GENDER PERSPECTIVES ON CHICKEN FARMING AND UPTAKE OF NEWCASTLE VACCINES AND VETERINARY SERVICES IN MACHAKOS TOWN SUB-COUNTY, MACHAKOS COUNTY, KENYA.

BY

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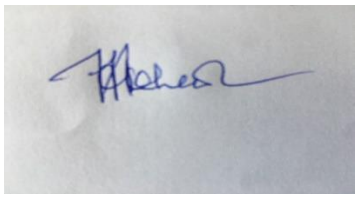
SUPERVISOR:  **DATE:** …04/10/2023…….

DR. GEOFFREY MUGA

DECLARATIONS

This project paper is my original work and has not been presented for examination in any other University.

Signature:  Date: **2/10/2023**

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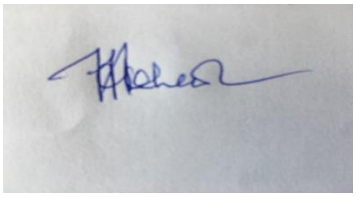
Declaration by Supervisors

This project has been submitted for examination with my approval as the University Supervisor.

Dr. Geoffrey Muga

Signature:…  Date:……4/10/2023……

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DEDICATION

I dedicate this project to the Lord and his infinite intelligence, my two beautiful girls, my life partner and my best friend Treza, my mother who is my rock and my whole incredible family and friends, you are the best.

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ABBREVIATIONS AND ACRONYMS

ND	Newcastle disease
VVC	Vaccine Value Chain
SheVax+	Main project (Hearing their voices: Action research to support women's agency and empowerment in livestock vaccine distribution, delivery and use in Rwanda, Uganda and Kenya).
ILRI	International Livestock Research Institute
WELI	Women's Empowerment in Livestock Index
FGDs	Focus group discussions
KIIs	Key informant interviews
WEAI	Women's Empowerment in Agriculture Index
USAID	United States Agency for International Development
NACOSTI	National Commission for Science, Technology & Innovation
SHG	Self-help groups
SQ. KM	Square Kilometre
ODK	Open Data Kit
KNBS	Kenya National Bureau of Statistics
KVB	Kenyan veterinary board
VMD	Veterinary medicine directorate
DVS	Directorate of veterinary services
KEVEVAPI	Kenya Veterinary Vaccines Production Institute
TOTs	Trainer of Trainers
IEC	Information, Education and Communication

ABSTRACT

This study was conducted in Machakos town sub-county of Machakos County. Underpinned by a cross-sectional design, the study investigated the gender perspectives on chicken farming and uptake of Newcastle vaccines and veterinary services in Machakos town sub-county. The study specifically sought to: describe the gender roles associated with women and men over chicken farming activities, Newcastle disease (ND) vaccine value chain and veterinary services at the village level; examine the socio-cultural factors that influence women's access and control over chicken farming resources, ND vaccines and veterinary services; and to establish available local pathways for women to access the information needed on chicken farming activities, and ND vaccine value chain in Machakos town sub-county. The study was guided by The Moser Gender Analysis Framework. The smallholder chicken farmers living in Kola and Kalama wards of Machakos town sub-county, constituted the study population for this study. The Unit of analysis was dual households in Kola and Kalama wards of Machakos town sub-county. Data was collected using quantitative and qualitative methods namely; women's empowerment in livestock index survey questionnaire (WELI), focus group discussions (FGDs) and key informant interviews (KIIs). The survey questionnaires were administered on 100 dual households, with both women and men chicken farmers that were randomly sampled, aged between 18 and 60 years. Purposive sampling was used to select the key informants and focus group discussion participants. Quantitative data collected was analyzed to produce descriptive statistics that involved data frequencies, percentages and averages. The qualitative audio recorded data from focus discussions and key informant interviews were transcribed verbatim, and the transcripts were coded and analyzed thematically, where the study objectives acted as the parent themes. The study findings indicated that (start with findings on gender roles, then move to findings on socio-cultural factors and finally on local pathways before conclusion and recommendations. Remove irrelevant materials in this section)

Reorganize these as indicated above the study recommended that since women were the chicken farming managers at the household level, their voices should be incorporated in decision-making processes that reflected on their unique needs and challenges around uptake of ND vaccines and veterinary services by the community farming elders associations, committees and county government. In terms of research, a study looking at social capital and networks as a form of coping

with the equal participation of both women and men farmers in the uptake of ND vaccines and veterinary services in Machakos town sub-county, Machakos county, Kenya, should be conducted.

CHAPTER ONE: BACKGROUND TO THE STUDY

1.1 Introduction

Chicken farming is an important livelihood strategy for many poor households in low-income countries, with an estimated number of nearly 320 million people in sub-Saharan Africa raising chickens in some capacity (Dumas et al., 2018; ILRI, 2012). In Africa, large animals such as cattle and camels are owned and controlled by men, while women have access and control over small animals such as chickens that they can sell to meet their financial needs (Waithanji et al., 2015). Kenya has approximately 30 million domesticated birds, where 70% comprise of chickens that are mainly kept in the rural areas, while the urban and peri-urban areas contain approximately 25% of chickens (*Ministry of Livestock Development, 2008. Annual Report for the Year 2008. - Google Search*, n.d.). The chickens play a vital gender role in terms of access to financial income, food security and socio-cultural activities in the lives of women, widows and orphaned children (Kaudia & Kitalyi, 2002), since chicken ownership is considered as livelihood asset that women can easily acquire, compared to other physical, social and financial assets (Rubin et al., 2010). The sustainable livelihood assets consist of the 5 forms of capital (personal, human, social, financial and physical capital) that provide livelihood opportunities for smallholder chicken farmers, which contributes net benefits to other livelihoods at the local and global levels (Natarajan et al., 2022).

However, some socio-cultural norms and inheritance rights, restrict women's access to sustainable livelihood assets such as land or large animals, while favoring the male relatives (Agarwal, 2003). Apart from land assets, women are faced with limited access to financial institutions, water resources and agricultural extension services (FAO et al., 2011), as well as dealing with high levels of poverty and food insecurity, thus forcing them to gradually turn to other practices as alternative means of improving their situations (Oino & Mugure, 2013). Women make up two-thirds of the world's poor smallholder farmers, who traditionally face more challenges in accessing knowledge, technologies and tools for improved chicken production, compared to men (FAO et al., 2011; Hillenbrand & Miruka, 2019). Women usually engage in chicken production because of the limited investment and work load required for their management (Alders & Pym, 2009; Bagnol, 2009; Sonaiya, 2009; Sultana et al., 2012), and the significant percentage of income it provides poor households in Africa (Alders & Pym, 2009; Bush, 2006; Gueye, 2005).

Chicken production make up over 80% of the total chicken population in sub-Saharan Africa, while over 75% of the rural households in Kenya practice chicken farming (Magothe et al., 2012; Olwande et al., 2010). The economic strength of chicken production in Kenya, lies in their adaptation to harsh scavenging conditions that contributes to the social lives of the poor rural households, where chicken production acts as a source of animal protein and cash income (Magothe et al., 2012). The cash income from chicken production in the western part of Kenya, is mainly controlled by men who only own 19% of the chickens, while women who own up to 63% of the chickens, can only make minor decisions over labour and farm management (Abate, 2019; Okitoi et al., 2007). Chicken diseases such as Newcastle Disease (ND) often threaten chicken generated income resources, by causing the death of many chickens that are exposed to it (World Health, 2006). ND is the most threatening viral disease affecting chicken production in Kenya (Kasiiti, 2000; Njue et al., 2002), and one of the most cost-effective means to prevent it is through the use of ND vaccines (Donadeu et al., 2019). Technical trainings on ND and chicken management available to farmers in the community, are more accessible to men than women, due to gender social norms along traditional structures that prioritize marriage over girl child education, thus limiting the literacy, mobility and communication skills of women to attend community meetings (Hillenbrand & Miruka, 2019).

