them directly or indirectly. One participant remarked the following:

> *Even if you do not follow the law by selling contaminated farm produce [gain goal], it will affect you, and if it does not affect you, it will affect your child, relative, neighbor, or another person you are close to. (FGD#6)*

Another FGD participant said:

> *When you kill another person by selling contaminated farm produce [gain motivation], you are indirectly killing yourself because someone close to you may consume it [hedonic motivation]. (FGD#2)*

The above quotes show how hedonic motivation strengthens the normative motivation to act in accordance with formal rules and weakens the gain motivation of generating income. One focus group participant said:

If you sell okoa or rotten maize and you accept money [gain goal], have you done good thing [hedonic]? It is better that as a farmer you are arrested as well as the buyer. (FGD#5)

6.2.4.4. *Effect of normative goal on hedonic goal*

Whereas the analysis of the opinions of the interview participants had shown that hedonic motivation influences normative motivation, it did not show a direct influence of normative motivation on hedonic goals. However, some interview respondents noted that if normative factors such as the provision of information and social norms are strengthened, the hedonic motivation of feeling guilt would increase. More precisely, if farmers are provided training on the impact of contaminated food, the hedonic motivation of the guilt feeling is amplified. One participant said:

Nowadays because a lot of food-borne diseases especially cancer, people have realised the importance of conscious food consumption. People are no longer eating food anywhere. (FGD#4)

The schematic illustration of the interrelationships between the three motivations in this study is provided in Figure 6.1. In the diagram, the dominant motivation is the gain goal, while the hedonic and normative goals are in the background. Normative motivation strengthens the gain goal while the hedonic goal destabilises the gain goal. The normative and hedonic goals both strengthen each other.

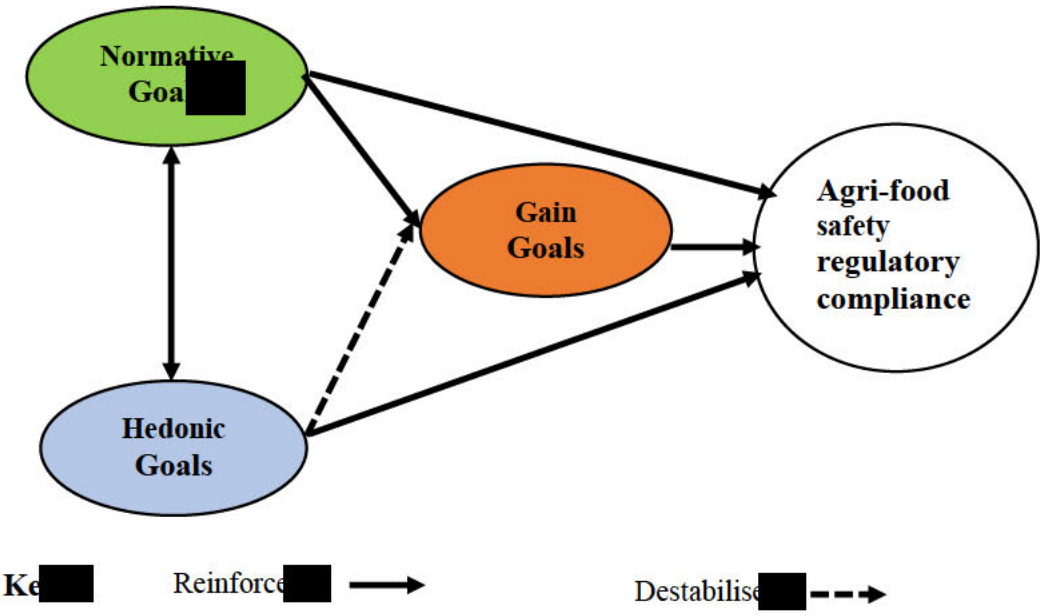

Figure 6:1: Schematic illustration of the interrelationship of gain, normative and hedonic goals, and agri-food safety compliance

6.3 Prevention of farmers' non-compliance with agri-food safety regulations

Views were sought from the focus group and interview participants on ways to prevent farmers' non-compliance with agri-food safety regulations. The participants' responses were analysed from a crime prevention perspective, namely using the routine activity theory (Cohen & Felson, 1979). The rationale for using the routine activity theory to analyse this question is its pragmatic leaning towards ways of preventing law violations or improving security practices that decrease crime or non-compliance (Miró, 2014). According to the routine activity theory, crime/deviance or non-compliance can be prevented by altering one of three components: motivated offender, suitable target, or capable guardian. In this study, these three components of the routine activity theory were used as themes to analyse the qualitative findings on how to prevent farmers' non-compliance with agri-food safety regulations.

6.3.1. Reduction of factors that encourage motivated offenders

Motivated offenders are those who are inclined to violate the law if an opportunity arises (Cohen & Felson, 1979). Analysis of participants' responses revealed that there is a need for a reduction in the factors that motivate farmers to violate agri-food safety regulations. Three major factors were identified as strategies that can help to reduce the tendency of farmers motivated to violate these regulations: a reduction in compliance costs, rewards for complying with regulations, and involvement of farmers in the implementation and design of regulations. In the context of the goal framing theory, a reduction of compliance costs and compensation for losses while complying with the law directly address the gain goal of saving money or generating income. A key informant (veterinarian) observed that to reduce the motivation for farmers to sell contaminated farm produce, farmers must be compensated for the losses they incur when they follow the law.

> *When farmers comply with these regulations, no one is compensating for the loss they incur. Farmers destroy their animals at their own cost. (KI#6)*

The involvement of farmers in the design and implementation of agri-food safety regulations ensures that farmers have a voice in the regulations that will govern their lives. The ensuing sense of ownership enhances the normative goal of acting appropriately and increases the feelings of belonging when upholding the community's common goals. One focus group participant said the following in relation to the involvement of farmers in the formulation of law.

> *Start at the grassroots [formulation of law]. If it starts from national, it does not reach here, you do not feel it. (FGD#4)*

Yet another focus group participant added:

If we sit and discuss and come with an idea, people are more likely to accept. But if it comes from you, people are likely to dismiss it as yours. It is best for people to suggest first. (FGD#4)

The above quotes indicate that rather than a top-down approach, farmers need to be involved in decisions that affect or destabilise their established ways of doing things. More importantly, long-held beliefs and normalised social practices concerning food that encourage non-compliance can be reduced if governments work alongside farming communities. As it was found in the survey [20], food safety is 'everybody's business' and, therefore, government needs to work with farmers in the design and implementation of agri-food safety interventions. This bottom-up approach will help to reduce non-compliance by farmers and, more importantly, develop normative motivations to act appropriately to comply with formal rules that ultimately benefit farmers, their community, the nation, and beyond.

6.3.2. Reducing the attractiveness of suitable targets

Suitable targets are people, items, or places that are attractive to a person who is motivated to violate law (Cohen & Felson, 1979). In this study, suitable targets include high-value, high-demand, easily sold farm produce and attractive markets. These suitable targets support the gain goal construct in the goal framing theory. Some participants mentioned that there is a need to reduce the attractiveness of the contaminated farm produce targeted by rogue traders. Farm produce is attractive when it can be easily sold and is in high demand, such as milk, meat, and maize. In particular, participants observed that *okoa* and rotten maize need to be devalued to discourage farmers from selling them. One focus group participant said:

For me, I think we need to devalue rotten maize or okoa. If we devalue okoa or rotten maize, no one will be motivated to sell. (FGD#1)

[20] See Section 5.4

One key informant (a government officer) highlighted that an increase in the price of farm produce that is grown or produced in line with the law could motivate farmers to follow the law. This will, in turn, reduce the gain goal of *generating money* from the sale of contaminated farm produce. More specifically, the money generated from the sale of safe farm produce would offset income that would have been received from selling contaminated farm produce.

> *There is need for price premiums on food produced by following the law. If a farmer can receive good money from the sale of goods [farm produce] when they have followed the law, they will not be motivated to sell contaminated farm produce. (KI#12)*

The market is a place where guardianship also needs to be increased. Participants observed that illegal markets, especially the operation of rogue traders, need to be eliminated to discourage farmers from selling contaminated farm produce.

> *If we have to kill this snake [violation of agri-food safety regulations], we need to focus on the market. Let's start arresting the person who is buying and the moment we have arrested the person buying these things and the market is not there, we will finish that issue. If there is a search of people who buy rotten maize, and they are asked "why do you buy rotten maize and where do you take rotten maize when it has been said that rotten maize has aflatoxins?". But, as long as there is a hole (the black market) we will still sell. So, to succeed, we need to cut the link to the black market. (FGD#1)*

The markets identified as supporting the breach of agri-food safety regulations are small informal businesses and markets within the informal settlements in urban areas. UN-Habitat (2004, p. 12) defines informal settlements as urban areas with "inadequate access to safe water, inadequate access to sanitation and other infrastructure, poor structural quality of housing, overcrowding, and insecure residential status". These informal settlements are lucrative places to dispose of illegal goods, specifically contaminated farm produce, because they have ready

buyers, no stringent quality and safety requirements, and are poorly regulated (Hoffmann et al., 2013b; Roesel & Grace, 2014). One focus group participant explained how small businesses, especially roadside vendors and those in informal settlements, are attractive to farmers who sell contaminated farm produce.

> *Even if the processors refuse your milk, there are a lot of small hotels who require milk. You just ask if they want milk and they will buy. (FGD#6)*

While most participants blamed small businesses in urban centres for purchasing contaminated farm produce, some participants claimed that some small businesses in rural areas also sell contaminated farm produce. One key informant said:

> *There is a market, but it is not in town, it is more so in rural areas. Because this is where there is pig farming. (KI#14)*

Cumulatively, the above observations of increasing guardianship measures that limit the factors that motivate farmers to offend and reducing the attractiveness of suitable targets show that preventing agri-food safety non-compliance requires a change in the contextual and situational factors or opportunities. These include the impact of social norms, the existence of illegal markets, the provision of information and training about agri-food safety for farmers and others in the agri-food chain, and including farming communities in the design and implementation of agri-food safety regulations. By addressing these contextual factors, governments will be able to address factors that motivate farmers to violate agri-food safety regulations. They will also be able to devise programs that align with the goals that motivate farmers to comply with agri-food safety regulations. Likewise, they can develop programs and interventions that help farmers to abandon practices, activities, or behaviours that conflict with agri-food safety regulations with less resistance.

6.3.3. Increased guardianship measures

Two sub-themes emerged within the findings that relate to improving guardianship: an increase in deterrence, especially the risk of detection, and increased education in agri-food safety for farmers, consumers, and food traders. To increase deterrence, participants observed that timely detection of the violations reduces the likelihood that farmers and other actors in the agri-food chain would breach agri-food safety regulations. This finding is consistent with the survey findings where participants suggested that to improve farmers' compliance with agri-food safety regulations, there is a need to change how agri-food safety regulations are implemented (see Section 5.4). One focus group participant explained how law enforcers should be empowered to visit, arrest, and teach farmers about agri-food safety regulations and the consequences of violations.

> *There are a lot of things that can be done to prevent some of us from doing those things [violating agri-food safety regulations]. If a village elder is the one who has been told to oversee agriculture, they must have tools and equipment. When I say tools and equipment, I mean power [authority], finance, mobility, or communication. They should have power so that they can call police that there is someone who wants to consume carcasses, and police should arrive promptly. They should have powers to stop that farmer who wants to sell vegetables when the pre-harvest period has not elapsed or that farmer who is desperate to sell unfit farm produce to solve personal needs such as to take a child to a clinic. (FGD#1)*

Another focus group participant supported the view that law enforcers should be able to visit farms anytime to increase compliance.

> *Some of the officers [law enforcers or extension officers] are far away from farmers. Yet some field officers are out of reach [financially] to many farmers, especially small-scale farmers. Let the field officer come and check my farm. Let him go to the chicken*

coop and tell me "it is not good". Let him go to the dairy shade and ask me "where is the place you wash your hands?". They do not need an appointment, they can come now, tomorrow, or anytime. This will help [increase compliance]. (FGD#4)

Participants also discussed how the organisation of farmers into cooperatives can increase deterrence and improve compliance. Cooperatives utilise group or peer pressure to promote compliance among actors who share similar characteristics, usually referred to as self-regulation (Gunningham, 2010). In the routine activity theory framework, the organisation of farmers into cooperatives enhances capable guardianship measures (i.e., formal or informal control) and consequently improves compliance. Specifically, it uses guardianship measures to deter motivated offenders. One focus group participant explained how farmer cooperatives can improve deterrence and exert pressure to act appropriately (normative goal).

For me I think the best way to ensure that no one does a bad thing [violate agri-food safety regulations] is to use cooperatives. An example is Matatu [public services] SACCO [cooperatives] in Kenya. If we are in cooperatives, we should be having good knowledge. And also, if one person does the wrong thing, all of us suffer. So, you are forced to be disciplined because you do not want to ruin the image of your cooperative. (FGD#3)

Three key informants supported the view that market participation through cooperatives increases agri-food safety compliance among farmers. One informant said:

To ensure that farmers sell safe food, it is best to organise them into cooperatives. I mean all smallholders should be members of cooperatives by law. Also, all government services should go through cooperatives, and farmers operating individually should not get any government services. (KI#26)

Another key informant (a modern farmer and consultant on governance and farming in Uasin Gishu County) explained how self-regulation in the cooperatives can drive farmers to comply with agri-food safety regulations.

> *We need to organise farmers, especially small-scale farmers, into groups so that they self-regulate. This is good because the government monitors cooperatives and cooperatives monitor their members. (KI#21)*

The above quotes show that farmer cooperatives not only increase guardianship measures, but also foster the normative goal of acting appropriately and the hedonic goal of feeling guilty by not complying. With regard to the hedonic goal, fear of guilt or the need to avoid shame for ruining the reputation of cooperatives increases the propensity of farmers to adhere to agri-food safety regulations. This qualitative finding about the organisation of farmers into cooperatives confirms the quantitative finding where some survey participants suggested that farmer cooperatives are one approach for improving compliance (see Section 5.4).

For the strategy to provide more education for farmers, consumers, and food traders, some interview participants mentioned that if these stakeholders are trained in food safety and safety regulations, compliance is likely to increase. A key informant explained:

> *It is just capacity building: if someone knows the benefits and consequences of not complying, they are more likely to comply. (KI#12)*

Yet another focus group participant explained that law enforcers should focus not only on arresting, but also on educating farmers.

> *The officers should not only to come to arrest, but they should also be able to teach them [farmers] about the law (FGD#1).*

One focus group participant explained that the training of farmers should be targeted, on-farm, and ongoing. Over time, this can help increase the normative goal of acting appropriately.

A person should come to the doorstep of the farmer and ask the farmer about any problems about his/her farming. Like, "which diseases are your livestock having?" Because there is no knowledge, some farmers may have chickens who are sick, and yet there are simple pesticides. But if government wait for field days to train farmers, it will not work. (FGD#3)

A key informant (the chairman of a national organisation of professionals in the agri-food chain) explained how the training of farmers on aflatoxin contamination and its links to lifelong diseases such as cancer have helped to improve compliance with safety regulations, especially in reducing the use of contaminated maize for animal feed, especially maize with high moisture content or rotten grain.