On the other hand, chicken production appears to be providing a quick and cheap source of income that can be used to purchase ND vaccines, as rural chickens are kept on free range with minimal inputs (Munyasi et al., 2012). However, poverty and food insecurity continue to affect the availability of development opportunities for smallholder chicken farmers (Walingo, 2009). This is because women chicken farmers are mainly responsible for household food nutrition and health; however, they continue to suffer heavy workloads and have little control over chicken production resources for family care (Walingo, 2009). Smallholder women farmers are overrepresented among the poor, and they are mainly involved in slow cash generating activities compared to men (Paudel et al., 2009). According to (Sharma, 2004), a considerable proportion of the income earned by poor smallholder chicken farmers, is obtained from the sale of chicken products such as eggs and meat.

1.2 Statement of the Problem

Majority of the smallholder farmers living in the rural areas of Kenya, depend on chicken farming as a source of livelihood (Njue et al., 2002), however, there are different gender roles undertaken by men and women in chicken farming and uptake of ND vaccines along the vaccine value chain. Unfortunately, the role of women often lack visibility due to their concentration in household work, the informal sector, and part-time employment (Shackleton et al., 2011). The invisibility of the role of women in the uptake of ND vaccines and veterinary services for chicken farming, undermines their recognition and value in this important livelihood activity, thereby reinforcing gender inequalities among women and men chicken farmers. Furthermore, even though some studies have been carried out on the socio-cultural factors that limit women's access and control over chicken farming resources, more empirical studies are still needed to reveal how these factors also influence women's participation in uptake of ND vaccines and veterinary services.

Failure to address these inequalities from a gender perspective, may undermine the contribution of women and men in chicken farming, uptake of ND vaccines, and the economic and social progress of a community (Bamber & Staritz, 2016). This study seeks to address these gaps by answering the following research questions;

1. What are the gender roles associated with women and men in chicken farming activities, uptake of ND vaccines and veterinary services at the village level?
2. What are the socio-cultural factors that influence women's and men's access and control over chicken farming resources, ND vaccines and veterinary services?
3. Which local pathways are available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services in their community?

1.3 Research Objectives

1.3.1 General Objective

To investigate the gender perspectives on chicken farming and uptake of Newcastle vaccines and veterinary services in Machakos town sub-county, Machakos county, Kenya.

1.3.2 Specific Objectives3

1. To describe the gender roles associated with women and men on chicken farming activities, uptake of ND vaccines and veterinary services at the village level, in Machakos town sub-county, Machakos county.
2. To examine the socio-cultural factors that influence women's and men's access and control over chicken farming resources, ND vaccines and veterinary services, in Machakos town sub-county, Machakos county.
3. To establish local pathways available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services in Machakos town sub-county, Machakos county.

1.4 Assumptions of the study

1. Women and men perform different roles in chicken farming, uptake of ND vaccines and veterinary services at village level;
2. Socio-cultural factors influence women's and men's access and control over chicken farming resources, uptake of ND vaccines and veterinary services;
3. There are local pathways available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services in Machakos sub-county.

1.5 Justification of the Study

The study focused on gender perspectives on chicken farming and uptake of Newcastle vaccines and veterinary services in Machakos town sub-county, Machakos county, Kenya. The study established results on the gendered experiences of women and men smallholder chicken farmers, in the uptake of ND vaccines and veterinary services in Machakos town sub-county. These results contributed to the general information needed on the uptake of ND vaccines and veterinary services, and specifically on the body of knowledge among chicken farmers in Machakos town sub-county. The study revealed that smallholder women farmers had more access and less control

over the 5 forms of capital, which limited their uptake of ND vaccines and veterinary services along the vaccine value chain. While smallholder women farmers were found to have more access and control over social capital, such as family/friendship support, community cooperation and group networks; the men had more control over the other 4 forms of capital on human skills - knowledge and employability; personal assets - self-esteem and self-confidence; financial income - capital and access to credit; physical assets - security and natural resources. The smallholder women and men farmers adopted mechanisms such as negotiating and planning activities around the 5 forms of capital, to cope with the challenges that limited uptake of ND vaccines and veterinary services along the vaccine value chain.

These findings would be useful to the vaccine manufacturers, distributors and policy makers within the county and national government, in formulating sound policies that value the contributions of smallholder chicken farmers along the ND vaccine value chain. The findings of the study could also inform the non-government organizations (NGOs) and other organizations working with smallholder chicken farmers, to advocate for a more rational understanding of the social and economic contributions by women and men smallholder farmers, in the uptake of ND vaccines and veterinary services along the vaccine value chain. By assessing the gender perspectives on chicken farming, the study focused on uptake of ND vaccines and veterinary services, thereby providing an assessment tool of smallholder women and men farmers in Machakos town sub-county. The findings generated from this study could also act as a reference point for academicians and researchers, as the information added to the growing body of knowledge on smallholder chicken farmers along the ND vaccine value chain, and it similarly created an understanding of who the stakeholders are, what roles they play along the ND vaccine value chain, and their perspective on the uptake of ND vaccines and veterinary services by smallholder chicken farmers.

1.6 Scope and Limitation

The study was a cross-sectional descriptive study conducted in Machakos town sub-county of Machakos county, which adopted both quantitative and qualitative methods to collect data. The study targeted 100 dual households owning 10 to 100 indigenous chickens, which were purposively selected in Kola and Kalama wards in Machakos town sub-County. Focus of the study

was on smallholder chicken farmers, which explored the gender roles associated with women and men on chicken farming activities, uptake of ND vaccines and veterinary services at the village level; the socio-cultural factors that influence women's and men's access and control over chicken farming resources, ND vaccines and veterinary services; and local pathways available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services along the ND vaccine value chain. The study was guided by the by the Moser Gender Analysis Framework that explored uptake of ND vaccines and veterinary services along the ND vaccine value chain in Machakos town sub-county. The Moser Gender Analysis Framework viewed the research problem from a gender and development approach perspective, which challenged the power relations between women and men, and adopted the women's triple role framework of division of labor within households and communities in developing countries.

One of the challenges faced by the researcher was community entry and rapport, which would have impacted discloser on the part of the research study participants, thus affecting the quality of data collected. However, the study overcame this limitation by using government extension officers from the Machakos sub-county livestock and gender departments, community gatekeepers such as village elders and self-help group leaders during community entry, to create rapport which assured the respondents of the confidentiality of the information they provided. Another challenge that presented itself was language barrier, which was a key limitation that the study encountered, since the researcher was an outsider. To overcome this limitation, the researcher was supported by some of the extension officers, village elders and self-help group leaders who acted as translators, local guides and mobilizers, during the collection of quantitative and qualitative research data.

1.7 Definition of terms

Gender: The concept of gender described all the socially given attributes, roles, activities, and responsibilities connected to being a male or a female in a given society. Gender identity determined how the chicken farmers were perceived, expected to think and act as women and men, because of the way society was organized.

Gender relations: These were concerned with how power, responsibilities and claims were valued and distributed among men and women, which varied according to different communities, time

and place; and other social relations such as family and friends support, cooperation, partnership and collaboration, networks and interconnectedness.

Gender analysis: Such an analysis explored the equalities and inequalities that existed within relationships of women and men smallholder farmers in the community, by asking: Who did what? Who had what? Who made decisions? How? Who gained? Who lost? While breaking down the power relations and divide between personal relationships at the household level, and public relationships within the wider community.

Access : This was defined as the opportunity and ability to use and benefit from specific resources.

Control: This indicated having the power to make decisions over the use of resources you benefited from, and who had access to them.

ND Vaccine administration: This was vaccination of chickens using ND vaccines that were packaged in vials of a hundred doses, and reconstituted by diluting with distilled water. The procedure was simple enough to be done by a chicken farmer, but many farmers shied away. The chicken farmers who had limited access to uptake of ND vaccines and veterinary services, experienced the death of large flocks of chickens.

ND vaccine value chain: This was a complex system of stakeholders and processes that consisted of ND vaccine production, transportation and distribution; chicken breeding and vaccination against ND; collection, processing and consumption of chicken products. Different stakeholders were involved along the ND vaccine value chain, such as: vaccine manufacturers, producers, distributors, service providers, traders and consumers (chicken farmers) as the chain actors.

Newcastle Disease: This a highly infectious chicken disease with symptoms such as: respiratory and nervous signs, gasping and coughing, drooping wings, dragging legs, twisting of the head and neck, circling, depression, complete paralysis, partial or complete cessation of egg production, egg is rough-shelled, thin-shelled and contains watery albumen. It also led to greenish watery diarrhea, swelling of the tissues around the eyes and on the neck. The mortality rate was high; sometimes the whole flock was lost.

Chickens: These were flocks of birds farmed as backyard chickens, local chickens or scavenging chickens. In this study, any flock of chicken that was not classified as exotic chicken breed, qualified for the research.

Smallholder chicken farmer: This was a woman or man who reared chickens either for family consumption or sale or both.

CHAPTER TWO: LITERATURE REVIEW

This chapter presented a relevant literature on the study, which was reviewed along the lines of the study objectives related to the concept of gender perspectives on chicken farming and uptake of Newcastle vaccines and veterinary services in Machakos town sub-county. The specific objectives included: gender roles associated with women and men on chicken farming activities, uptake of ND vaccines and veterinary services at the village level; socio-cultural factors that influence women's and men's access and control over chicken farming resources, ND vaccines and veterinary services; and local pathways available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services. It also looked at the role of community group meetings, trainings and workshops, together with IEC materials (Information Education and Communication) as local pathways available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services. While identifying the institutional arrangements for ND vaccine acquisition, distribution and veterinary service provision in Kenya, this chapter concluded with a discussion of the Moser Framework as the lenses that guided this study.

2.1 Gender roles associated with women and men on chicken farming activities

Majority of smallholder chicken farmers in most countries, do not always have tools to address issues on the different gender roles that women and men farmers carry out in their chicken farming activities (Bagnol et al., 2012). Therefore, it is crucial for them to practice understanding of gender relations, and its implications with regard to chicken farming systems, in knowing not only why and how people raise chickens, but also who is raising the chickens, is of foremost importance for the improvement of chicken farming and control of ND outbreaks to succeed (Bagnol et al., 2012). Chicken farming is of great importance in Kenya, which accounts for over 80% of the total national chicken population, and about 40 to 60% of the marketed eggs and white chicken meat enjoyed by the Kenyan people (Upton, 2000). When Machakos county generally registered an increase in chicken population numbers between the years of 2011 and 2017, the chickens registered the highest growth was attributed to free chicks' program, implemented by county community animal health workers from the Ministry of Agriculture, Livestock and Fisheries (Machakos County Intergrated Development Plan, 2018).

Table 2.1: Chicken Population in Kenya (Machakos county) from 2011 to 2017

Year	Chicken population (Millions)
2011	30
2012	34
2013	40
2014	42
2015	41
2016	44
2017	48

Source (FAOSTAT, 2018) - (Abdirahman et al., 2023)

However, smallholder chicken farmers face the challenges of improving food productivity of their flock and incomes generated from selling chicken (Justus et al., 2013). This is mainly because rural chickens are adapted to the scavenging systems that are characterized by continuous exposure to ND disease outbreaks, inadequate feeding quality, together with poor housing and health care (Guèye, 1998). ND is considered to be an important chicken disease that is endemic in many countries worldwide, which sometimes kills 100% of susceptible chickens (FAO, 2014). Therefore, to achieve increased productivity, the smallholder chicken farmers need to access extension service interventions such as veterinary services for ND vaccination, as well as other services that include chicken housing, feed supplementation, chicken brooding and rearing system (Njue et al., 2006), since healthy chickens are adequately nourished, have access to appropriate shelter and are free of diseases (FAO, 2014).

Therefore, major chicken diseases such as ND outbreaks must be prevented using vaccines, if smallholder chicken farming is to become a reliable source of food or income (FAO, 2014). However, most of the smallholder chicken farmers are unable to uptake ND vaccines and veterinary services needed to control chicken diseases such as ND outbreaks, because of the increasing costs of vaccines and extension service fees (Milkias et al., 2019). At the same time, (Abadi et al., 2018) indicates that there is limited information regarding ND vaccines, such as

using thermo-stable ND vaccines where cold chain is not available (FAO, 2014), since improved knowledge creates links between smallholder chicken farmers and animal health veterinary service providers, which in turn contributes to the control of ND outbreaks.

2.2 Socio-cultural factors that influence women's and men's access and control over chicken farming resources

Smallholder chicken farmers at the household levels vary globally, with women and children being in charge of extensively raising chickens, while men are more likely to own and provide intensive labor in chicken farming, such as construction of a chicken house (Alders & Pym, 2009; Bagnol, 2009). Such tasks are brought about by gender division of labor, which is one of the factors helping to create productive and reproductive tasks assigned culturally to women and leadership tasks assigned to men at the household level, where women are responsible for collecting and carrying home water, fuel wood, and agricultural produce, in addition to caring for chickens and their children's health and educational needs (Sobania, 2003). Generally, chicken farmers have a lot in common, however, most men and women may have different interests in relation to the chicken farming resources they have access to and control over, due to their different, even contradictory interests in chicken farming, uptake of ND vaccines and veterinary services (Ahlers et al., 2009). As a consequence, understanding the social relations between men and women, and their implications for raising chickens, promotes the importance of the paradigms of access, control and benefits of chicken farming resources (Ahlers et al., 2009).

Since this is not unique to Kenya, smallholder farmers in Africa as a whole, are responsible for three-quarters of all food production, a situation they find acceptable because they directly use their financial capital for their children's school fees and home improvements (Sobania, 2003). The income earned by most rural women living in countries that mainly depend on smallholder chicken farming, frequently derive a significant percentage of their financial capital from chicken products (Alders & Pym, 2009; Bush, 2006; Gueye, 2005). This is mainly because of the small investment needed for the women to start engaging in chicken farming, ease of doing it from their homesteads, consumption of chickens as food for the family and quick sells of the chickens provides petty cash needed for the household (Alders & Pym, 2009; Bagnol, 2009; Sonaiya, 2009; Sultana et al., 2012). Therefore, chicken vaccination projects that target the control of ND in the

communities, have generally raised the financial capital received from chicken products, which has in turn benefited smallholder farmers, who tend to own chickens in many communities (Fisher, 2014).