For me, farmers are the first line of defence and we need to train them. However, there are less efforts in helping farmers understand the connection between their action on farms and the long-term impacts. Yet, some serious health problems crossover from animals. One exception is that some farmers are now aware of the serious long-term impact of using contaminated animal feeds especially those which relate to aflatoxin contamination. This has been possible after farmers have been trained about aflatoxins. (KI#16)

The above quotes suggest that to improve farmers' compliance with agri-food safety regulations, government and other stakeholders in the agri-food chain need to put more effort into training farmers about the direct benefits of compliance or the negative impacts of non-compliance. By doing so, they will be activating the normative goal of behaving appropriately as well as the hedonic goal of feeling guilty for violating agri-food safety regulations. Also, it will improve guardianship measures, as educated farm producers and consumers can act to deter crime.

6.4 Summary and conclusions

This chapter presented the findings of the focus group discussions with farmers and in-depth interviews with key informants. Like the survey participants, the focus group participants and key stakeholders in the agri-food chain discussed agri-food safety, agri-food safety regulations, farmers' compliance with agri-food safety regulations, and factors that influence their compliance decisions.

Three important findings emerged from the qualitative studies. First, consistent with the quantitative findings, the sale of contaminated farm produce and non-observance of withholding periods were identified as major agri-food safety concerns. The participants openly discussed their non-compliance in the qualitative studies, suggesting non-compliance with certain regulations has become a social norm. The qualitative study also found a disconnect between the perceptions of key informants and farmers on farmers' compliance with agri-food safety regulations and the seriousness of non-compliance. Specifically, more key informants than survey participants observed that farmers rarely comply with agri-food safety regulations. In addition, key informants were more likely than the survey participants to consider farmers' non-compliance to be a serious concern.

Furthermore, farmers tended to consider non-compliance with agri-food safety regulations from only a public health perspective as harm to consumers, whereas the key informants portrayed a broader perspective of food crime to include violations of agri-food safety regulations that harm not only consumers but also farmers, farm workers, farm animals, and the environment. Both the farmers and the key informants defined non-compliance with agri-food regulations as a crime from a social-legal perspective. Finally, the farmers did not consider the violation of formal agri-food safety regulations a crime if non-compliance is guided by social norms and the actions benefit them socially and culturally.

Eleven factors that influence farmers' non-compliance with agri-food safety regulations were identified: cost avoidance, securing income or profit, loss aversion, lack of reward for complying, opportunities to generate income, a low penalty for non-compliance, a low risk of being caught, fear of social norms that contradict the law, lack of awareness of law and policy outcomes, poor perception of government, and feelings of guilt.

Regression analysis of the quantitative data identified three factors that are significantly related to farmers' compliance with the agri-food safety regulations (deterrence measures; provision of information, training, and extension services to farmers; and farmers' perception of regulations as being fair), and the qualitative analysis provided insights into the way these and other factors shape farmers' response to agri-food safety regulations. More importantly, the qualitative study demonstrated how the factors of loss aversion, lack of rewards for complying, and existence of economic opportunities are worthy of consideration for improving agri-food safety compliance. The qualitative findings revealed that agri-food safety regulations that reduce economic returns are likely to be disregarded.

Social norms were perceived to affect agri-food safety compliance both positively and negatively. They were perceived to have a positive effect when not in conflict with agri-food safety regulations, but social norms that pressure farmers to follow traditions have a negative effect by encouraging non-compliance. The findings revealed that more effort is required to motivate farmers to comply with regulations by involving them in the formulation of the regulations, training them to understand the regulations, and assisting them to comply.

While statistical analysis of the quantitative data showed that the variables that represent gain and normative goals are statistically related to agri-food safety compliance, the qualitative findings revealed that the hedonic goal is equally important in explaining the compliance

decisions of farmers. More specifically, the feeling of guilt for violating regulations that protect the health of fellow human beings encourages people to follow agri-food safety regulations. From a crime prevention perspective, while there is a need for government to increase deterrent measures, there is also the need to address social, economic, and legal contextual factors such as the existence of illegal markets, the provision of information and training about agri-food safety, and farmers' perceptions of government.

Overall, the findings of these qualitative studies significantly enhanced the quantitative findings reported in the previous chapter. The integration of the qualitative and quantitative findings is discussed in the next chapter.

Chapter 7

Discussion and Conclusion

7.0 Introduction

Compliance with agri-food safety regulations is critical for protecting consumers. However, it also has implications for access to markets and the financial returns for farmers. Unfortunately, balancing these public health and economic interests is a complex endeavour. This chapter presents a summary of the key findings of the study, which sought to understand the factors that influence farmers' agri-food safety compliance responsibilities and highlight any gaps that exist between policy outcomes (consumer protection and economic development) and what actually occurs in practice in Uasin Gishu County, Kenya. This chapter also includes a discussion of the contribution of the study to knowledge and policy development.

This chapter has seven sections. Following this first introductory section, the second section provides an overview of the study, and the third section presents a summary of the key findings. The fourth section discusses the implications of the findings, the limitations of the study are acknowledged in the fifth section, the sixth section provides suggestions for future studies, and the final section provides a conclusion and recommendations for future research.

7.1 Overview of the research

This study investigated agri-food safety and agri-food safety regulations, compliance, and enforcement in Kenya from the perspective of farmers and key stakeholders in the agri-food chain. There were three main research objectives:

1. examine the perceptions and opinions of farmers and industry insiders of agri-food safety and agri-food safety regulations and how well these regulations are complied with by farmers in Kenya.
2. identify the economic, socio-cultural, and legal factors that determine agri-food safety compliance in the context of a developing country such as Kenya.
3. provide recommendations on how compliance with agri-food safety regulations can be improved.

The study was inter-disciplinary in nature, drawing upon the disciplines of economics, entrepreneurship, criminology, law, psychology, political science, and sociology. In terms of theoretical frameworks, the goal framing theory from social psychology, the rational choice theory, and the routine activity theory from criminology were used to examine the aims and objectives of the study. However, the goal framing theory was the major framework that guided this research.

7.2 Summary of the key findings

The discussion on the key findings is organised around the two central research questions: 1) farmers' and key informants' attitudes toward agri-food safety, agri-food safety regulation, and farmers' compliance in Kenya, and 2) the factors that influence farmers' compliance with agri-food safety regulations. Figure 7.1 below summarises the key findings for each research question.

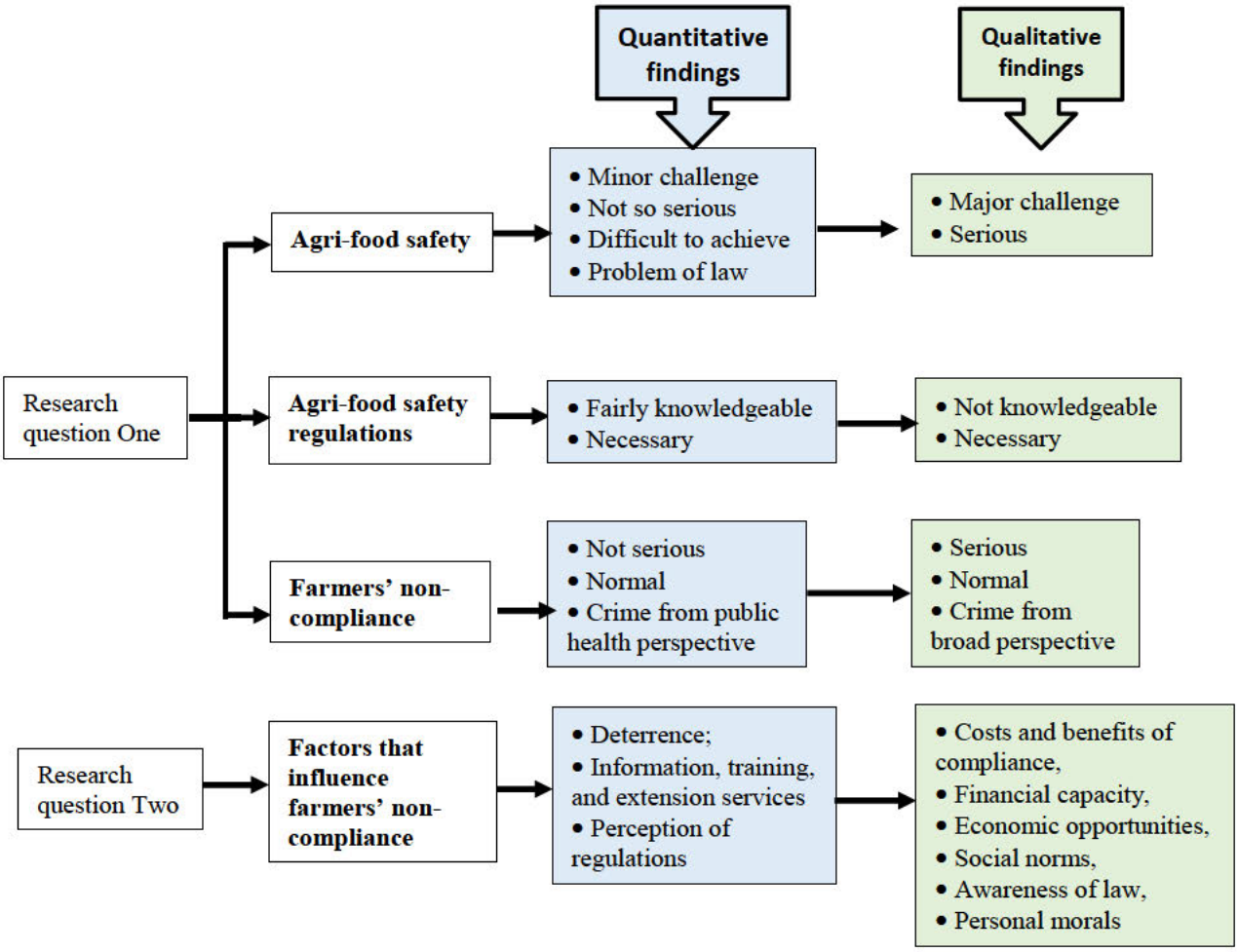

Figure 7:1: A conceptual diagram summarising the key findings of the study

The following two sub-sections discuss the key findings on these two central research questions.

7.2.1 Attitudes toward agri-food safety, agri-food safety regulation, and farmers' compliance in Kenya

7.2.1.1 Perceptions of agri-food safety

The findings on farmers' perceptions of agri-food safety were diverse. The study sought to understand how food safety is integrated into the context of other challenges that farmers face and how these impact on farmers' compliance decision-making. An understanding of farmers' attitudes towards food safety is vital for designing effective agricultural policy on food safety

that farmers will comply with and thus ensure public health. There were five major findings on farmers' and key informants' perceptions of agri-food safety.

First, the study found that safe and quality food is not a priority among farmers and other stakeholders in Uasin Gishu County in Kenya. Second, consistent with previous studies in other countries (Phuong et al., 2018; Shimeles et al., 2018), this study found that market volatility, the high cost of production, and climate change are the most pressing agricultural challenges. Third, few of the farmers surveyed identified food safety as a challenge for agriculture; in fact, some did not see it as a challenge at all. Conversely, many of the key informants interviewed considered food safety to be a major farming challenge in Uasin Gishu County. Large-scale farmers were more likely than small-scale farmers to consider food safety to be a challenge to farming.

The fourth finding was that while the focus group participants agreed that food safety is an agricultural challenge in Kenya, some thought that food safety was more of a problem for the law, and they could not link their responsibility for food safety on farm with public health. Others perceived that maintaining food safety standards is just too difficult to achieve. This disparity in perceptions of food safety among different farmers and key informants suggests that policy makers need to consider the socioeconomic differences (i.e., age, economic ability, and farm size) among farmers when implementing agri-food safety policy and programs. It also suggests that more effort is required to increase awareness of agri-food safety and its link to public health and economic development.

The fifth finding concerned the perceptions of farmers about various agri-food safety hazards and concerns. Key informants as compared to farmers were more articulate, specific, and detailed in their perception of different agri-food safety hazards and concerns The study revealed that the sale of contaminated farm produce, especially livestock under medication or

sick livestock, which tends to have an immediate and severe public health impact. Farmers and key informants were also concerned about aflatoxin contamination in maize and the sale of crops or produce where the withholding period had not elapsed. Farmers did not use of contaminated water, farm chemicals, or manure in food production to be threatening. This finding is consistent with previous research in Kenya (Momanyi et al., 2019; Nguetti et al., 2018; Odwar et al., 2014) that identified the sale of contaminated produce as a key food safety challenge. This suggests areas where the government needs to provide more information about the effects of various agri-food hazards and act to enhance knowledge and improve agri-food safety behaviour.

Last, another key observation was related to the major incidences of food poisoning in Uasin Gishu County, particularly the blurred lines between agri-food safety violations and general food poisoning events. In fact, few incidents were directly linked to a breach of agri-food safety regulations by the focus group participants. Rather, they linked food poisoning to the consumption of contaminated meat and vegetables, which they considered to be a normal occurrence. The focus group participants did not consider the likelihood that the contaminated food could have been caused by non-adherence to the withholding periods after drug or chemical administration. These findings indicate that participants do not have a clear understanding of food safety and its impacts on human health.

7.2.1.2 Perceptions of agri-food safety regulations

There were four key findings concerning the perceptions of agri-food safety regulations. First, the surveyed farmers believed that farmers are fairly knowledgeable about agri-food safety regulations in Kenya. Conversely, the key informants maintained that a greater proportion of farmers are not knowledgeable about agri-food safety regulations. This finding is similar to reports for Tanzania by Mwatawala and Yeyeye (2016) concerning farmers' lack of knowledge

of pesticide regulations. Likewise, Foundjem-Tita et al. (2014) found in Cameroon that farmers' awareness of forest regulations was low.

The second key finding was that the surveyed farmers were more aware of milk safety regulations compared with regulations for meat, general farm produce handling and storage, and farm inputs. This was not surprising as the leading milk regulator in Kenya (the Kenyan Dairy Board) has provided training for farmers and ensured the enforcement of regulations. This was in contrast to regulators in other areas of agri-food safety who were perceived as not doing enough to raise farmers' understanding of agri-food safety law. Many farmers (both in the survey and the focus groups) acknowledged the role of the milk regulator in enhancing their awareness of milk safety regulations, which implies that other agri-food safety regulators in Kenya need to improve their training and provision of information to farmers.

Third, the majority of farmers believed that agri-food safety regulations in Kenya are necessary, but few thought that these regulations are fair, clear, and understandable. Some farmers maintained that agri-food safety regulations are outdated and no longer appropriate. Lastly, others claimed that they have limited access to information about agri-food safety regulations in Kenya. Cumulatively, these qualitative findings also point to the need for more farmer education and training on agri-food safety regulations to improve the safety and quality of farm produce in Uasin Gishu County and Kenya.

7.2.1.3 Perceptions of agri-food safety compliance and enforcement

In relation to farmer's compliance with agri-food safety regulations, the farmers surveyed noted a lower level of non-compliance than was reported by the key informants. This is partly explained by the fact that some key informants were from government departments that deal directly with agri-food safety and thus have a heightened awareness of the issue of non-compliance.

Another observation about agri-food safety compliance is the normalisation of violations of agri-food safety regulations. Both the focus group discussions and key informant interviews revealed that some violations of agri-food safety regulations have become so normal that they are now part of everyday practice for farmers. This was supported by the openness with which participants reported their own breaches of some agri-food safety regulations. One such normalised agri-food safety breach is the sale of sick livestock or stock under medication. In fact, one focus group participant openly reported that he had sold a sick cow. The key informant interviews corroborated that some non-compliance practices have become a social norm. This finding highlights that non-compliance has become engrained in society and emphasises the need for government action to work with communities to reverse the social norms.

With regard to the perception of non-compliance with agri-food safety regulations being a 'crime', there were two major findings. First, both farmers and key informants leaned towards defining agri-food safety non-compliant behaviour as food crime from both social and legal perspectives. These non-compliant behaviours included food adulteration, the deliberate sale of contaminated farm produce, non-adherence to drug use procedures and withholding periods, and the sale and use of contaminated animal feeds. Other agri-food safety non-compliant behaviours that were identified as constituting crime were the non-disclosure of information about farm produce and the use of contaminated containers to store or transport farm produce. However, farmers did not consider the violation of formal agri-food safety regulations to be a crime if non-compliance is guided by social norms and the actions benefit them socially and culturally.

Second, participants viewed food crime from three angles: harm, intention, and deterrence. From the harm perspective participants viewed food crime to be any violation of law that has a serious impact upon human beings or farm animals (i.e., loss of life or illness), or leads to

environmental destruction. While farmers tended to consider non-compliance with agri-food safety regulations from only a public health perspective (i.e., harm to consumers), the key informants portrayed a broader perspective of food crime to include violations of agri-food safety regulations that harm consumers, farmers, farm workers, farm animals, and the environment (Gray & Hinch, 2015; Tourangeau, 2016a).

In terms of intention, any violation of agri-food safety regulation that is committed with the intention of economic gain was viewed by participants as food crime. This definition of food crime included deceptive and fraudulent practices such as the deliberate sale of contaminated farm produce. In relation to the deterrence perspective, participants observed that some food safety non-compliance practices should be defined as crimes and attract harsh punishment to discourage and prevent repetition. The deterrence perspective is largely a crime prevention approach to defining crime.

Overall, these findings on perceptions of non-compliance with agri-food safety regulations as food crime suggest that regulators and governments need to develop a broad definition of what constitutes food crime. It also emphasises the need to improve the education of farmers to increase compliance. Last, the government needs to expand regulations and enforcement beyond the farm gate to include farm produce and farm input markets.

With regard to enforcement of agri-food safety regulations, the survey participants believed that there is no pressure on farmers to comply with agri-food safety regulations. The focus group discussions corroborated the survey findings, which were that it is unlikely that farmers who breach agri-food safety regulations would be penalised. These findings suggest that the absence of deterrence is a major contribution to non-compliance with agri-food regulations.

7.2.2 Factors that influence farmers' compliance with agri-food safety regulations

Kenyan farmers' decisions to comply with agri-food safety regulations depend upon a variety of factors that are explained by the goal framing theory (i.e., gain, normative, and hedonic goals). These findings are consistent with previous research that identified the importance of gain, normative, and hedonic goals in shaping farmers' compliance with agri-food safety regulations (Longo et al., 2019; Winter & May, 2001; Yan et al., 2015).

Whereas the regression analysis identified the three factors of deterrence; provision of information, training, and extension services; and perceptions of regulations as being significantly related to farmers' compliance with agri-food safety regulations, the qualitative analysis provided important insights into how these factors shape farmers' response to agri-food safety regulations. The qualitative findings also revealed that the non-significant factors of rational choices around costs and benefits of compliance, financial capacity, economic opportunities, social norms, awareness of law, and personal morals are equally important for understanding why famers violate regulations that have important outcomes for consumer protection.

7.2.2.1. Gain goal

Regarding the gain goal, participants in the qualitative study identified four related issues: (1) cost-benefit-driven decisions, (2) financial capacity, (3) deterrence, and (4) economic opportunities.

A. Cost-benefit-driven decisions

Complying with regulations has implications for farm operations and affect the economic decisions of farmers. The survey participants reported that farmers make agri-food safety compliance decisions based on the associated costs or benefits. This finding is consistent with

previous studies on agricultural regulatory compliance and farmers' rational choices around the costs and benefits of compliance (Arias, 2015; Muriithi et al., 2011; Yan et al., 2015).

The qualitative studies showed five major manifestations of rational choices around costs and benefits of compliance: avoidance of compliance costs, loss aversion, farmers' financial capacity, existence of economic opportunities (legal or illegal), and lack of government compensation for losses incurred by compliance. With regard to compliance costs, the study found that if farmers perceive compliance costs to be high, the chances of compliance are reduced, which is in line with the findings of Muriithi et al. (2011) and Yan et al. (2015). Importantly, complying with regulations has direct and indirect cost implications. It can also mean extra fixed or operational expenses, which some farmers may be motivated to avoid to save money or generate a profit. Complying with agri-food safety regulations requires farmers to modernise their farming practices with little or no returns. As one farmer put it, "*whether you follow the law or not, the price is the same*" (KI#11). As Okello (2005) states, compliance with agri-food safety regulations increases the fixed costs and the transactions costs of production, which reduces farm profit. This situation indicates that the government needs to make agri-food safety regulatory compliance attractive and affordable for farmers.

Loss aversion emerged as another factor associated with farmers' cost-benefit analysis of agri-food safety regulatory compliance. In particular, it was clear from the focus group discussions that some farmers breach agri-food safety regulations in order to avoid loss or costs associated with following the law. The qualitative studies revealed that compliance with agri-food safety regulations puts a relatively high cost burden on small-scale farmers or farmers with lower incomes, which reflects the findings of several regulatory scholars (Arias et al., 2015; Hendrickson & James Jr, 2005; Winter & May, 2001). For example, some small-scale farmers face the dilemma of losing income or going hungry because they cannot sell the milk from their

one cow for three days in order to comply with the agri-food safety regulations regarding the withholding period. Therefore, as complying with food safety regulations has differential implications on their lives, some farmers breach agri-food safety regulations for socioeconomic reasons. The implications are that the government needs to make compliance with agri-food safety regulations financially attractive by supporting farmers to modernise their operations.

Compliance with regulations compounds other farming pressures, such as a lack of reliable access to agricultural supplies, fluctuating market prices, climatic changes, or poor government policy, which means farmers need to prioritise their spending. Basic needs such as food, school fees, medical costs, clothing, and contributing to local ceremonies take precedence over compliance with agri-food safety regulations. According to Winter and May (2001), regulated actors with financial resources have a greater capacity to comply, suggesting that the socioeconomic status of farmers must be considered when developing agricultural policies. To develop effective and sustainable agri-food safety policies, governments from developing economies like Kenya must pay attention to farmers' financial capacity to comply, especially small-scale farmers.

Another finding that relates to rational choices around costs and benefits of compliance is the impact of market dysfunction and instability upon farmers' compliance with agri-food safety regulations. Scholars have long examined the impact of market stability on individual decision-making (Beckert & Wehinger, 2012; Spencer et al., 2018). This study demonstrates that there are two ways in which market dysfunctionality and instability impact not only on farming operations but also on farmers' daily lives.

First, agri-food safety regulations tend to disproportionately affect small-scale farmers more than large-scale food producers. Small-scale farmers viewed agri-food safety regulations as a barrier to accessing formal markets. The strict requirements of the formal markets (i.e.,

commercial and government food processers, public hospitals, supermarkets, public schools, boards, and other government institutions) mean extra costs, as farmers are required to implement operational changes to guarantee the safety and quality of farm produce. Farmers reported that they would rather sell to informal markets that do not have stringent requirements. This finding is similar to the findings of Hoffmann and Moser (2017) in Kenya in relation to rejected contaminated maize that is redirected to lower value markets (i.e., informal markets in this study). In addition to tight restrictions and regulations by formal buyers, farmers believed that the bureaucratic nature of payment by the formal markets creates unnecessary delays and possibly increases financial pressure on farmers, especially small-scale farmers.

Second, the farmer discussions and key informants interviews revealed a connection between loss aversion, avoidance of compliance costs, and the existence of illegal markets, especially rogue traders willing to trade contaminated agricultural produce. Rogue traders present an opportunity for financially constrained farmers to avoid the stringent requirements of formal buyers and generate cash for farming and daily living expenses. This finding suggests that government and regulators need policies that regulate rogue traders. The findings also indicate that breaches of agri-food safety regulations occur on both supply and demand sides in the agri-food chain. Specifically, on the demand side, consumers who are struggling to purchase cheap food for daily living buy farm produce that corresponds to their financial situations and may be produce of poor quality that might not be safe. This finding mirrors that of Hoffmann and Moser (2017), who reported that poor consumers who cannot afford the high-priced farm produce from formal markets are at high risk of exposure to contaminated food. On the supply side, farmers sell contaminated farm produce to avoid loss or generate income for daily living. Therefore, there is a need to also target consumers in any campaign aimed at improving farmers' compliance with agri-food safety regulations.

Generally, in accordance with a goal framing approach, it is concluded that the gain goals of avoiding compliance costs and losses and generating income or making profit significantly influence the compliance decisions of farmers. Agri-food safety regulations that involve costs to farmers or reduce economic returns are more likely to be violated. In other words, where there is opportunity to profit or avoid costs or loss, non-compliance is likely to occur.

B. Deterrence

The influence of deterrence on farmers' compliance with agri-food safety regulations was found to be statistically and positively significant, reflecting the findings of Yan et al. (2016) and Ramcilovic-Suominen and Hansen (2012). The farmers' group discussions and key informant interviews complemented the survey findings. Not only did farmers appear to weigh the benefits and costs of non-compliance, but their compliance decisions also appeared to confirm the frequency with which regulations are implemented and where they are implemented. First, there is low or poor inspection of farms by compliance officers, with more remote farms being less likely to be inspected or monitored compared to farms in peri-urban areas. Second, there was a general belief that the absence of criminal prosecution of farmers and other food chain actors is fuelling the breaches of agri-food safety regulations.

Previous studies (such as by Okello & Swinton, 2005; Yan et al., 2015) on deterrence and agricultural regulatory compliance also found that lapses in enforcement of agri-food safety regulations in terms of low risks of detection and criminal prosecutions entice some farmers to flout agri-food safety regulations for economic gain, as guardianship is reduced or eliminated. This conclusion implies that more effort should be targeted towards regulating remote farms and prosecuting those who violate regulations.

7.2.2.2 Normative goal

This section discusses the findings regarding the normative goal across three broad areas: (1) the impact of social norms, (2) awareness of regulations and provision of information, training, and extension services, and 3) the influence of legitimacy. Each is discussed next.

A. Social norms

It was hypothesised that social norms affect farmers' compliance with agri-food safety regulations. While the regression analysis revealed that social norms were not statistically significant, the qualitative analysis provided important insights on how social norms influence agri-food safety compliance. In short, the study found that social norms could either enhance or reduce farmers' compliance with agri-food safety regulations. Norms enhance farmers' compliance with agri-food safety regulations when they are consistent with formal regulations; however, when social norms mandate a different course of action to that required by the agri-food safety regulations, non-compliance prevails. This finding supports the findings of Foundjem-Tita et al. (2014) and Siddiki et al. (2012), who concluded that fear of social sanctions or a desire to maintain a good social reputation influence the way farmers respond to agricultural regulations. Overall, social norms are likely to negatively affect farmers' compliance with agri-food safety regulation.

Four observations were made regarding the impact of social norms on farmers' compliance with agri-food safety regulation. First, the focus group participants demonstrated how beliefs that individuals and communities hold about food, food animals, or human life are used by farmers to justify or rationalise their choice of breaching or adhering to agri-food safety regulations. This finding is in line with previous research that identifies an important role for social norms in shaping farmers' decisions about law (Foundjem-Tita et al., 2014). In this study, participants in the qualitative studies discussed how beliefs about milk and meat and livestock production pressure farmers to breach agri-food safety regulations by selling

livestock or milk that do not meet health requirements. For example, the need to avoid being seen to go against social norms, such as burying dead stock, forces some farmers to opt to sell sick livestock rather than bury or burn an animal if it dies. Similarly, the belief that it is not culturally appropriate to waste milk pressures some farmers to sell milk that does not meet safety standards. However, there is evidence of an impact of government action. The study found that traditional norms about food and food animals are waning as modern methods of handling and storing food increase.

These findings about the impact of beliefs and social sanctions on compliance mirror what other scholars have concluded about the influence of social norms on compliance (see Burton et al., 2008; Siddiki et al., 2012; Winter & May, 2001). Winter and May (2001) investigated the compliance of Danish farmers with environmental regulations and found that social pressure can bolster compliance. Similarly, when examining American farmers' compliance with aquaculture regulations, Siddiki et al. (2012) showed that the desire to maintain a good reputation and a strong feeling of guilt significantly affect the compliance intentions of farmers. This finding also supports Foundjem-Tita et al.'s (2014) conclusion about farmers and forest use rules in Ghana.

Another finding from the qualitative studies is the way societal values concerning food and food animals and market availability interact to motivate farmers to violate agri-food safety regulations that prohibit the sale of contaminated food. In this study, the beliefs about farm produce and farm animals such as "*you cannot throw milk out"*, "*it is bad to burn maize"*, or "*it is painful in our community to see cow suffering"* support the unlawful sale of contaminated farm produce.

A further observation about the impact of social norms on agri-food safety compliance relates to responses to normalised agri-food safety breaches. Behaving contrary to normalised social

norms or practices may attract social sanctions in the form of ridicule or shaming, or in extreme case, exclusion from a group. This is consistent with the findings from the focus group participants in this study [21], which were that some agri-food safety violations have been normalised to a point where farmers tend to adhere to them without fear of formal sanctions. Specifically, the use of farm chemical containers for storage and transportation of milk and the sale of sick livestock or stock under medication (i.e., *okoa*) have been normalised to the extent that farmers openly discussed their participation in these illegal practices. To conclude, this study shows that social norms can both support or inhibit farmers' acceptance of and compliance with agri-food safety regulations.

B. Awareness of law and provision of information, extension, and training

The survey found no significant difference between farmers' awareness of agri-food safety regulations and compliance with these regulations, despite the fact that most participants identified this as a factor that can either impede or encourage compliance. However, the focus group discussions and key informant interviews revealed that farmers' awareness of the law does influence their compliance decisions, which is in line with the findings of Winter and May (2001) and Mwatawala and Yeyeye (2016), who noted that awareness of any regulation increases compliance. Yan et al. (2015) concluded that if those who intend to obey regulations are not made aware of them, it will be difficult for them to comply with the regulation. Also, some regulations may be new or not sufficiently publicised to gain the attention of the regulated community. Moreover, the requirements of known regulations may not be well understood because they are too vague or complex for the regulated community.