2.3 Local pathways available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services

In most communities at the village level, there are a number of barriers that emerge in preventing smallholder chicken farmers to fully participate in the uptake of ND vaccines and veterinary services, such as lack of awareness of ND vaccines as a key barrier within the villages (Bagnol et al., 2013). The lack of knowledge and awareness of ND vaccines discourages some households from having to pay for the vaccine in some areas (Bagnol et al., 2013), due to lack of confidence in the vaccine, especially when vaccinated chickens die because they were already infected with ND before vaccination. However, sometimes vaccines become ineffective when some chickens are vaccinated against ND, due to problems encountered by smallholder chicken farmers in maintaining the vaccine cold chain (Fisher, 2014). As a consequence, sometimes, self-help groups (SHG) of chicken farmers have been targeted with trainings on chicken farming and ND vaccination, so as to take on the role of community vaccinators (Bagnol et al., 2013), which in turn provides the women and men with local pathways for information needed on chicken farming and uptake of ND vaccines. Smallholder chicken farmers who are members of SHG, easily access financial facilities (banks) and inputs like technical advice, credit facilities, trainings, improved chicks, drugs for treating chicken diseases and ND vaccines, together with feed supplements, as well as transportation and marketing of chicken products (Branckaert et al., 2000).

Furthermore, SHG membership for smallholder farmers has been shown to have numerous and extensive benefits for rural women and men to easily access credit services, since they could guarantee each other in banks; hold community group trainings; collectively purchase farm inputs thus reducing costs; and gain easy access to collective marketing with the aim of reducing transaction costs and increase bargaining power (Ayieko et al., 2014; Danda et al., 2010; Kinambuga, 2010). Access to credit services has provided the smallholder women farmers with additional income that raises their status within the community, as female community vaccinators are more likely to remain working in their home areas than their male counterparts (Alders, 2009).

Members of most SHG use their additional income to access table banking services and financial institutions like Kenya Women Finance Trust (KWFT), where borrowers have to be guaranteed by other group members, for the credit they would take for expansion of their chicken farms and accessing the ND vaccine value chain enterprise (Abura, n.d.). However, in some cases where women experienced an increase in income from their chicken farming products after ND is controlled through vaccination, men sometimes took over control of the chickens (Bagnol et al., 2013).

2.4 Institutional arrangements for ND vaccine uptake and veterinary service provision in Kenya

Smallholder chicken farmers continue to encounter several challenges due to inadequate institutional support and inefficient management (Kirui, 2014), despite efforts made by various government and private institutions, such as the Ministry of Agriculture, Livestock and Fisheries and NGOs respectively, to promote the chicken farming industry through provision of information and ND vaccination skills development (Abura, n.d.). This has been enhanced by the lack of government-sponsored programs in Kenya, to support ND eradication via culling or compensation policies (Absalón et al., 2019). Therefore, there is need for institutions such as the Ministry of Agriculture, Livestock and Fisheries to develop policies that support smallholder chicken farmers in rural areas, due to the low yields and incomes (Kingori et al., 2010). Chicken farming is Kenya's most important type of poultry production, but the smallholder chicken farmers face the challenge of improving flock productivity, as chickens are exposed to viral diseases like ND; food quality and quantity deficiency; and poor housing and health care under the scavenging systems of the flocks (Guèye, 1998; Kitalyi & Mayer, 1998).

However, most of the smallholder chicken farmers are not aware that ND can be controlled by vaccination (Kingori et al., 2010), as information on the ND vaccine value chain is generally lacking (Abura, n.d.). To deal with these constraints and enhance productivity, the government community animal health workers sometimes offer extension services on management intervention packages consisting of: chicken feed supplementation, ND vaccination, brooder, chick rearing equipment and improved housing to smallholder chicken farmers (Njue et al., 2006).Veterinary care from community animal health workers, especially to chicks in smallholder

chicken farming, is one of the most important factors affecting chicken production; as it helps in detecting, preventing and treatment of any kind of disease at an early stage (Grepay, 2009). This type of care contributes to the improvement and adaptation of chicken breeds to varied environmental conditions, which promotes the Kenyan economy's chicken production, through asset accumulation for smallholder chicken farmers (Mbuza et al., 2017). At the county level, the department of Agriculture, Livestock and Fisheries in Machakos county has also established local pathways among chicken farmers and stakeholders along the ND vaccine value chain, which links a farmer with their friends in the village, who occasionally buy a bird or few eggs from them in a week (Abura, n.d.).

2.5 Farmers training methodologies and communication pathways in a rural setting

The Kenya Agricultural Sector Development Strategy 2009-2020 recognizes the importance of providing local pathways for linking smallholder chicken farmers to other actors and institutions that offer extension services and trainings in sharing of knowledge, technologies and chicken farming information (Mwobobia, 2016). (Branckaert et al., 2000), acknowledges that training of smallholder chicken farmers on basic understanding of the chicken anatomy and physiology; chicken diseases and predator control; proper housing, feeding and use of equipment; entrepreneurship and budgeting; record keeping and marketing; is an important local pathway in creating a functioning business enterprise for the smallholder chicken farmers. This is due to poor telecommunication infrastructure in rural areas that lead to lack of sufficient market information, thus forcing smallholder chicken farmers to rely on private or even physical contacts for market related information (Munyaka, 2010), whereby, market prices are sometimes demand driven, with local purchases and middlemen who exploit chicken farmers as the main outlets (Danda et al., 2010).

Therefore, community trainings provide important local pathways used by the government and other institutions in communicating with rural smallholder chicken farmers, and providing information in areas like breeding, feeding, disease control and quality chicken products for marketing (Kinambuga, 2010). This is confirmed by (Mwobobia, 2016), who states that most rural smallholder chicken farmers request for community trainings and seminars on general chicken

rearing, disease control, chicken feeds, feed supplements and drugs/vaccines, and housing methods and designs.

2.6 Theoretical Framework

This section explains the Moser Framework that was developed by Caroline Moser, which will be adopted to guide the research study.

2.6.1 Moser Framework

The Framework attempted to establish ‘gender planning’ as a type of planning in its own right, and questioned the assumption that planning is a purely technical task, which assisted the research study in questioning the gender perspectives on chicken farming and uptake of Newcastle vaccines and veterinary services in Machakos town sub-county (March et al., 1999). The study adopted the women’s triple role framework that was widely applied in gender analysis, as it supported the adequate capture of division of labor within households and communities in developing countries (Ludgate, 2016). The Moser Framework used six principles, tools and procedures: The first was on gender roles identification/ triple role tool that involved mapping the gender division of labor by asking 'who does what?' (March et al., 1999), as Caroline Moser identified the triple role for women consisted of reproduction (household-related and child care); production (farm work or engagement in other economic activities); and socio-cultural (community based) functions (Moser, 2014). The recognition of women’s triple role – with the aim of ensuring that tasks are equally valued – highlighted work that is often ignored in gender roles associated with women on chicken farming activities, uptake of ND vaccines and veterinary services at the village level (Bolt & Bird, 2003).

The second one was based on the concept of gender needs assessment, whereby women and men have different needs, as a consequence of women’s subordinate socio-cultural position to men in most societies, gender division of labor, power and control (Bolt & Bird, 2003). As the third tool addressed who has the decision-making power and control over resources within the household, the second and third tool were able to examine the socio-cultural factors that influence women’s access and control over chicken farming resources, uptake of ND vaccines and veterinary services in Machakos town sub-county (Bolt & Bird, 2003). The fourth was a planning tool used for

balancing women's triple roles thus increasing their productivity; the fifth tool was mainly used for evaluation of how different planning approaches meet the strategic needs of women empowerment; and the final tool required involving women and men in gender-planning, which was essential to ensure that real practical and strategic gender needs were identified, and incorporated into the planning process of establishing local pathways for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services in Machakos town sub-county.