The survey findings also indicated that farmers with secondary school qualifications or above were more knowledgeable about agri-food safety regulations than those with primary school

[21] See Section 6.2.1.1

or lower qualifications. Ogolla et al. (2015) also found a strong association between level of education and compliance with safe work practices among dairy farmers in Kenya. In their research, dairy farmers with a primary level education or below were less likely to implement safe work practices. This study also found that older farmers are perceived to be less knowledgeable than younger farmers about agri-food safety regulations, which suggests that differential strategies are required to train older farmers and encourage them to comply with agri-food safety regulations.

In relation to the provision of information, extension, and training, the study found this to be positively related to farmers' compliance with agri-food safety regulations, which reflects the findings of Longo et al. (2019) and Mwatawala and Yeyeye (2016) in Tanzania. The qualitative findings revealed that it is not only awareness of the law that matters, but also awareness of policy outcomes or purpose. Therefore, as well as providing awareness of the regulations, regulators need to train farmers on the purposes of the regulation (i.e., consumer protection, access to market). This finding supports the findings of Toma et al. (2013) in the UK and Kaine et al. (2010) with Australian farmers, as they also concluded that awareness of policy objectives matters.

Indeed, information is power, and farmers who have information can use it for self-development and take advantage of opportunities that arise from compliance with agri-food safety regulations. The availability and accessibility of information can also help farmers understand the impact of their actions, such as selling farm produce where the withholding period has not expired. Thus, in addition to improving the design of the regulations, the government should seek to increase farmers' knowledge of the importance of safe and quality food, how to produce safe food, the impact of unsafe food in the market on the population, and the importance of complying with agri-food safety regulations. Such information would

empower farmers and enable them to make informed farming decisions that support compliance.

Since agriculture is the mainstay of the economy and the livelihood of the people in the study area and in Kenya as a country, the need to strengthen extension services cannot be ignored. It is therefore recommended that interactions between farmers and extension officers be increased, and this strategy can also go hand-in-hand with the provision of education on the purposes of agri-food safety regulations. It is suggested that agri-food safety education be expanded to inform farmers of the ultimate purpose of the agri-food safety regulations, as it will increase the capacity and willingness of farmers to comply with law (Winter & May, 2001).

C. Legitimacy

The study found that if farmers trust and perceive the government to be fair in the way regulations are designed and implemented, they are more likely to comply. This finding is consistent with scholars like Kaine et al. (2010) and Ramcilovic-Suominen and Hansen (2012), who concluded that a favourable perception of government improves compliance. Three major observations were made in relation to the influence of legitimacy on compliance.

First, the regression analysis revealed that the perceptions of the agri-food safety regulations being fair and clear were significantly related to farmers' compliance with regulations, which is a finding that is confirmed by the qualitative studies. The focus group participants observed that the government is not fair in the way it designs agri-food safety regulations. In particular, they claimed that some regulations are inappropriate, irrelevant, impractical, and unclear. As noted earlier, many farmers were aware of some agri-food safety regulations, particularly 'milk regulations', largely due to the fact that the Dairy Board actively promotes their requirements.

If regulations are understandable, widely known, relevant, and simple, the chances of compliance would be high.

The farmers also claimed that the government fails to consider the different capacities of farmers when designing agri-food regulations. In particular, some farmers believed that agri-food safety regulations favour large-scale farmers who have the financial means to implement agri-food safety regulations. Small-scale farmers viewed agri-food safety as a constraint that prevents them from participating in the sale of farm products, which is consistent with the findings of Hoffmann et al. (2013a), and suggests that the government needs to build the capacity of farmers so that they view agri-food safety regulations as a source of economic development. Like other humans, farmers have a hierarchy of needs, and therefore need economic support to be financially able to comply. In addition, some farmers stated that the agri-food safety regulations should be fair to both producers and consumers. They maintained that the government wants them to implement agri-food safety regulations and yet are not ready to reward them for following the law with good prices for their produce.

Another important finding from this study about legitimacy relates to the impact of trust in government on the design and implementation of regulations. Farmers maintained that there has been limited involvement of farmers in the design of the agri-food safety policies and strategies. In their opinion, farmers' involvement in law making would improve acceptance and reduce resistance to compliance. This finding is in line with Kaine et al. (2010) and Barns et al. (2009), who noted that participation of the regulated community in policy formulations will improve implementation and enhance compliance. It is therefore important that the government considers a bottom-up approach that incorporates the views of farmers when developing agri-food safety regulations.

This study also noted a relationship between farmers' compliance with agri-food safety regulations and the behaviour of law enforcers. In particular, the focus group participants viewed corruption in law enforcement as a legitimacy factor that does not motivate farmers to comply with agri-food safety regulations. Some key informants noted that corruption has become a normalised practice that is fuelling non-compliance not only by farmers but also by others in the food marketing chain. Thus, where there is regulatory failure in terms of poor regulation and inappropriate enforcement, farmer compliance decreases.

Overall, the findings indicate that trust in and fairness of government in administration and implementation of agri-food safety regulations are important for securing compliance. Thus, more effort should be made by governments to involve and work with farmers in the formulation and implementation of regulations and assisting them to comply.

7.2.2.3 Hedonic goal: personal values and guilt

It was hypothesised that personal values influence farmers' compliance with agri-food safety regulations. While the regression analysis revealed that personal values had no significant relationship with farmers' compliance with agri-food safety regulations, the qualitative study participants maintained that personal values positively influence agri-food safety compliance. In particular, feelings of guilt for endangering the life of fellow human beings motivated some farmers to adhere to agri-food safety regulations. This finding is consistent with those of Yan et al. (2015) in their study of horticulturalists in China. They reported that personal morals influenced how farmers responded to agri-food safety regulations, especially those that have an impact on the social and psychological lives of the farmers.

Likewise, in the focus group discussions, it become apparent that the values and principles that an individual farmer holds about human life and the lives farm animals impact on their response to agri-food safety regulations. The more favourable the attitudes of a farmer towards human

welfare, the greater the likelihood of compliance with agri-food safety regulations. Further, the focus group participants were concerned that their role in selling contaminated farm produce could cause harm to people close to them, which suggests that public campaigns could emphasise the risk of non-compliance to the life of children, relatives, neighbours, and friends.

An associated observation from the qualitative studies in relation to personal values was the relationship between non-compliance and serious illnesses, particularly cancer, that are linked to the consumption of contaminated food. Farmers believed that they have a moral obligation to help reduce the suffering of others, which suggests that the government needs to improve training and information to farmers to remind them that food safety is a universal concern. The government can also demonstrate to farmers that improving food standards could provide opportunities to access new markets, especially global markets, and enhance economic returns.

While some farmers were mindful of their actions, others were knowingly violating agri-food safety regulations for personal financial gain. The farm practices that demonstrate this finding concern the sale of sick livestock or stock under medication (*okoa*). This normalised illegal practice demonstrates how some farmers who are motivated either by greed or the need for survival violate agri-food safety regulations despite knowing that the contaminated produce can lead to serious health outcomes.

According to the goal framing approach, the hedonic goal of guilt feelings for producing or selling contaminated produce is positively associated with agri-food safety compliance. More specifically, feelings of guilt for violating regulations that protect human beings encourage people to follow food safety regulations. Thus, hedonic goals strengthen and support agri-food safety compliance. Therefore, this study concludes that policy makers should not neglect personal values in the design of agri-food safety regulations, as some of the values farmers hold can provide a basis for their compliance with agri-food safety regulations. This

observation suggests that regulators in general need to activate hedonic goal frames, such as teaching farmers the dangers or consequences of non-compliance for the lives of others.

7.2.2.4 Interrelationship between goal frames as per the goal framing theory

Another important finding was the simultaneous influence of two or more factors on farmers' compliance with agri-food safety regulations. While the survey findings revealed that economic gain and normative and hedonic factors uniquely influence farmers' compliance with agri-food safety regulations, the qualitative studies revealed how these factors interact to shape farmers' compliance decisions. First, the focus group discussions showed that whenever there was more than one factor influencing the compliance decision of the farmer, the economic factors received most attention. This finding supports the goal framing theory postulation that at any time, there is one salient goal (Chakraborty et al., 2017; Jaafar et al., 2019; Lindenberg, 2000). In this study, the need to save or generate money prevailed over the normative goal of acting appropriately and the hedonic goal of avoiding guilt feelings.

Second, normative goals can strengthen the violation of food safety regulations for economic gain, in line with the findings of Chakraborty et al. (2017). Specifically, social norms concerning the production, marketing, and consumption of food or animals combined with normalised social practices and fear of sanctions by significant others support the influence of economic factors, especially loss aversion, in compliance decision-making. In addition, the socioeconomic factors of poverty, the existence of illegal markets, lack of deterrence measures (low risks of detection or punishment), and corruption among law enforcers support the violation of agri-food safety regulations for economic benefit. Therefore, regulators and government in general need to appropriately remunerate law enforcers and educate them on the importance of the impacts of allowing contaminated farm produce to market.

Last, personal values and feelings of guilt about producing or selling farm produce that can cause suffering to another human being reduces the motivation for farmers to violate agri-food safety regulation for economic gain. Similarly, the realisation of the increasing cases of illness or disease linked to non-adherence with agri-food safety regulations was found to increase compliance with agri-food safety regulations.

7.3 Contribution of the thesis to knowledge/ Implications of the findings

The findings have contributed to the body of knowledge on agricultural compliance, particularly agri-food safety compliance behaviour within a developing country. The following sub-sections discuss how this study contributes to theoretical framework, policy and practices, and methods used to study agri-food safety.

7.3.1 Contribution of the thesis to theoretical frameworks

This study contributes to the goal framing theory and the routine activity theory, and also demonstrates how these theories can be integrated in the context of agricultural regulatory compliance. The contributions to each of the theoretical frameworks and their integration are discussed below.

7.3.1.1. Goal framing theory

This study extended the application of the goal framing theory to the agricultural regulatory compliance literature. It contributes to the small but emerging body of research on the application of the goal framing theory to understanding farmers' compliance with laws or regulations in a non-Western context. A review of the literature revealed only one study in a developing country context that had previously applied the goal framing theory to understand compliance in the agricultural sector (Longo et al., 2019). However, Longo et al.'s (2019) study only focused on one aspect of agri-food safety regulation. The current study contributes to

agricultural regulatory compliance knowledge by utilising the goal framing theory within a Kenyan context to understand the reasons and factors that shape farmers' decisions to comply with agri-food safety regulations from the time they buy farm inputs to when they sell farm produce.

Overall, the goal framing theory was found to be robust for examining farmers' regulatory compliance, as support was observed for all three goals. Farmers were more likely not to comply with agri-food safety regulations where there was an opportunity to save or generate money (i.e., gain goal), formal rules mandated that they act contrary to existing social norms, they were not aware of food safety regulations, they perceived government as unfair, or they had no trust in the way regulations were designed or implemented (normative goals). Lastly, the feeling of guilt (hedonic goal) for violating regulations that protect a fellow human being encourages farmers to comply with agri-food safety regulations.

In terms of which goal is salient, the study found that the gain goal seems to have a dominant frame that informed farmers' decisions about complying with agri-food safety regulations. With regard to the interrelationship between goals, the study found that the normative goals strengthen the gain goals while the hedonic goal of feeling guilty for exposing another human being to illness or general food poisoning weakened or destabilised the gain goal of saving or generating money. Last, another interesting observation is the impact of contextual factors, such as farmers' financial capacity and the presence of illegal markets, on the goal frames. More specifically, this study has demonstrated how the existence of opportunities such as illegal markets and poorly policed markets can support both the gain and normative goals to violate agri-food safety regulations. While this study has shown the robustness of the goal framing theory when applied to understanding farmers' compliance with food safety

regulations, significant opportunities still exist for its application to compliance by other stakeholders in the food chain, such as food and farm input suppliers and consumers.

7.3.1.2. Routine activity theory

The study also found that the routine activity theory was useful for explaining and suggesting ways to improve farmers' compliance with agri-food safety regulations. Like other studies that have utilised the routine activity theory, the findings of this research highlighted how the interaction of motivated offenders with suitable targets and the corresponding lack of capable guardianship results in farmers' non-compliance with agri-food safety regulations in Kenya. Specifically, the findings highlighted the characteristics of motivated farmers (financially constrained) who are likely to violate law and the suitable targets of contaminated farm produce (i.e., high-value, high-demand, and easily sold farm produce) that are attractive and therefore likely to offer opportunity for law violation. It also highlighted the characteristics of farm markets (i.e., informal markets and informal settlements) that are poorly policed and therefore lack guardianship, which provide opportunities for breaches of food safety regulations.

Furthermore, the study demonstrated that farmers' non-compliance with agri-food safety regulations correspond with the daily routine activities of farming and the need to generate income for basic needs (i.e., from the selection of farm inputs and resources to the sale of farm produce). It also showed that farmers' non-compliance with agri-food safety regulations can further be shaped by other external factors (such as the presence of rogue traders and the lack of education for consumers). These external factors can generate motivation and opportunities to violate food safety regulations. Overall, the routine activity theory indicated areas that need to be improved to increase farmers' compliance with agri-food safety regulations.

7.3.1.3. Integration of goal framing theory with routine activity theory

This study contributes to the literature through the integration of the goal framing theory with the routine activity theory to understand compliance behaviour. As mentioned in the literature review, one of the criticisms of the goal framing theory is that it does not provide ways to prevent law violations or improve security practices to decrease crime or non-compliance. The few studies in developing countries (for example Longo et al., 2019) have not integrated the goal framing theory with criminological theories to understand and provide solutions to understanding of farmers' compliance behaviour. Consequently, to address this limitation, this study drew upon the routine activity theory to identify pragmatic solutions to prevent farmers violating agri-food safety regulations or improve food safety practices among farmers and other actors within the agri-food chain.

The routine activity theory offered solutions to address the goals that motivated farmers to breach food safety regulations as per the goal framing theory. The implication is that the goal framing theory and the routine activity theory combined can expand the understanding of compliance problems and inform the development of solutions to resolve them. Future researchers may utilise this approach of integrating the goal framing theory and the routine activity theory to understand and recommend solutions for the factors that influence how regulated actors such as food traders respond to regulations or laws. Also, there is a need for integration of the goal framing theory with other theories [22] such as the deterrence theory and the neutralisation theory to explore and understand agricultural regulatory compliance.

7.3.2 Methodological contributions

There are three methodological contributions from this study. First, the study used a mixed-method approach to understand the phenomenon of farmers' compliance with agri-food safety

[22] See Table 3.4 at Section 3.8.4 for other theories that can be used together with the goal framing theory.

regulations and to test the theoretical framework that guided this study. This approach compares to other previous studies that used only a quantitative approach (Longo et al., 2019; Toma et al., 2013; Winter & May, 2001) or a qualitative approach (Kaine et al., 2010). The qualitative studies provided insight into the relationships identified in the quantitative study with regard to agri-food safety compliance decision-making, which is difficult to achieve through the quantitative approach on its own.

Another methodological contribution of this study is the use of the indirect approach (Maxfield & Babbie, 2015) in the data collection, whereby respondents were asked about their observations of other people (Chaudhuri & Christofides, 2013). This approach has been used by previous studies (Yan et al., 2015, 2016) and is effective for collecting sensitive information, in this case from farmers. It enabled farmers to freely provide extensive information on relevant issues that would have been difficult to collect through the direct approach.

Last, this research applied an interdisciplinary approach to study farmers' compliance with agri-food safety. Approaching food safety from a range of disciplines enhanced the understandings in this study. The study utilised concepts and theories from the fields of business, economics, law, criminology, sociology, social psychology, and public health to examine the phenomena of food safety and farmers' compliance with food safety regulation. This approach revealed findings that would have been otherwise overlooked if the phenomena were examined from the perspective of a single discipline. The integrated approach also highlighted the interrelationships among disciplines with regard to issues such as the effect of social norms and loss aversion on compliance. The use of a multidisciplinary approach is consistent with Lemma et al. (2018), who recommended this approach for improving understanding of food safety and compliance with food safety regulations.

7.3.3 Contribution of the thesis to Kenya and other similar rural economies in Sub – Saharan Africa

This study provides insightful findings on how farmers Kenya and other similar economies in a developing country deal with the issue of agri-food safety compliance. It also presents a comprehensive picture of the real issues faced by farmers, especially small-scale producers, in developing economies on issues of livelihoods and policy development and implementation. By addressing the agri-food safety compliance problems identified in this study, the likelihood of securing livelihoods, promoting economic development, and, more importantly, public health is enhanced.

From a situational risk analysis perspective, this study has identified three areas where breaches of agri-food safety regulations tend to occur: 1) on farms, 2) at farm produce transportation routes, and 3) at farm markets. Second, the study has identified a problem in the way agri-food safety regulations are formulated. Last, the study identified that apart from farmers, other important stakeholders need to be targeted to improve compliance with agri-food safety regulations, including food and farm input operators, consumers, and law enforcers.

Overall, this contribution implies that government and regulatory agencies in Kenya other similar rural economies in Sub – Saharan Africa need to adopt different compliance enhancement and enforcement strategies for the different stakeholder groups in the agri-food chain to address the specific factors that were identified as influencing or contributing to breaches of agri-food safety regulations in each stakeholder group. It also shows that to improve agri-food safety compliance, there is a need to address challenges (such as flow of income, lack of education, and lack of understanding of regulations) in the supply (farmers) and demand sides (lack of education of consumers and food traders, low risk of detection) of

the agri-food chain. Likewise, there is the need to address the role of rogue traders in facilitating law violations by farmers.

7.3.4 Policy implications

The study has practical implications that can inform policy makers' efforts to improve the design and implementation of agri-food safety regulations to safeguard livelihoods, promote economic development, and ensure consumer protection in Uasin Gishu County. The ensuing policy formulation and implementation framework can be adapted for other parts of Kenya and other similar rural economies in Sub–Saharan Africa. The strategies that can be used for key stakeholders in the agri-food chain to improve compliance with regulations are summarised in Table 7.1 below and discussed in detail in the next sub-sections.

7.3.3.1. Farmers and the farming community

The findings suggest several strategies for policy makers to consider to improve farmers' compliance with agri-food safety regulations. First, the lack of information, training, and education for farmers and the impact of social norms call for attention to improvements in agri-food safety education and training. A variety of formal and informal delivery strategies is required to meet the different levels of understanding among the various farmer groups represented in the population of farmers, such as small-scale farmers, older farmers, and those with lower than secondary school education. Ongoing training for farmers is required on the importance of agri-food safety, health risks, and food-borne diseases and illness linked to agri-food safety non-compliance and unsafe farm produce, and the purpose of regulations. Training can be delivered both formally and informally through media such as television, radio, short text messages (SMS), roadshows, and farmers' field days. Agricultural extension officers can also utilise their farm visits to orient farmers to new regulations.

Table 7:1: Summary of compliance strategies for different stakeholders in agri-food chain

Strategy	Farmers	Food traders	Consumers	Law enforcers
1. Promote agri-food safety education and awareness of agri-food safety regulations.	Agri-food safety regulations Risks and impact of unsafe food Good feeding practices and feed preservation	Agri-food safety regulations Risks and impact of unsafe food	Agri-food safety regulations Risks and impact of unsafe food	Risks and impact of unsafe food
2. Promote financial incentives and quality-based rewards to drive competitive food sector development	Subsidise farm inputs Price premium Insurance and compensation			
3. Intensify food safety monitoring and surveillance system to improve compliance with regulatory standards	Unpredictable or impromptu inspection of farms Punish offenders harshly	Unpredictable or impromptu inspection of farm produce and farm markets Punish the rogue traders. Unpredictable patrolling of transportation routes and markets of farm produce	Patrol farm produce transportation routes and markets	Punish corrupt law enforcers
4. Strengthen self-regulation mechanisms	Organise farmers especially small-scale producers into cooperatives			

Second, closely connected with agri-food safety education is the strengthening of extension services to farmers. The extension agents (i.e., government and private sector) should consider holistic education programs for farmers. As suggested by the National Agriculture Sector Extension policy of Kenya, broad training on agri-food safety that covers, in addition to the topics suggested above, the use of safe and quality standards of inputs is important for

improving farmers' knowledge. Another effective method of training farmers to modernise their operations is to use trusted and respected people in the local community, including community leaders, to deliver information on agri-food safety. Improving farmers' awareness of food safety and agri-food safety regulations and providing them with practical training on how to comply are crucial starting points for improving compliance.

Third, governments need to involve farmers at each stage of the regulation formulation process. Involving farmers at the end of the regulation formulation process or not involving them at all leads to resistance. Instead, government and regulatory agencies need to work alongside farming communities and consult and listen to them to understand why farmers maintain certain practices. They also need to explain the need for change to farmers and allow discussions that are inclusive of farmers' opinions until consensus is reached upon a way forward. Incorporating farmers' voices and concerns into the regulations enhances their ownership of the regulations, reduces resistance, and will ultimately encourage compliance.

Fourth, the finding that some farmers breach agri-food safety regulations because they want to save money, generate income or avoid losses, implies that there is a need for financial incentives to encourage compliance. The government may consider interventions that reduce the costs of compliance or loss when farmers comply. Financial incentives that can improve farmers' compliance include agricultural subsidies and credit provision for farmers to help them acquire the necessary agri-food farm inputs such as aluminium milk cans, safe gunny bags, or aflatoxin-free animal feeds. Other financial incentives are price premiums for quality and safe farm produce and crop or animal insurance for damaged crops or sick livestock. To discourage farmers, especially small-scale farmers, from bypassing agri-food safety regulations for monetary gain or to avoid costs, governments should consider compensation for the losses that are beyond farmers' control.

Fifth, there is a need to strengthen law enforcement and the monitoring of farm practices and farm markets. The finding that the lack of deterrence contributes to farmers breaching agri-food safety regulations for economic gain suggests that all agri-food safety regulators need to ensure that they enforce existing agri-food safety regulations by increasing their presence on farms, along public roads and in farm markets. They also need to engage in random testing of farm produce and strengthen penalties for those who violate agri-food safety regulations.

Sixth, governments need to strengthen self-regulation mechanisms by organising farmers, especially small-scale farmers, into cooperatives. This would not only promote food quality and safety standards but also facilitate the sale of farm produce. It will also offer deterrence, as the normative goal of behaving appropriately would be activated. Specifically, the fear of shame for ruining the reputation of the cooperative will drive farmers to behave appropriately. This strategy has been used to achieve compliance among farmers who grow food crops for export (Mwambi et al., 2020). However, given that the majority of farmers are small-scale producers who depend on domestic sales of farm products for daily living, the cooperatives will need to proactively find ways to ensure speedy payment of farmers for their sales. Co-operatives also help farmers to increase returns on their produce through the ability to buy supplies (including appropriate farm chemicals) in large qualities at discounts and access larger markets or even export.

7.3.3.2. Consumer awareness

Increasing consumers' awareness of the health impacts and risks of consuming unsafe farm products is a critical step toward safe food consumption in Kenya. From a crime prevention perspective through the routine activity theory framework, informed consumers can act as capable guardians. Consumer demand for safe and quality farm produce would result in farmers improving their practices and compliance with agri-food safety regulations. Therefore, if

consumers are made aware of the importance of buying safe and quality farm produce, requesting information on the origin of farm produce, and buying from legitimate farmers or food traders, deterrence would increase and compliance improved. Consumers can be educated on the importance of agri-food safety through mass media such as television and newspapers, outreach by community health workers, and public education campaigns in schools.

7.3.3.3. Food traders

Two major implications are observed for the food traders. First, given that the majority of farm produce in Kenya is sold informally, regulators should consider including informal food vendors and those who buy farm produce from farmers in the agri-food safety education and awareness campaigns. Previous research in Kenya (Hoffmann & Jones, 2021; Mwambi et al., 2020; Nanyunja et al., 2015) has shown that training and certifying farm produce vendors can improve farmers' compliance with agri-food safety regulations. Food traders can also be trained on agri-food safety and compliance with agri-food safety regulations. Information about the consequences of consuming contaminated food can persuade food traders to avoid such trade with farmers.

Second, given the finding that rogue food traders support breaches of agri-food safety regulations, it is suggested that the government expand its detection and sanction processes to capture such traders. Suggested punitive strategies could include harsh fines and the threat of loss of licence for traders found breaching agri-food safety regulations. Another approach to deter rogue traders is public shaming. Public shaming is a form of punishment where anyone who violates a law is exposed and discredited, and has the aim of deterring or drawing attention to the consequences of violating the regulations (Billingham & Parr, 2020). In relation to this study, traders who engage in selling *okoa*, may be shamed through the mainstream media (i.e., newspapers, radio, television broadcast) and/or social media (i.e., Facebook, Twitter). Also, local enforcers such as chiefs may be empowered with resources and gadgets such as mobile

phones to record and communicate illegal farm activities, community members can be encouraged to report rogue traders anonymously, and impromptu patrolling and visits may be combined with rewarding food traders who sell legitimately sourced safe farm produce.

7.3.3.4. Law enforcers

The finding that corruption in law enforcement is associated with farmers' compliance with agri-food safety regulations points to the need for policies that address corrupt law enforcers. First, government and regulatory agencies need to identify and sanction law enforcers who engage in or support the sale of contaminated farm produce. One strategy would be to empower the public to report corruption among law enforcers anonymously. This should be combined with educating law enforcers on the health impacts and risks of contaminated farm produce entering the food chain, especially that this can affect their families, friends, or neighbours. Government must also ensure that law enforcers are appropriately remunerated to discourage them from corruptible practices such as allowing contaminated farm produce into the food chain for economic gain.

Generally, to ensure high levels of farmer compliance with agri-food safety regulations, a holistic approach that involves multiple stakeholders (farmers, consumers**,** food traders, regulators, agricultural extension officers, and public health), multiple motivators, and deterrence is needed. Therefore, for behavioural change and knowledge development, an effective and efficient agri-food safety policy needs enforcement not only by regulatory agencies, but also by other responsible stakeholders such as the ministries of Education, Agriculture, Livestock, and Fisheries Development, Health, and Trade. Other key stakeholders, such as consumers and food and farm input traders, should also be involved.

Strategies should be tailored to the context. According to Gunningham (2010), strategies should be chosen according to their effectiveness and efficiency. A strategy should also

consider structural, contextual, and personal factors, including the type of farming, type of farmer organisation, geographical distribution of the farmers, size of farm operations, socioeconomic status of the farmers, and the characteristics of other stakeholders in the agri-food chain, especially consumers. Other factors to be considered are the level of risk of non-compliance, political environments, market structures, farmers' perception of agri-food safety and government, and structural constraints (Hoffmann & Jones, 2021).

7.3.5 A personal reflection on my PhD journey

In this last sub-section, I reflect on my PhD journey over the last three years and six months. Generally, the whole course of my PhD studies has been an intriguing and exciting one. I have learned about farmers, agri-food safety regulations and their compliance with the food safety law, research processes, and methodologies. I also gained important insights relating to how the research process enriches your personal development. While there are many insights gained in my PhD journey, there are four that stand out.

First, I have learned that the pursuit of knowledge requires determination, perseverance, resilience and support from family, supervisors and the university. For example, while I experienced elation in some instances, there were unforeseen setbacks along the way. (i.e., loss of a parent, resignation of supervisor, lock-downs due to the emergence of Covid-19). These setbacks taught me to be patient, resilient and focused. Without these critical skills (i.e., patience, perseverance and resilience) which I developed earlier in my life and with support from the university, supervisors and family; my PhD journey could have become a lonely and frustrating process.

Secondly, I have also realised that conducting research and writing the thesis is not a quick and straightforward process, but rather, it is back-and-forth activity. Many times, I had to go back to what I had thought I had finished, only for new literature to emerge, which made my previous

thoughts untenable. I also learned that research is a continuous learning process. I had to read many articles, theoretical perspectives and concepts from many disciplines (for example, sociology, political science, law, economics, entrepreneurship, management, public health). Reading this literature (especially articles on compliance with the law and the various theoretical frameworks) not only grounded my studies, but also helped me gain important knowledge that is very useful in how I perceive the world. It also helped me rethink how I approach life situations, as well as how I relate to and engage with others.

Third, researching a community as an insider is another useful lesson that those who seek to understand complex and sensitive topics may consider. An insider approach occurs when a researcher studies a community or organisation to which he/she belongs. As a resident of the study area; farmers found it easier to discuss with me the sensitive topic of compliance. One particular observation worth mentioning is the ease with which farmers were able to disclose how some breaches have become normalised without being concerned with my presence. This approach offers a greater benefit than studying sensitive topics as an outsider, where it may be difficult to access information. However, as an insider researcher, it's critical to maintain objectivity by assuming you do not know anything about the topic being investigated.

Finally, I realised that no matter what, when human beings face difficulties, what matters most is immediate survival. For example, in this study, I realised that the threat of the loss of livelihood and source of income pushes some farmers to violate the law, notwithstanding its virtue. Overall, the PhD journey is a rewarding and meaningful experience in terms of the people you meet, the skills and information you obtain, intellectual advancement, and the opportunities it provides after graduation. Personally, I have become more critical and confident in my thinking and questioning.

7.4 Limitations of the study

This study using a mixed-method approach to explain farmers' agri-food safety compliance behaviour in Kenya. It is one of the few studies on farmers' compliance with agri-food safety regulations within a developing country context that utilises the goal framing theory, which was developed in a Western context. Despite the study's significant contributions, several limitations must be noted for accurate interpretation of the findings, the appropriate application of the recommended policies, and future research.

First, given the time and cost constraints, this study's focus on the Uasin Gishu County (an intensive agricultural region) of Kenya is considered a limitation as the findings cannot be generalised to other countries or beyond. Nevertheless, the findings indicate areas where improvements can be made. Second, the sample size of 160 for the farmer survey may be considered a limitation; however, the findings make recommendations that may inform future research. Third, the absence of longitudinal statistics on agri-food safety in Kenya denied this study the baseline data for comparing and understanding the trends. Fourth, since the study is reliant upon participants' opinions on compliance, one potential limitation is the risk of socially desirable answers (Maxfield & Babbie, 2015). It is possible that participants may under-report their individual opinions and accentuate the public opinions, which could affect reliability (Lynch & Addington, 2011). Last, while the study included the views of a variety of key informants, the perspectives of law enforcers and consumers were absent.