2.6.2 Reproductive roles

Moser portrays reproductive roles as being almost always the responsibility of women and girls, which involves the care and maintenance of the household and its members, including child bearing, caring and domestic tasks aimed at preparing food, raising chickens, collecting water and fuel, housekeeping, and family health-care, which are tasks rarely paid for, as they are often not considered as 'real work', and therefore do not often feature in the household economic equation (March et al., 1999).

2.6.3 Productive roles

These involve income generating activities by both men and women in many developing countries, who carry out chicken farming and exchange of goods and services for petty trade and consumption (March et al., 1999). However, Moser points out that women's workload is likely to be higher but less visible, as they carry out such activities alongside reproductive functions that are less valued than those of men in many developing countries, whose access to and control over productive resources is often favored by patriarchal systems (Balgah, 2016).

2.6.4 Community (or socio-cultural) roles

The final activities of community (or socio-cultural) roles were expounded on by Moser, who indicates that they include the collective organization of social events and services such as ceremonies and celebration activities, to improve the community, participation in SHG and political organizations, local political activities and community resource management (Ludgate, 2016; Moser, 2014). Such activities and their frequencies involve considerable volunteer time that

is important for the spiritual and cultural development of communities, as a vehicle for community organization and self-determination (March et al., 1999). Both women and men engage in community activities, nevertheless, Moser hypothesized that power relations are likely to be unbalanced, as gender division of labor encourage men to dominate women by taking up positions of power in such institutions and activities, while women's contribution would often go unnoticed (Ludgate, 2016; March et al., 1999).

2.6.5 Relevance of the Theory to the Study

The Moser Gender Analysis Framework was relevant in helping to address the research study objectives, which adopted the women's triple role framework of division of labor, within households and communities in developing countries. The theory viewed the behavior of women and men in chicken farming, their experiences along the ND vaccine value chain and course of action in their uptake of ND vaccines and veterinary services. In exploring the gender perspectives on chicken farming and uptake of Newcastle vaccines and veterinary services, the theory helped inform the gender roles associated with women and men on chicken farming activities, uptake of ND vaccines and veterinary services at the village level. Further, the theory helped explain how socio-cultural factors influence women's and men's access and control over chicken farming resources, ND vaccines and veterinary services. The theory fundamentally helped in explaining the local pathways available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services in Machakos town sub-county.

The theory argued for an integrated gender-planning perspective in all development work, while concentrating on the power relations between women and men, and mapping the gender division of labor within households and communities, by asking 'who does what? In this model, the initial goal was to consistently demonstrate that the women's triple role framework has been widely applied in gender analysis, which consists of reproduction (household-related and child care); production (farm work or engagement in other economic activities); and socio-cultural (community based) functions that were in contrast to men who primarily undertake productive and community political activities. According to theory, it has been successful in identifying gendered interrelationships necessary for putting gender issues right at the centre of development. In turn, the study was informed on the unequal gender roles in labor distribution between men and women,

through access and control over socio-cultural resources, and information that can be used to make informed decisions individually at household and community levels. Such decisions could be on what needs to be changed (or not), so that innovative technologies like ND vaccine cold chain can be adopted at household level; and who should be involved in community trainings or not, based on hands–on, context – specific knowledge of who does what (Lukong & Balgah, 2018; Moser, 2014). In addition, the triple roles framework empowered men to change existing patriarchal paradigms, when they observed that a lot of socio-cultural factors prevent women from being at the same empowerment level as the men, because they are overburdened with unpaid reproductive and community-based functions (March et al., 1999; Meyerowitz, 2008; Moser, 2014).

CHAPTER THREE: METHODOLOGY

This chapter discussed the procedures and strategies that were followed in conducting the study on gender perspectives on chicken farming and uptake of Newcastle vaccines and veterinary services in Machakos town sub-county. A description of the research site; research design; study population and unit of analysis, as well as sample size and sampling procedure are presented. It further describes data collection methods as well as data processing and analysis techniques. The ethical issues that guided the study are explained herein.

3.1 Research site

The study took place in Kola and Kalama wards in Machakos town sub-county in Kenya, located in Machakos County. This is a semi-arid region with a long rainy season between March and May, and short rains between November and January, making it suitable for chicken farming (Baaru & Gachene, 2016). Machakos town sub-county is located in Machakos county that was the first capital city of Kenya, and now it is an administrative county in Kenya (Geographical Location - Machakos County Assembly, 2020), which borders Nairobi and Kiambu counties to the West, Kajiado to the South West, Makueni to the South, Kitui to the East, Embu to the North and Murang'a and Kirinyaga to the North West. Machakos county covers an area of 6,042.7 square kilometre (SQ. KM), with a total population of 1,421,932 people, and a population density of 235 persons per SQ. KM, with 402,466 households (Kenya National Bureau of Statistics, 2019).

The dominant habitants of Machakos county are the Akamba people, who live in eight sub-counties (Figure 1), namely: Machakos town, Kangundo, Kathiani, Matungulu, Mwala, Mavoko, Masinga and Yatta (Population - Machakos County Assembly, 2020). As per the 2019 census report, Machakos town sub-county had a total population of 170,606, with a population density of 609 persons per SQ. KM (Kenya National Bureau of Statistics, 2019). Machakos town sub-county has 7 wards with a population of: Kalama ward - 54,462; Mutituni ward - 34,705; Mua ward with - 8,805; Kola ward - 12,801; Mumbuni North ward - 59,926; Machakos central ward - 111,322; and Muvuti ward - 10,641 (Kenya National Bureau of Statistics, 2019).

The county is characterized by smallholder farmers practicing chicken farming, crop farming, rearing of livestock, farm forestry and bee keeping as the major agricultural land use activities carried out in the study area (Muloo et al., 2019). Rainfall is the most important climatic element

in Sub-Saharan Africa, and smallholder chicken farmers living in Machakos county rural areas, are dependent on rain-fed farming as a source of livelihood (Huho, 2017). However, past studies have been largely gender blind, where some have assumed that men are the main implementers on the farm, although majority of smallholder women farmers are the ones predominating in chicken farming (Cheng'ole et al., 2003). This is because in Africa, including Kenya, women contribute about 60 to 80 per cent of chicken farming labor input (Adekanye et al., 2009).

This observation seems to remain the same, despite all the regional differences in smallholder chicken farming, which indicates that the day-to-day management of chickens is undertaken by women, often with assistance from their children (Mutombo, 2014). Whereas men may occasionally assist in the construction of chicken housing and marketing of chickens and eggs, women and children are usually the ones who clean the chicken house, feed, water and treat the birds (Mutombo, 2014). Despite this, Smallholder women farmers rarely receive as much chicken farming support as men, which in turn constrains the women from producing marketable surplus (Mwangi et al., 2015). At the same time, the economic opportunities provided for smallholder women farmers remain very constrained compared to men, as they continue to lack voice in decision-making power both in their household and in society at large (Mwangi et al., 2015).

It should also be noted that the division of labor tends to change when chicken production increases, whereby women's involvement decreases while that of men intensifies, since women are not necessarily endowed with complete ownership of the birds, or with decision-making power regarding the use of the chicken products, and income from sales (Abdirahman et al., 2023). Therefore, understanding gender roles assigned to smallholder farmers, involves not only looking at activities specifically done by women and men chicken farmers, but also the factors that influences these activities across gender, such as: age, education level, marital status and wealth (Grace, 2004).

On the other hand, the major impediment to chicken farming has always been a shortage of water (farming chicken feeds, drinking water for chickens and constituting ND vaccines), due to unreliable rainfall in the county, with the short rains in October and December, while the long rains are in March and May (Muendo & Gimode, 2022). The climate is semi-arid with an average annual rainfall of 800 mm/year, that support the growth of maize, beans, cowpeas, pigeon peas, green grams, sorghum and millet in small quantities, which act as chicken feeds (Mwangi et al.,

2015). At the same time, the Machakos county topography still has some impact on the development of the county, with the hills acting as catchment areas for numerous springs and streams that are relatively high potential areas for chicken farming (Muendo & Gimode, 2022).

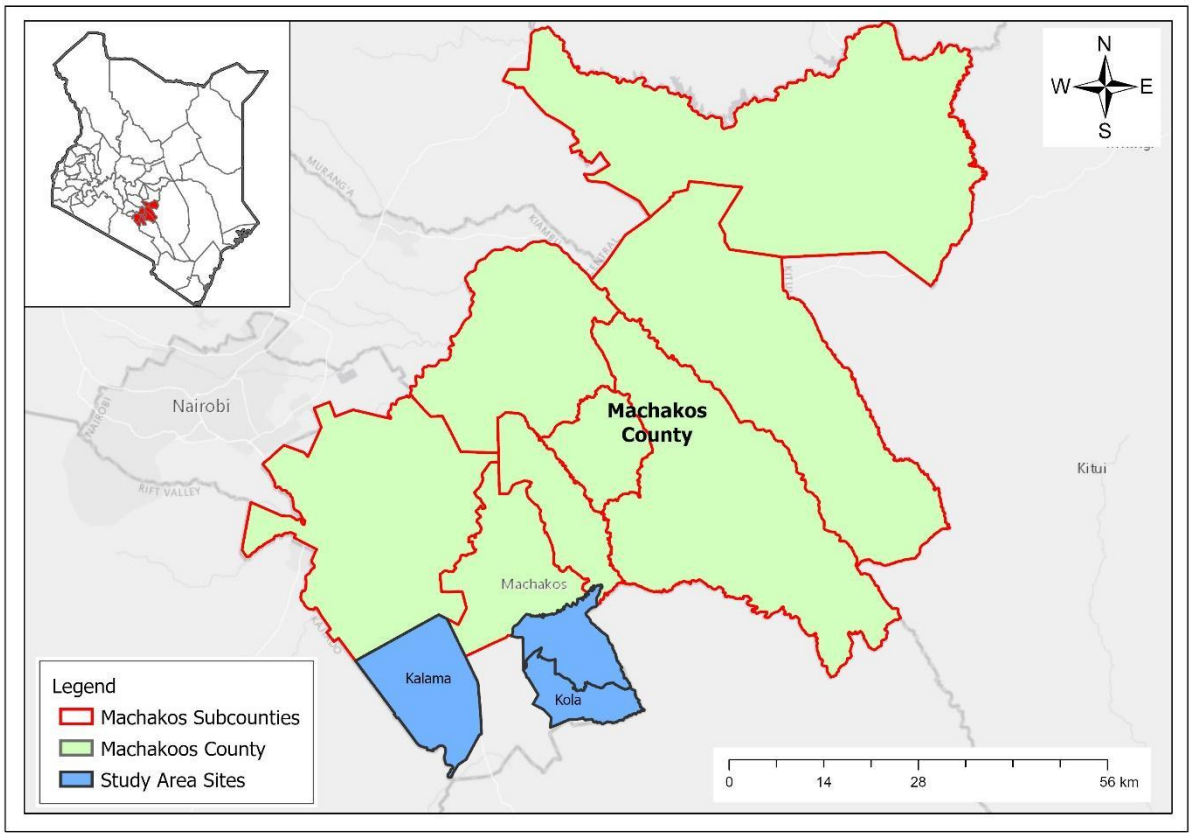

Figure 3.1: Map of Machakos county. The wards of Kola and Kalama within Machakos town sub-county were selected for inclusion in this study.

3.2 Research design

The study employed a cross-sectional descriptive study and mixed methods design that employed the use of both quantitative and qualitative methods in collecting data. The cross-sectional descriptive study and mixed methods research design guided the study in generating data about the gender perspectives on chicken farming and uptake of Newcastle vaccines and veterinary services in the study area, while providing the opportunity for drawing valid recommendations and conclusions (Creswell & Zhang, 2009). The study used a well-articulated action research strategy

that integrated gender analysis tools and frameworks for action research in chicken farming, uptake of ND vaccines and veterinary services. The research study also utilized resources from the USAID five domains of gender analysis and the Women's Empowerment in Agriculture Index (WEAI). Therefore, using the PRO-WEAI as a starting point, a team of researchers at International Livestock Research Institute (ILRI) and Emory University developed the Women's Empowerment in Livestock Index (WELI), a new index to assess the empowerment of women in the livestock sector. The WELI focuses on animal health, breeding, and feeding; as well as how livestock supports women's empowerment and the health and nutrition of women and children at the household level, together with an extra module focused on livestock roles, access and control over livestock related resources.

The study used the WELI, a standardized quantitative survey tool used to measure empowerment of women in the livestock sector at the level of the household and along the VVC (Galiè et al., 2019). The WELI survey questionnaire was customized for the project by ILRI, to include questions on ND vaccines, administered using the ODK collect (Open Data Kit) - an android app used in survey-based data collection. The project country team and students were trained by ILRI for three days, on how to apply and practice using the ODK app, before it was uploaded onto tablets and phones for fieldwork data collection in Kola and Kalama wards. Specifically, while the WELI survey questionnaire provided quantitative data, focus group discussions (FGDs) and key informant interviews (KIIs) provided qualitative data. The data was collected in the period between the months of July and September 2022. Participants in the FGDs and KIIs were purposively selected, while selection of participants for the WELI survey was done through simple random sampling.

The fieldwork data collection process was conducted in two staggered phases, which allowed the data collected from the questionnaires to inform questions in the FGDs, and data collection in the FGDs inform questions in the KIIs (Creswell, 2014). The collection of quantitative data through the WELI survey was carried out in the first phase, while the second phase involved the collection of qualitative data through FGDs and KIIs. Some of the information identified in the WELI survey questionnaires, were incorporated into the FGDs to build consensus. While the WELI participant sample size was calculated for the quantitative survey method, the qualitative methods sample size

for the FGDs and KIIs were based on the principle of saturation, with the emphasis on the need for information (Orodho, 2003).

For the data analysis, the WELI data was analyzed using STATA V10.0. whereby, a chi2 test was used to compare the proportion of women who participate in SHGs as a social capital resource, compared to the men, while the computed data was analyzed using descriptive statistics that included percentages, frequencies and means (Shamoo & Resnik, 2009). On the other hand, qualitative data and fieldnotes collected from FGDs and KIIs, were processed through transcription and translation, where every data was transcribed verbatim in Swahili, translated into English, and augmented with observational notes which were obtained during data collection (Rabiee, 2004). These were then coded by theme in Excel, and content analysis was used to examine patterns and interpret meaning (Hsieh & Shannon, 2005). The content and thematic analysis approach were used to analyze the research data, where the guiding themes were the key research questions. The voices of the chicken farmers could be heard through the verbatim quotes that were used alongside the presentation of the study findings, while adhering to key ethical issues throughout the data collection process and reporting of findings.