To address some of the above limitations, a number of steps were taken to ensure the reliability, credibility, and validity of the findings of the study. First, the survey was triangulated with focus group discussions with farmers and in-depth interviews with different stakeholders within the agri-food chain. Second, to capture the different views from a variety of sources, participants in the focus group discussions and in-depth interviews were diverse. More

precisely, the key stakeholders comprised various players in the agri-food chain (i.e., agricultural extension officers, community leaders, farm produce business operators, representatives of farmer organisations, farmer input supply chain operators, and professionals in livestock production, veterinary services, agronomy, and agri-business). In the focus groups, participants had a variety of demographic profiles based on age, gender, farming experience, geographic location, and size of farm operations. Last the study focused on four agricultural commodities (i.e., milk, livestock, maize, and vegetables) as these farm products are the most common commodities traded in domestic markets in this part of Kenya as they form the basis of the local diet.

7.5 Suggestions for future studies

In view of the limitations identified above, this study recommends the following for future study to improve understanding of farmers' compliance with agri-food safety regulations, and therefore increase the application of the findings. First, in relation to the limitation that this study was confined to one region in Kenya, it is suggested that similar studies be carried out in different regions of Kenya and other developing countries to provide an increased understanding of farmers' non-compliance and increase the applicability of findings. In addition, further survey research is needed that involves a larger sample than the 160 farmers in this study.

Second, as this study extended Lindenberg's (2000) goal framing theory to a non-Western country in the domain of agricultural compliance, replicating it in another developing country might add to this study and allow generalising of the present findings. In addition, further research is needed to understand the integrative effects of the three goal frames of the goal framing theory. For example, research could be undertaken on the mediation effects of hedonic motivations when investigating motivations and farmers' intentions to comply with agri-food

safety regulations. Also, research is needed to understand the interrelationship between the goal framing theory and other human behaviour theories, especially those aligned with the criminological discipline like the routine activity theory.

Third, in relation to the absence of longitudinal statistics on agri-food safety and reliance on participants' opinions on compliance, more research that involves different methodological practices is still needed to better understand farmers' compliance behaviour in terms of what facilitates compliance and change in behaviour. Some methodological approaches that can be explored are ethnographic research methods and multiple case studies. In addition, longitudinal studies might provide unique insights that are not possible from a one-off study, which can improve understanding of farmers' compliance behaviour. Fourth, more research is needed on non-compliance with agri-food safety regulations by key stakeholders other than farmers, especially from the perspective of the regulation and the compliance behaviours of traders who source or buy farm produce from farmers.

Last, future studies could consider investigating criminal entrepreneurship in the agri-food chain. The subject of criminal entrepreneurship has been widely researched in business studies (see, for example, McElwee et al., 2017; Smith, 2004, 2013). Another line of inquiry would be to use the goal framing theory to examine the dynamics of illegal entrepreneurial opportunities in agri-business, the role of farmers, and the relationship between urban and rural markets in the sale of contaminated food within a developing country context.

7.6 Conclusions

This thesis investigated farmers' and agricultural industry stakeholders' perceptions and attitudes toward agri-food safety, agri-food safety regulation, and farmers' compliance with agri-food safety regulations in Uasin Gishu County, which is a major agricultural region in Kenya. The study adds to the understanding of farmers' compliance behaviour in regard to

agri-food safety in a developing country context. The interdisciplinary approach applied involved the use of the goal framing theory and a mixed-method research design, and was effective for studying individual farmer compliance decisions and the complex issues surrounding agri-food safety. The thesis suggests that farmers' decisions to comply with agri-food safety regulations depend upon the different goals they seek to achieve.

Further, the study identified differences in the way various groups of farmers perceive agri-food safety, agri-food safety regulations, and agri-food safety compliance and explained the different approaches to improving agri-food safety among the farming community. It also noted that certain external factors influence the way farmers respond to agri-food safety regulations. These external factors are social norms, rogue traders, illegal markets, and corrupt law enforcers. These observations provide insight into how, what, and where compliance strategies should be targeted. Thus, framing policy in terms of the goals and contexts that shape farmers' personal goals can be important not only for improving farmers' compliance with agri-food safety regulations but also for safeguarding livelihoods, consumer protection, public health management, and economic development.

The multidisciplinary approach adopted means this study contributes to several fields, including agricultural economics, agricultural and food policy development, and the sociology of agriculture. Specifically, it contributes to the agri-food safety compliance literature from a social science perspective. It also extends the agricultural regulatory compliance literature and agri-food safety research based on Western theories to a developing country context. It is expected that the findings from this study will enable those concerned with farmers' compliance with agri-food safety regulations to establish sound strategies to secure livelihoods, promote economic development, and improve compliance, with the ultimate goal of improving public health outcomes.

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Appendices

Appendix 1: Information Sheet for Interview Participants

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INFORMATION SHEET for FARMERS

I wish to invite you to participate in my research project, described below. My name is Emmanuel Bunei and I am conducting this research as part of my PhD in the School of Business at the University of New England. My supervisors are Associate Professor Bernice Kotey, Associate Professor Elaine Barclay and Dr. Oluwagbenga (Michael) Akinlabi.

Research Project	**The Effectiveness of Agri-food Safety Laws in Kenya**
Aim of the Research	The research aims to explore the attitudes, opinions and perceptions of farmers on factors that shape compliance with agri-food safety laws in order to identify strategies for improving compliance.
Interview	I would like to conduct a face-to-face interview with you at your local ward administration centre. The interview will take approximately 60 minutes. With your permission, I will make an audio recording of the interview to ensure that I accurately recall the information you provide. Following the interview, a transcript will be provided to you if you wish to see one.
Confidentiality	Any personal details gathered in the course of the study will remain confidential. No individual will be identified by name in any publication of the results. All names will be replaced by pseudonyms; this will ensure your anonymity. If you agree I would like to quote some of your responses. This will also be done in a way to ensure that you are not identifiable.
Participation is Voluntary	Please understand that your involvement in this study is voluntary and I respect your right to stop participating in the study at any time without consequence and without needing to provide an explanation.
Questions	The interview questions will not be of a sensitive nature: rather they are general, and will enable me to enhance my knowledge of agri-food safety in Kenya.
Use of Information	I will use information from the interview as part of my doctoral thesis, which I expect to complete in August 2021. Information from the interview may also be used in academic journal articles and conference presentations before and after this date. At all times, I will safeguard your identity by presenting the information in a way that will not allow you to be identified.
Upsetting Issues	It is unlikely that this research will raise any personal or upsetting issues but if it does you may wish to contact your local Community Health Centre (+254) 053-2033471.
Storage of Information	I will keep all hardcopy notes and recordings of the interviews in a locked cabinet in my office at the University of New England's School of Business. Any electronic data will be kept on cloud.une.edu.au, UNE's centrally managed cloud server

managed by the research team. It will also be kept on a password protected computer in the same location. Only the research team will have access to the data.

Disposal of Information

All the data collected in this research will be kept for a minimum of five years after successful submission of my thesis, after which it will be disposed of by deleting relevant computer files, and destroying or shredding hardcopy materials.

Approval

This project has been approved by the Human Research Ethics Committee of the University of New England ((Approval No.: HE19-134, Valid to .01/09/2020 [23]).

Researchers Contact Details

Feel free to contact me with any questions about this research by email at ebunei@myune.edu.au.

You may also contact my supervisors. My Principal supervisor's name is Bernice Kotey and she can be contacted by email at bkotey@une.edu.au or by phone on +612 6773 2830 and my Co-supervisor's name is Elaine Barclay and her email address is ebarclay@une.edu.au and phone number is +61412053415 or Oluwagbenga (Michael) Akinlabi and his email address is oluwagbenga.akinlabi@une.edu.au and phone number is +612 6773 1819.

Complaints

Should you have any complaints concerning the manner in which this research is conducted, please contact:

Mr. Boniface Wanyama
Director General,
National Commission for Science Technology and Innovation
off Waiyaki Way, Upper Kabete,
P. O. Box 30623, 00100
Nairobi, KENYA
Wireless: 020 267 3550
Mobile: 0713 788 787 / 0735 404 245

OR

Mrs Jo-Ann Sozou
Research Ethics Officer
Research Services
University of New England
Armidale, NSW 2351
Tel: +612 6773 3449
Email: humanethics@une.edu.au
Thank you for considering this request and I look forward to further contact with you.

Regards,

[redacted]
Emmanuel Bunei

[23] An extension of time was sought to enable completion of validation of analysis, especially interview responses for focus group interviews and in-depth interviews. This was done concurrently with data analysis until 01/06/2021 when the student researcher finalised the findings.

Appendix 2: Consent Form for Participants

Research Project: The Effectiveness of Agri-food Safety Laws in Kenya

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I, ……., have read the information contained in the Information Sheet for Participants and any questions

I have asked have been answered to my satisfaction. Yes/No

I agree to participate in this activity, realising that I may withdraw at any time. Yes/ No

I agree that research data gathered for the study may be quoted and published using a pseudonym. Yes/ No

I agree to have my interview audio recorded and transcribed. Yes/No

I would like to receive a copy of the transcription of the interview. Yes/No

I am older than18 years of age. Yes/No

…….. …….

Participant Date

…….. …….

Researcher Date

Appendix 3: Email Transcript for Recruiting Key Informants

Date

NAME
ADDRESS

Dear NAME

My name is Emmanuel Bunei. I am a PhD student at the University of New England, Australia. I am conducting research on the effectiveness of agri-food safety laws in Kenya.

As a key stakeholder in the agricultural industry in Kenya, I would like to invite you to participate in my PhD research project that aims to understand factors that shape compliance with agri-food safety laws.

This project has been approved by the Human Research Ethics Committee of the University of New England (Approval No.: HE19-134, Valid to .01/09/2020 [24]).

I recently surveyed farmers across Uasin Gishu County to gather an understanding of the things farmers are currently doing on their farms and in their villages that contribute to food safety. The survey revealed the difficulties producers face in ensuring food safety and complying with food laws. I need to explore these issues further so that I can make recommendations to policy makers as to how best to address these problems.

Your participation in this study is entirely voluntary. However, your assistance in this important research will be greatly appreciated. If you agree to participate in this study, I would like to conduct a face-to-face interview with you at your office at a time convenient to you. The interview will take approximately 60 minutes.

If you are interested in finding out more about this study, I can be reached at 0701458899 or ebunei@myune.edu.au.

I hope that you will be able to join me to contribute your knowledge and understanding to this study.

Yours faithfully,

[redacted]

Emmanuel Bunei

[24] A time extension was sought to enable completion of validation of analysis, especially interview responses for focus group interviews and in-depth interviews. This was done concurrently with data analysis until 01/06/2021 when the student researcher finalised the findings.

Appendix 4: Interview Schedule for Survey Participants

SECTION A

We will start by asking you some general demographic questions. Please answer the following questions about yourself.

<table>
<tr><td>1. What is your gender?
○ Male
○ Female
○ Others</td><td colspan="2">2. What is your educational background?
○ Not gone to school
○ Primary school completed (6 years)
○ Secondary school completed (12 years)
○ Completing/completed an undergraduate university course or equivalent</td></tr>
<tr><td>3. How long have you lived in this County? _____ (in years)</td><td colspan="2">4. Where do you sell most of your farm produce to?
○ Informal Market
○ Formal market
○ Both</td></tr>
<tr><td>5. Estimated age group:
○ 20-29
○ 30-39
○ 40-49
○ 50-59
○ 60+</td><td colspan="2">6. How long have you been actively engaged in farming in this County?
_____ (in years)</td></tr>
<tr><td>7. What is your ethnicity?
○ Kalenjin
○ Kikuyu
○ Luhya
○ Luo
○ Others</td><td colspan="2">8. Average monthly income range from farming? (in KSH)
○ 0 – 20,000
○ 21,000 – 40,000
○ 41,000 – 60,000
○ 61,000 – 100,000
○ 100,000 – 500,000
○ 500,000 – 1million
○ Above 1 million</td></tr>
<tr><td>9. What is your marital status?
○ Single
○ Married
○ Divorced/Separated
○ Widowed</td><td>10. What is your religious background?
○ Muslim
○ Christianity
○ Traditional religion
○ No religious affiliation</td><td>11. Farm location _____</td></tr>
<tr><td>12. Farm ward _____</td><td colspan="2">13. Is this the sole source of income? ○Yes ○No

If NO, what are your other sources of income? _____</td></tr>
<tr><td>14. What kind of farming are you in?
○ Dairy cattle
○ Goats
○ Sheep
○ Maize
Others _____</td><td colspan="2">15. Roughly, how many animals? _____

Land size for crop production _____Ha/acres

Numbers of employees on this farm? _____</td></tr>
<tr><td colspan="3">16. What are the best things about this County? What has it got going for it?</td></tr>
<tr><td colspan="3">17a. What are the main challenges for the agricultural sector in this County?
_____</td></tr>
</table>

Probe on the following: Input costs (land prices, labour, and material costs)/ Start-up costs (capital investments)/ Resource constraints (water scarcity, land availability, energy)/ Farm produce safety/ Stringent agri-food safety regulations and safeguards/Market volatility/ Lack of government support/ Domestic competition/ Foreign competition/ Changing consumer wants/ Climate change
17b. Can you rank these concerns in order of importance? (If participant don't mention food safety – then ask them where it fits)

SECTION B

People have different views and experiences about some farming practices, agri-food safety processes and the regulations/law. The next few questions will address issues related to what you think about these issues in Kenya. Please respond as it applies to you.

Perceptions of Agri-food Safety

How threatening are the following substances or problems to food safety in Kenya	Not Very	Neutral	Threatening	Very Threatening
Farm chemicals	○	○	○	○
Contaminated water	○	○	○	○
Use of rotten maize to feed livestock	○	○	○	○
Sale of unhealthy meat	○	○	○	○
Use of Agrichemical containers for food storage	○	○	○	○
Use of animal manure in crop production	○	○	○	○

Without naming any person, has there been any incidences of food poisoning or contamination in this county in the past two years?	○ Yes ○ No
If YES,	
Please describe the type of food safety issue	
How did the community respond?	
How often does this happen?	○ Usually ○ Sometimes ○ Rarely ○ Never
Would you describe these incidences as a crime? Which ones and why?	
If not, how would you describe them?	

Perceptions of Agri-food Safety Laws

Are you aware of the following agri-food safety laws in Kenya?	Yes	No
Laws relating handling of carcasses, dead and sick livestock	○	○
Laws relating to handling, transportation and storage of farm produce	○	○
Laws relating to proper and appropriate use of drugs and chemicals on the farm	○	○
Laws relating to use of fertilizers and animal feedstuffs	○	○

Laws relating to milk handling	○	○
What do you feel is the level of understanding among farmers regarding the above agri-food safety laws?	○ Very knowledgeable ○ Fairly knowledgeable ○ Not very knowledgeable	
Are there any laws regarding food safety that you like – Examples + reasons?		
In general, do you think that food safety laws are necessary; are they on the mark; - are they fair?		