3.3 Study population and unit of analysis

A group of smallholder chicken farmers that theoretically had the desired characteristics of the research, formed the study population from which a sample was drawn, and used in the research (Resnik, 2011). In the study, Machakos town was chosen because it was a major chicken farming production area, which provided an estimated 862,392 chickens per year to nearby Nairobi town (Ipara et al., 2019), due to its close proximity of about 63 km from Nairobi County, which is the capital city and main population centre of Kenya (Muiruri Njoroge et al., 2017). The smallholder chicken farmers living in Kola and Kalama wards of Machakos town sub-county, constituted the study population for this study. The Unit of analysis was dual households in Kola and Kalama wards of Machakos town sub-county.

3.4 Sample size and sampling procedure

Machakos town sub-county was chosen for its proximity to Nairobi town, and because most households practice chicken farming. The survey was done on 100 dual households, where two

adults, the man and woman were interviewed. The study selected the required sample size of 100 dual households owning 10 to 100 chickens in Kola and Kalama wards, using simple random sampling. In each household, one woman and one man were recruited to participate in the survey, hence the total number of women who responded to the questionnaire were 100, together with 100 men from the same households.

The study assumed that women and men performed different roles in chicken farming activities, uptake of ND vaccines and veterinary services at village level. As such, it was important to collect quantitative information at the household levels to compute the patterns of gender relations; participation in the ND vaccine value chain roles; access and control over ND vaccines and veterinary services; the gendered participation in chicken farming decision-making processes at the household level; and how these relationships shape the local pathways for women and men to access the information needed on the importance of the ND vaccine value chain.

The Cochran (1963, 1975) formula equation ($n_0 = Z^2\ p\ q\ /\ e^2$) was used to yield a representative sample size from the large project sample (Singh & Masuku, 2014):

Where:

n_0 = required sample size,

Z^2 = desired confidence level of 95%,

e = desired level of precision or margin of error at +-5% (standard value of 0.05),

p = estimated proportion of an attribute that is present in the response from the population,

q = 1-p (estimated responses).

The formula for calculating sample size is:

$n_0 = (1.96)^{-2}\ (0.5)\ (0.5)\ /\ (0.5)^2$

=96

This is rounded to 100

Thus,

n_0=100

The sample size was fit to represent the dual households of smallholder chicken farmers in Kola and Kalama wards. While acknowledging that the population of Kola and Kalama wards were not homogenous, the list of the dual households that acted as the sampling frame in the wards, was obtained by the researcher from the offices of the chiefs and ward administrators. The sample frame obtained was based on the demographic data and the clustering of households in Kola and Kalama wards, using statistics from the Kenya National Bureau of Statistics (KNBS) and the county government of Machakos town, made available through the public administration officers.

From this frame, a sample of 100 dual households were selected randomly, and in each household, one woman and one man were recruited to participate in the survey, hence the total number of women who responded to the standardized WELI survey questionnaire was 100 and the number of men from the same households was 100. In recruitment, a set of criteria for inclusion was used, where the study participants were at least 18 years old, smallholder chicken farmers and had lived in Machakos town sub-county for at least 3 years, to have experienced the gender perspectives on chicken farming activities and uptake of ND vaccines and veterinary services in Machakos town sub-county.

3.5 Data collection methods

3.5.1 Focus Group Discussions

Focus group discussions were held with smallholder chicken farmers in Kola and Kalama wards, to obtain qualitative data on the socio-cultural factors that influence women's and men's access and control over chicken farming resources, ND vaccines and veterinary services. This method generated rich data on the experience of the gender roles associated with women and men on chicken farming activities, uptake of ND vaccines and veterinary services at the village level. The researcher conducted 6 FGDs that addressed the five USAID Domains for Gender Analysis: 1) gender roles, responsibilities and time use; 2) access to and control over assets and resources; 3) cultural norms and beliefs; 4) laws, policies, regulations and institutional practices; and 5) patterns of power and decision-making (*USAID Kenya Final Gender Analysis Report March 2020*, n.d.).

The FGDs were composed of 48 participants (8 participants per group), and were conducted with at least three facilitators, where the researcher facilitated the discussions, while the other facilitator

recorded observational notes during the discussions, and the third facilitator acted as a translator whenever there was a need. All FGDs were audio-recorded to facilitate transcription and analysis. FGD guide (annex 3) was used to collect data. The FGDs brought out local pathways available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services in the community. The FGD participants also agreed on the different challenges, such as lack of knowledge and information on chicken diseases and treatment, limited access to ND vaccines and lack of cold chain for storing the vaccines in the correct temperature.

Table 3.5a: Distribution of FGDs conducted with smallholder chicken farmers

		Kola	**Kalama**	**Total**
No of the Focus group discussions		4	2	6
No of the focus group participants	Men	12	5	17
	Women	20	11	31

3.5.2 Key Informant Interviews

In addition to the FGDs, key informant interviews were conducted with sixteen (16) participants based on their expertise and knowledge on chicken farming, accessing ND vaccines and veterinary services along the ND vaccine value chain in the county. The key informants included: chicken farmers (5 women; 3 men), agrovets (1 woman; 1 man), distributor (1 woman; 1 man), importer (1 man), producer (1 man), directorate of veterinary services (1 man) and county veterinary officer (1 man). The KIIs were audio-recorded to facilitate transcription and data analysis on the gathered information, regarding the challenges women chicken farmers face in accessing ND vaccines, and the available opportunities for the women to fully participate in the ND vaccine value chain. A key informant interview guide (annex 4) was used to collect data.

Table 3.5b: KIIs conducted along the ND vaccine value chain node

CHAIN NODE/LEVEL	FUNCTION	MEN	WOMEN	TOTAL
Consumers	chicken farmers	3	5	8
Agrovets	Sell ND vaccines	1	1	2
Distributor	Distributes/sells ND vaccines	1	1	2
Importer	Import ND vaccines	1	-	1
Producer	Produce ND vaccines	1	-	1
Policy and legislation (directorate of veterinary services)	Give license to vaccine producers and importers	1	-	1
Policy and legislation (county veterinary officer)	Decide on how and when to distribute ND vaccines	1	-	1

3.5.3 The standardized Women's Empowerment in Livestock Index Questionnaire

The Women's Empowerment in Livestock Index (WELI) was a standardized measuring tool that was specifically designed to capture the impact of women's empowerment in agriculture, with a focus on key areas of livestock production (Galiè et al., 2019). The WELI was based on local understandings of empowerment, on the WEAI, and on consultations with ILRI livestock experts in Kenya (Galiè et al., 2019). The standardized WELI questionnaire tool included both a quantitative and a qualitative component (Quisumbing, 2019).

The WELI survey questionnaire was customized for the project to include questions on ND vaccines that were used to domestically collect data in Machakos town sub-county, on the socio-cultural factors that empower and could also disempower chicken farmers from using ND vaccines in chicken farming. The qualitative component helped to locally identify key areas of

empowerment and disempowerment involved in the keeping of chickens, by exploring what participants understood by empowerment and disempowerment; the key indicators they considered important to measure empowerment and disempowerment; and their perspectives on how gender roles, access and control over chicken farming resources, ND vaccine uptake and veterinary services at household level were connected (Price et al., 2018).

This was carried out through simple random sampling that was employed in Kola and Kalama wards, which identified 100 dual households, where participants over 18 years of age (1 woman and 1 man) were interviewed from each household. The WELI survey was administered using the ODK collect, which was an android app that was used in survey-based data collection. This app was uploaded onto tablets and phones, and then administered to 100 dual households of smallholder chicken farmers in Kola and Kalama wards. A household coding and tracking system was used to capture the total number of households that were interviewed during the surveys. A WELI survey questionnaire (annex 2) was used to collect data.