To what extent do you agree or disagree with the following statements regarding Agri-food safety laws in Kenya.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
These laws are very clear and understandable	○	○	○	○	○
These laws are outdated and are no longer appropriate.	○	○	○	○	○
Farmers have easy access to information about food safety laws	○	○	○	○	○
Farmers feel uncertain about future regulatory restrictions	○	○	○	○	○

Agri-food Safety Compliance

Do you think there is pressure on farmers in this area to follow food safety practices in producing food?	○ Yes ○ No
Do most Kenyan farmers comply with agri-food safety laws?	○ Usually ○ Sometimes ○ Rarely ○ Never
How serious is non-compliance with Agri-food safety laws in Kenya?	○ Very Serious ○ Serious ○ Somewhat Serious

	○ Not Serious ○ Don't Know

Factors that Contribute to Agri-food Safety Compliance

How often do you attend training workshops or farm group meetings?	○ Usually ○ Sometimes ○ Rarely ○ Never
How often do you use extension services?	○ Usually ○ Sometimes ○ Rarely ○ Never
If detected being non-compliant, how likely is it that a farmer would be penalized?	○ Extremely Likely ○ Somewhat Likely ○ Unlikely ○ Somewhat Unlikely ○ Extremely Unlikely
In your opinion, what are the main barriers to compliance with agri-food safety laws in Kenya?	
In your opinion, what are the factors that encourage compliance with agri-food safety laws in Kenya?	

Recommendations

If you had the power, how would you improve laws - the way in which they are designed or the way they are implemented?
Are there any food safety laws that you would like to make?

What method of intervention provides the best results in enhancing food safety among farmers?	○ Voluntary (farmer-driven) ○ Collaborative (farmer, government and market driven) ○ Government-Driven ○ Market-Driven ○ Other
What group in society should have primary responsibility for looking after agri-food safety laws?	○ National or County Government ○ Farmer Cooperative and Association ○ Food Safety Groups ○ Everyone ○ Others
Is there any additional information that you would like to tell me that we might not have discussed?	
This concludes our interview. Do you have any questions for me? Question for Interviewer: Thank you for sharing your experiences and opinions with me.	

Appendix 5: Interview Schedule for Key Informants

SECTION A

We will start by asking you some general demographic questions. Please answer the following questions about yourself.

1. What is your gender? ○ Male ○ Female ○ Others	2. What is your educational background? ○ Not gone to school ○ Primary school completed (6 years) ○ Secondary school completed (12 years) ○ Completing/completed an undergraduate university course or equivalent ○ Completing/completed a graduate university course or equivalent	
5. Estimated age group: ○ 20-29 ○ 30-39 ○ 40-49 ○ 50-59 ○ 60+	6. Occupation _____	
7. What is your ethnicity? ○ Kalenjin ○ Kikuyu ○ Luhya ○ Luo ○ Others	8. What is your marital status? ○ Single ○ Married ○ Divorced/Separated ○ Widowed	
9. What is your religious background? ○ Muslim ○ Christianity ○ Traditional religion ○ No religious affiliation		

SECTION B

What do you think are some of the challenges and issues faced by farmers in Uasin Gishu County?
From your involvement with farmers, what are the main agri-food safety concerns in this county/country?
What do you think is the general perception of farmers towards agri-food safety laws?

To what extent do you think farmers comply with agri-food safety laws?	○ High ○ Medium ○ Low ○ Not at all
How well do you think agri-food safety laws are understood by farmers? (*Note: Adjust the laws you are referring to depending on interviewee*).	○ Very knowledgeable ○ Fairly knowledgeable ○ Not very knowledgeable
How often do farmers attend training workshops or farm group meetings on agri-food safety laws?	○ Usually ○ Sometimes ○ Rarely ○ Never
How often do farmers use extension services?	○ Usually ○ Sometimes ○ Rarely ○ Never
How serious is non-compliance with agri-food safety laws in Kenya?	○ Very Serious ○ Serious ○ Somewhat Serious ○ Not Serious ○ Don't Know
Which law has there been the most resistance from farmers? (*Probe: For industry members, monitoring enforcement officials, etc.| Probe: How is this resistance expressed?)*	
Do you think culture plays a part in the way food is produced?	
If Yes, How and why? Can you please provide some examples from your experience with food producers? *(Probe: national government/ county government/farmers, voluntary/mandatory etc?)*	
Are there any barriers to farmers complying with laws? (*Probe: Financial, culture, lack of transport?)*	
What sorts of things encourage people to comply with laws?	
If you were in a position to make policy changes that would help farmers comply with food safety laws, what would they be and why? (*Probe: designed or implementation*)	

Who should lead food safety requirements in rural communities?
Are there important issues that are not currently included in the agri-food safety laws?
On a final note, I would like to explore your understanding of some key concepts
If I ask you to consider the concept of Crime in food production, what types of things do you think of?
Would you describe this non-compliance with food safety laws as crimes and which ones and why?
➥ If not, how would you describe them?
This concludes our interview. Do you have any specific question for me? Question for Interviewer:

Thank you for your time.

Appendix 6: Interview Schedule for Focus Group Participants

SECTION A

1. Date_____	2. Place_____
3. Estimated age group Distribution: 20-29 _____ 30-39 _____ 40-49 _____ 50-59 _____ 60+ _____	4. Number of Participants _____
5. What is your ethnicity? Kalenjin_____ Kikuyu _____ Luhya _____ Luo _____ Others _____	6. Gender Distribution Male _____ Female _____ Others _____

SECTION B

What are some of the challenges and issues faced by farmers in this county?
Can you tell me about the day to day practices around food handling on farms in this county? *For example, throwing away food such as milk or meat/Eating meat from sick livestock/Measuring or testing the safety of food/Storage of food especially milk*
Do you think there is a bit of pressure on farmers in this area to maintain strict food safety practices?
➥ If YES, where does this pressure come from? (Government, community, industry?)
Without naming anyone, have there been any incidences of food poisoning or contamination in this county in the past two years?
➥ If YES, please describe the type of food safety issue
➥ **If YES, how did the community respond?**
➥How often does this happen? (Probe on farm chemicals, contaminated water, rotten maize, and agrichemical containers)

What sorts of things encourage farmers to comply with laws?
Are there any barriers to people complying with food safety laws in this county?
➥ If YES, what sorts of barriers? *Financial, culture, lack of transport?*
In general, do you think that food safety laws are necessary; are they on the mark; - are they fair? *For example, rules about the home slaughter of stock for a farmer's own consumption?*
Are there laws that you don't like? Examples + reasons?
Are there any laws that you do like? Examples + reasons?
If you had the power, how would you improve laws - the way in which they are designed or the way they are implemented?
Are there any food safety laws that you would like to make?
Who should lead food safety requirements in rural communities? *National or county government/Food safety groups/Farmer cooperative and association/Everyone (government, farmer cooperatives, the public, etc)*
Would you describe non-compliance with food safety laws as a 'crime' If not, how would you describe them?
This concludes our discussion. Do you have any question for me? Question for Interviewer:

Thank you for your time.

Appendix 7: Translated Version of the Interview Schedule for Survey Participants

SEHEMU YA A

Ningependa kuanza kwa kuuliza maswali kuhusu ukulima na na kilimo. Tafadhali jibu hii maswali kuhusu wewe.

<table>
<tr><td>1. Je, jinsia yako ni gani?
○ Kiume
○ Kike
○ Ingine</td><td colspan="2">2. Je, kiwango chako cha masomo ni?
○ Haukwenda shuleni
○ shule ys msingi (8 years)
○ Shule ya sekondari (12 years)
○ Ulimalisa masomo ya chuo cha kikuu
○ Ulimalisa masomo ya juu ya chuo kikuu</td></tr>
<tr><td>Umeishi miaka ngapi katika kaunti ya Uasin Gishu?
.....</td><td colspan="2">4. Je, Huwa unauzia wapi mazao yako ya mashambani sana?
○ Informal Market
○ Formal market
○ Both</td></tr>
<tr><td>5. Kadhri ya umri
○ 20-29
○ 30-39
○ 40-49
○ 50-59
○ 60+</td><td colspan="2">6. Umeshiriki ukulima kwa miaka ngapi katika kaunti hii .....</td></tr>
<tr><td>7. Kabila Lako?
○ Kalenjin
○ Kikuyu
○ Luhya
○ Luo
○ Others</td><td colspan="2">8. Je! Kwa mwezi mapato yako ni shilling nagapi? (KSH)
○ 0 – 10,000
○ 11,000 – 20,000
○ 21,000 – 30,000
○ 41,000 – 50,000
○ 50,000 – 100,000
○ 100,000 – 500,000
○ 500,000 – million moja
○ Zaidi ya million moja</td></tr>
<tr><td>9. Je hali yako ya ndoa ni?
○ Sijaoa/Sijaolewa
○ Umeoa
○ Nimetalikiwa/tumetengana
○ Nimefiwa</td><td>10. Je, dini ni gani?
○ Hakuna yeyote najiuzisha
○ Kiislamu
○ Kikristo
○ Kitamaduni</td><td>11. Eneo la shamba _____</td></tr>
<tr><td>12. Kata _____</td><td colspan="2">13. Je, Ukulima ndio mahali unapata mapato yako pekee? Ndio _La_

Kama LA, huwa unapata wapi mapato yako? _____</td></tr>
<tr><td>14. Ni aina gani ya kilimo unajiuzisha nayo?
○ Nogmbe ya maziwa
○ Mbuzi
○ Kondoo
○ Mahindi
Nyingine
_____</td><td colspan="2">15. Uko na mifugo takribani ngapi ____

Uko na shamba kiasi gani.....Ha/acres

Uko na wafanyakazi wangapi? ____</td></tr>
<tr><td colspan="3">16. Ni mambo gani bora kuhusu kaunti hii ya Uasin Gishu? Uniambie vile kuwa mkulima katika kaunti ya Uasin Gishu?</td></tr>
</table>

17a. Ni vitu gani inaathiri sekta ya kilimo katika kaunti hii? _____ *Dadisi: Gharama ya vitu ya kutumia kwa shamba (bei ya ardhi, kazi, na gharama za vifaa) / gharama ya kuanzisha ukulima/ vikwazo ya rasilimali (uhaba wa maji, upatikanaji wa ardhi, kawi) / usalama wa mazao ya kilimo / sheria magumu za usalama wa mazao ya kilimo / tete ya soko / ukosefu wa msaada wa serikali / mashindano ya ndani / mashindano ya nje / mabadiliko ya anga*
17b. Hebu oredhesha hizi vikwazo uliosema ukianzia ile muhimu? (*Iwapo mshiriki akutaja usalama wa chakula, uliza mahali usalma uko wapi kwa kazi ya ukila*)

SEHEMU YA B

Watu wana maoni tofauti na uzoefu kuhusu desturi za ukulima, taratibu za usalama, kanuni au sheria za usalama wa vyakula vya kilimo. Maswali machache ijayo, yatashughulikia masuala yanayohusiana na kile unachofikiria kuhusu maswala haya nchini Kenya

Mtazamo wa usalama wa chakula

Ni jinsi gani hizi vitu au shida zifuatazo ni hatari kwa usalama wa chakula nchini Kenya	Si hatari	Neutral	Hatari	Hatari sana
Kemikali ama dawa za shamba	○	○	○	○
Maji machafu	○	○	○	○
Matumizi ya mahindi iliyooza kulisha mifugo	○	○	○	○
Uuzaji wa mifugo yaliyo magonjwa/*okoa*	○	○	○	○
Matumizi ya mitungi ya kemikali kwa kuhifadhi chakula	○	○	○	○
Matumizi ya mbolea ya wanyama katika uzalishaji wa mazao	○	○	○	○

Bila kutaja jina la mtu, Je! Kwa miaka mbili iliyo pita, kuna kiza yeyote ya vyakula vya mashambani kuleta shinda katika kaunti hii?	○ Ndio ○ La
Kama NDIO,	
Eleza zaidi kuhusu tatizo hili la usalama wa chakula	
Jamii ilesemaje?	
Ni mara ngapi hii shida utokezea?	○ Kawaida ○ Mara kidogo ○ Si sana ○ Kamwe
Je, unaweza fikiria hii ni uhalifu? Gani and kwa nini?	
Kama LA, utasema ni nini?	

Mtazamo juu ya sheria za usalama wa chakula vya mashambani

Je! Unafahamu sheria zifuatazo za usalama wa vyakula za mashambani za Kenya?	Ndio	La
Sheria zinazohusiana utunzaji wa mizoga ya mifugo au mifugo yaliyo magonjwa au wamekufa	○	○
Sheria zinazohusiana na utunzaji, usafirishaji na uhifadhi wa mazao ya kilimo	○	○
Sheria zinazohusiana na matumizi za dawa na kemikali kwenye shamba	○	○
Sheria zinazohusiana na matumizi ya mbolea na vyakula vya mifugo	○	○
Sheria zinazohusiana na utunzaji wa maziwa	○	○
Je, kwa kadhiri yako, kwa kiasi gani wakulima wanafahamu wanajua sheria za usalama wa chakula?	○ Wanajua sana ○ Wanajua Kidogo ○ Hawajui	
Je, kuna sheria za chakula unapenda – kwa mfano + sababu?		
Je, kwa ujumla, unafikiria sheria za usalama wa chakula ni sawa au muhimu; - Ni wa haki?		

Ni kwa kiwango gani unakubali au hawakubaliani na kauli zifuatazo kuhusu sheria za usalama wa chakula nchini Kenya	Hawakubaliani Kabisa	Hawakubaliani	Katikati	Unakubaliana	Unakubaliana Kabisa
Sheria za usalama wa vyakula vya mashambani ni zinaeleweka	○	○	○	○	○
Sheria hizi zimepitwa na muda na hazifaa tena.	○	○	○	○	○
Wakulima wanapata urahisi habari kuhusu sharia za usalama wa chakula	○	○	○	○	○
Wakulima hawana uhakika wa sheria zijazo	○	○	○	○	○

Ufuataji wa sheria wa usalama wa vyakula wa mashambani

Je, unafikiria kuna msukumo wa wakulima kufuata sheria ya salama wa chakula?	○ Ndio ○ La
Je! Wakulima wengi wa Kenya huwa wanfuuta sheria za usalama wa chakula.	○ Kawaida ○ Mara kidogo ○ Si sana ○ Kamwe

Kutofuataa sheria za usalama wa vyakula vya mshambani ni mbaya kiasi gani?	○ Mbaya sana ○ Mbaya ○ Si mbaya sana ○ Si mbaya ○ Sijui

Sababu zinazochangia sheria za usalama wa vyakula vya mshambani kutofuata

Ni mara ngapi unahudhuria warsha za mafunzo ya ukulima ama mikutano ya wakulima?	○ Kawaida ○ Mara kidogo ○ Si sana ○ Kamwe
Ni mara ngapi wewe utumia huduma ya wataalamu?	○ Usually ○ Sometimes ○ Rarely ○ Never
Ukipatikana kama hujuafuata sheria za usalama wa vyakula mashambani, je kuna uwezekano wa mkulima kuadhibitiwa?	○ Inawezekana sana ○ Inawezekana kiasi fulani ○ Haiwezekani ○ Haiwezekani kiasi ○ Haiwezekani kabisa
Kwa maoni yako, ni vikwazo gani inayoweza kufanya mtu kutofuata sheria za usalama wa vyakula ya mashambani nchini Kenya.	
Kwa maoni yako,ni mambo gani hufanya mkulima afuate sheria za usalama wa vyakula ya mashambani nchini Kenya.	

Mapendekezo

Kama ulikuwa na uwezo, ni kwa jinsi gani ungeboresha sherahia ya usalama wa vyakula vya mshamban – vile inanundwa ama kutekelezwa?
Je, kuna sheria yeyote ya chakula ambayo ungependa kutungeneza?

Je, ni njia ipi inaweza kufanya wakulima wafuatee sheria za usalama wa vyakula vya mashambani	○ Sheria ya Hiari (Mkulima mwenyewe) ○ Shirikishi (wakulima, serikali, wanunuzi ○ Serikali ionogozee ○ Soko iamuue ○ Ingine
Ni kikundi kipi katika jamii kinapaswa kuwa na wajibu wa msingi kwa kuangalia sharia za usalama wa chakula?	○ Serikali ya kitaifa au kaunti ○ Ushirika wa wakulima ○ Makundi ya usalama wa vyakula ○ Kila mtu ○ Wengine
Je, kuna maelezo ya ziada ambayo ungependa kuniambia ambayo hatujuazungumizia ambayo pengine ungependa tuzungumizie?	
Hii inahitimisha mahojiano yetu. Je uko na swali yeyote Swali kwa mtafiti:	

Asante tena kwa kushiriki mazungumzo na kwa mchango na maoni yako.

Appendix 8: Translated Version of the Interview Schedule for Focus Group Participants

SEHEMU YA A

1. Tarehe ya mjadaliono _____	2. Mahali ya mjadiliano _____
3. Idadi ya washiriki kulingana na vikundi ya miaka: 20-29 _____ 30-39 _____ 40-49 _____ 50-59 _____ 60+ _____	4. Idadi na jinsia ya washiriki_____
5. Idadi ya washiriki kulingana na kabila Kalenjin_____ Kikuyu _____ Luhya _____ Luo _____ Others _____	6. Idadi ya washiriki kulingana na jinsia Kiume _____ Kike _____ Ingine _____

SEHEMU YA B

Ni changamoto au vikwazo gani vinaathiri ukulima katika kaunti hii?
Je, muniambie vile uwamunafanyia vyakula vya mashambani katika kaunti hii? Kwa mfano, *kutupa chakula kama maziwa ama nyama/kukula nyama kutoka ngombe mgonjwa/ kujua kama chakula kiko sawa/ kuweka au kuhifadhi chakula hasa maziwa*
Je, unadhani kuna ya shinikizo kwa wakulima katika kaunti hii kufuata sharia za usalama wa chakula?
➥ Ikiwa NDIO, ni wapi shinikizo zinatoka Sanaa? (serikali/jamii/sekta)
Bila kutaja jina la mtu, Je! Kwa miaka mbili iliyo pita, kuna kiza yeyote katika kaunti hii amabvyo vyakula vya mashambani ilifanya watu wawe wagonjwa?
Kama NDIO
Eleza zaidi kuhusu tatizo hili la usalama wa chakula
Jamii ilesemaje?

Ni mara ngapi hii shida utokezea? (Probe on farm chemicals, contaminated water, rotten maize, and agrichemical containers)
Ni vitu gani huwafanya wakulima kufuataa sheria?
Je! Kuna vikwazo ambayo hufanya watu kutozingatia sheria katika kaunti hii
➥ Kama NDIO, ni vikwazo gani? *Pesa, utamaduni, ukosefu wa usafiri*
Je, unafikiria sheria za usalama wa chakula ni sawa, muhimu; - Ni wa haki? *Kwa mfano, sheria za kukataza mkulima kuchinja mifugo nyumbani kwa ajili ya kukula nyumba?*
Je, kuna sheria za chakula munapenda – kwa mfano + sababu?
Je, kuna sheria za chakula hamupendi – kwa mfano + sababu?
Kama mungekuwa na uwezo, ni kwa jinsi gani mungeboresha sheria za usalama wa vyakula vya mshambani – vile inanundwa ama kutekelezwa?
Je, kuna sheria yeyote wa chakula ambayo ungependa kutengeneza?
Ni kikundi gani katika jamii kinapaswa kuwa na wajibu mkuu kutekeleza sheria za usalama wa chakula*(Serikali ya kitaifa ama ya kaunti/ Makundi ya usalama wa vyakula / Ushirika wa wakulima / Kila mtu/umma n.k.)*
Je! Unaweza kusema kuwa kutofuataa sheria za usalama wa chakula ni uhalifu? Kama LA, utasema ni nini?
Hii inahitimisha mahojiano yetu Je, muko na swali yeyote? Swali kwa mtafiti:

Asante kwa wakati wenu.

Appendix 9: Assessment of Normality Assumptions

Variable	Skewness	Kurtosis
Gender	.892	-1.220
Age	.314	-.681
Education background	-.118	-.817
Religious status	-3.428	9.874
Farming experience	.686	-.347
Cost-benefit analysis	1.354	-.169
Financial capacity	-.819	-1.347
Deterrence	1.226	-.503
Social norms	-1.958	1.858
Awareness of law	-.299	-1.304
Information, extension services and training	1.146	-.695
Legitimacy	1.891	1.596
Perceptions of regulator	1.566	1.804
Perceptions of regulations	-.116	-.735
Personal morals	-.088	-1.499

Skewness: any value between +2 to -2 is acceptable
Kurtosis: any value ranging between +2 to -2 is acceptable

Appendix 10: Diagnostic Results for Multicollinearity

Variable	Collinearity Diagnostics	
	Tolerance	VIF
Gender	.879	1.138
Age	.752	1.330
Education background	.309	3.240
Religious status	.888	1.126
Farming experience	.313	3.198
Cost-benefit analysis	.343	2.912
Financial capacity	.344	2.908
Deterrence	.819	1.220
Social norms	.717	1.394
Awareness of law	.862	1.160
Information, extension services and training	.799	1.252
Legitimacy		
Perceptions of regulator	.628	1.592
Perceptions of regulations	.697	1.434
Personal morals	.686	1.458

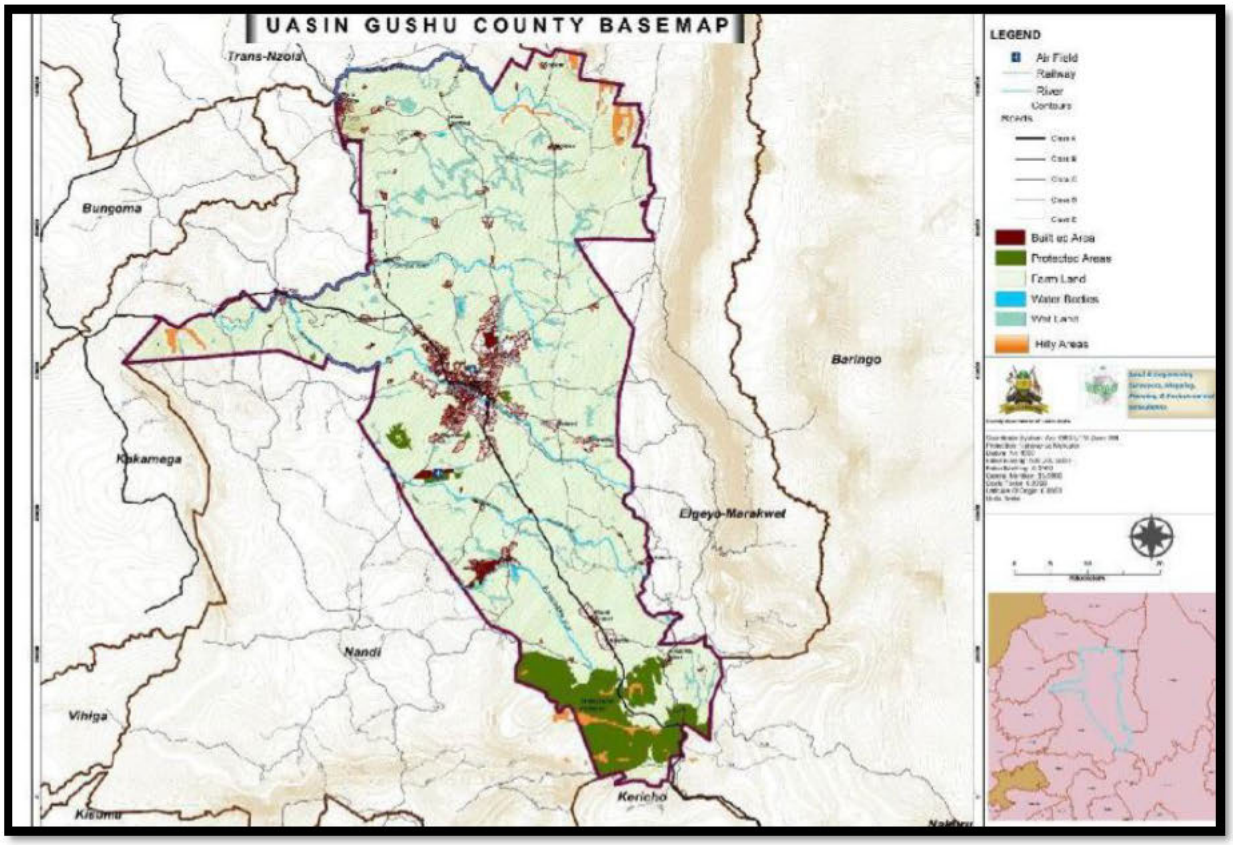
If the VIF value lies between 1-10, then there is no multicollinearity, but if the VIF <1 or> 10, then there is multicollinearity.

Appendix 11: Descriptive Statistics and Correlations Between Dependent and Key Independent Variables

Variables	1	2	3	4	5	6	7	8	9	10
Agri-food safety regulatory compliance	1	.089	.111	.177*	.013	.146	.074	.105	.370**	-.044
Cost-benefit analysis		1	.802**	.172*	-.004	-.008	-.142	.085	.046	-.060
Financial capacity			1	.187*	0.053	0.040	-0.048	.083	0.145	0.063
Deterrence				1	.066	.089	-.181*	.121	.186*	.117
Social norms					1	-.101	-.024	.055	-.014	-.511**
Awareness of law						1	-.114	.112	.189*	.020
Information, extension services and training							1	-.254**	-.142	.010
Perception of regulator								1	.344**	.080
Perception of regulations									1	-.029
Personal values										1

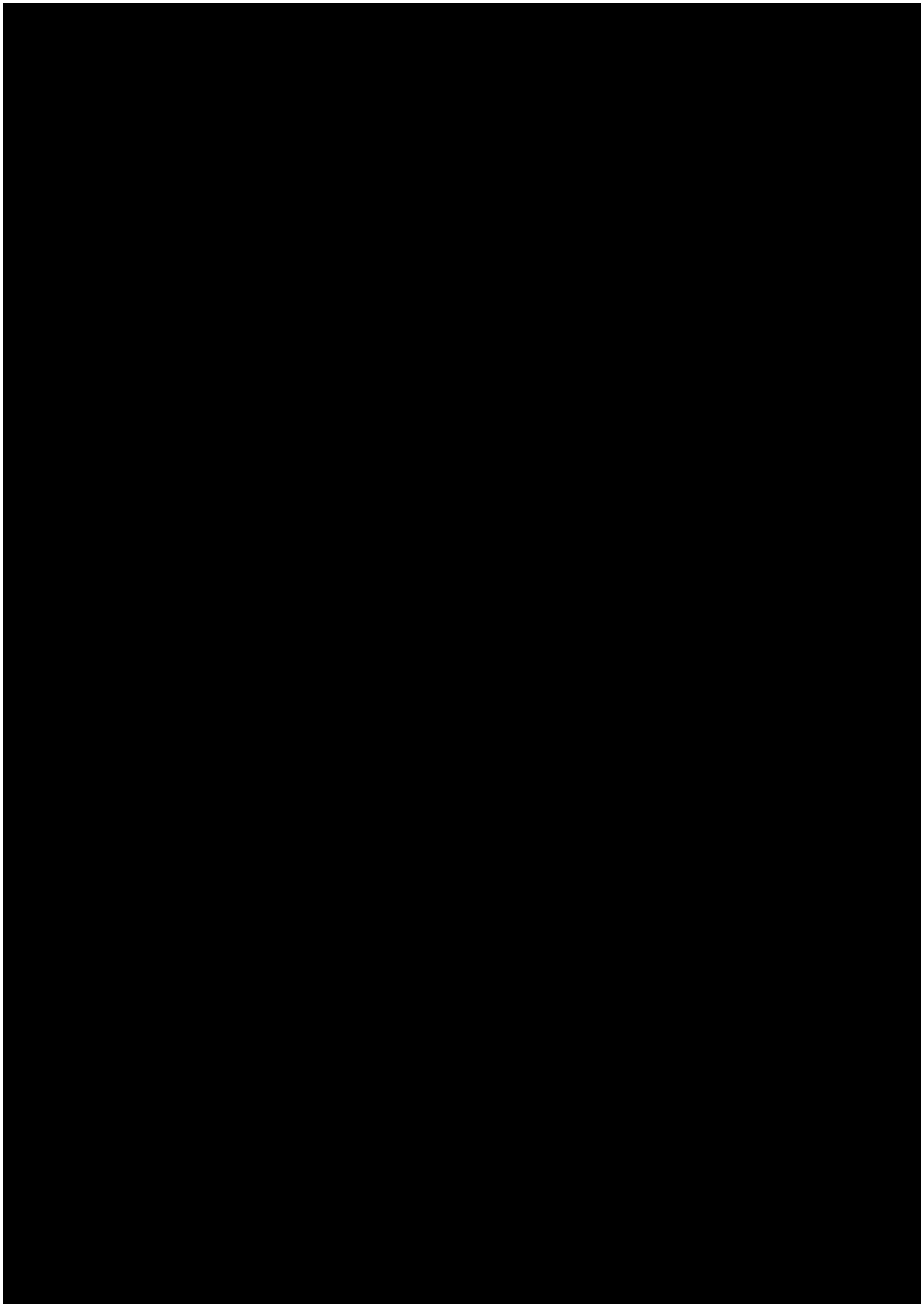
*p<.05; **p<.01; ***p<.001

Appendix 12: Uasin Gishu County Land Use Map



Source: Adapted from County Government of Uasin Gishu (2018)

Appendix 13: UNE Human Research Ethics Committee Approval



Appendix 13: Approval by National Commission for Science, Technology and Innovation