3.6 Data processing and Analysis

Each of the WELI survey questionnaire items were coded and then the data entered into the ODK collect, which was an android app that was used in survey-based data collection. Data were then scrutinized for missing values that could have been wrongly captured during data entry, by counter checking with the WELI survey questionnaires. Afterwards, the data collected from the WELI survey questionnaires were explored to identify any outliers and extreme values, while at the same time, reliability tests were performed by visual check and percentiles to determine the appropriate statistical techniques (Resnik, 2011). The data was then analyzed from a gender perspective, looking into power relationships between men and women through analysis of their access to and control over the 5 forms of capital (social, financial, human, physical, and personal capital) (Murray & Ferguson, 2001), by using descriptive statistics that involved data frequencies, which recorded the number of times a score occurred, and percentages that recorded the extent of occurrence of a particular observation. At the same time, mean values were used to inform the study on the expected score, while standard deviations informed the researcher about the distribution of scores around the mean of the capital distribution (Creswell, 2014). Graphical illustrations were also deployed to enhance the findings.

The qualitative audio recording data from FGDs and KIIs were transcribed verbatim in the language of the interview, and the transcripts were translated into written English text. After each verbatim transcription, the transcripts were labelled properly using a system of labelling adopted by the researcher. The analyzed research data were then labelled using codes developed through the inductive approach analysis process (Creswell, 2009), whereby the study research implemented open coding to identify emerging themes (codes) and trends, for insights into gender perspectives on chicken farming and uptake of Newcastle vaccines and veterinary services, by reading and re-reading through the transcripts (Orodho, 2003; Resnik, 2011).

At this stage, the researcher developed a codebook that was informed by the study objectives, questions, data collection themes and findings from the desk review of documentation, while updating the codebook until the coding process was completed (Shamoo & Resnik, 2009).These codes were then applied to the data texts and transcripts, which were then reviewed to ensure there was agreement in the coding. The data were then analyzed through content and thematic analysis, in line with the study objectives acting as the main themes. Tables and charts were used to present the final data.

3.7 Ethical approval

This study was conducted within a bigger project whose ethical approval for human subjects' research was obtained locally in Kenya through the country clearance National Commission for Science, Technology and Innovation #NACOSTI/P/19/80106/28666; ethical approval via University of Nairobi Faculty of Veterinary Medicine Biosafety, Animal Use and Ethics Committee #FVM BAUES/2019/194) and through the Tufts University Social Behavioral & Educational Research Institutional Review Board (#1907033) prior to commencement of research activities. While in the field, the researcher informed all the study participants on the purpose of the study, and explained the procedures, risks and benefits using the informed consent form (annex 1). The participants were made aware of the fact that participation in the study was voluntary, and they had a right to anonymity of all the information they gave. As much as possible, disruption of the day-to-day activities of participants was avoided, where they were informed that consenting was both verbal and written, as they were free to decline to answer certain questions and could withdraw from the study at any stage.

The participants were assured of confidentiality and anonymity throughout the study, on the likelihood of being quoted verbatim (for example, in FGDs or KIIs), the information they gave would be handled with the utmost confidentiality and that it would not be used for other research purposes. The researcher acknowledged the sources where secondary information was obtained from, and bear the obligation to the scientific community. For quality purposes, copies of the final research project will be availed at the University of Nairobi Library for academic purposes, while the researcher will also share the findings of the study with the scientific community through publications, and disseminate them back to the community through local administrative channels.

CHAPTER FOUR: GENDER PERSPECTIVES ON CHICKEN FARMING AND UPTAKE OF NEWCASTLE VACCINES AND VETERINARY SERVICES IN MACHAKOS TOWN SUB-COUNTY

In this chapter, the study findings and discussion on gender perspectives on chicken farming and uptake of ND vaccines and veterinary services in Machakos town sub-county, based on WELI survey questionnaire responses, FGDs and KIIs are presented. The chapter has three sections, where the first section provides the socio-demographic characteristics of the study participants, the second section presents findings of the study based on the three specific objectives that were analyzed using the Moser Framework's six principles, and the third presents the response rate of the participants.

4.1 Socio-demographic characteristics of respondents

The socio-demographic profile of the survey participants provided context on the study population. The main project targeted 400 participants that were to be interviewed, but ended up with 381 participants as having completed interviews/data (95.3%). Of these 75.1% were female and 24.9% male. My study focused on 100 households owning 10 to 100 chickens in Kola and Kalama wards, where two adults (one woman and one man) were interviewed from each household. However, only 96 dual households completed the survey questionnaire, thus representing a response rate of 96%. In terms of gender, the study findings indicated that the total number of married couples interviewed from the 96 dual households were 96 women (48%) and 96 men (48%). My analysis focused on the 96 dual households with complete data. Reasons for non-response/missing interviews were: 2 missing or mis-matched husband/wife and 2 households' failure to consent. The majority of both women and men were Christians (97.8%), while Muslims were about 0.9%, with only 0.5% of people practicing other religions and about 0.7% did not practice any religion (City population, 2019). 66.9% of married women from dual households decided how their cash earnings were used, compared to 81.1% of married men from the same households (Kenya National Bureau of Statistics et al., 2015).

Table 4.1a: Socio-demographic characteristics

SOCIAL DEMOGRAPHIC	CHARACTERISTIC	PERCENTAGE
Gender	Female	48
	Male	48
Marital status	Women	48
	Men	48
Household income	Female	66.9
	Male	81.1
Chickens	Indigenous chickens	61
	Exotic chickens	11
Religion	Christians	97.8
	No religion	0.7
	Islam	0.9
	Other religion	0.5

When it came to the education level, slightly more women from Kola (72.7%) than Kalama (53.8%) were able to complete their primary education level, however, when it came to the tertiary level, there were fewer women (7.7%) than men (33.3%) who completed their tertiary education in Kalama ward. The main project had a significant difference on the average age between the female and male participants, ranging from 22 to 85 years with a median of 48 years of age for the women, and 25 to 90 years with a median of 59 years of age for the men (Kaluwa et al., 2022), therefore, my study participants' ages ranged between 28-70 years for women in Kola ward and 30-70 years in Kalama ward. At the same time, men's age ranged from 25-70 and 30-65 years in Kalama and Kola wards respectively.

Table 4.1b: Demographic characteristics of FGD participants

	Education level	Kola		Kalama	
		Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Male	Primary	2	50	0	0
	Secondary	2	50	2	66.7
	Tertiary	0	0	1	33.3
	No-education	0	0	0	0
Female	Primary	16	72.7	7	53.8
	Secondary	4	18.2	4	30.8
	Tertiary	0	0	1	7.7
	No-education	2	9.1	1	7.7
Participants age range (in years)			Men	30-65	25-70
			Women	28-70	30-70

4.2 Participation of women and men along ND vaccine value chain

The ND vaccine value chain (fig.4.2) in Machakos town sub-county was categorized into two parts: the first was legislative and policy sector that include the Kenyan Veterinary Board (KVB), Veterinary Medicine Directorate (VMD) and Directorate of Veterinary Services (DVS). The second was technical parts that included the ND vaccine manufacturers, producers, and importers; distributors and sellers; extension and educative services; and smallholder chicken farmers (consumers). The legislation part included both national and international laws, and policies that were related to or guided the making and distribution of ND vaccines.

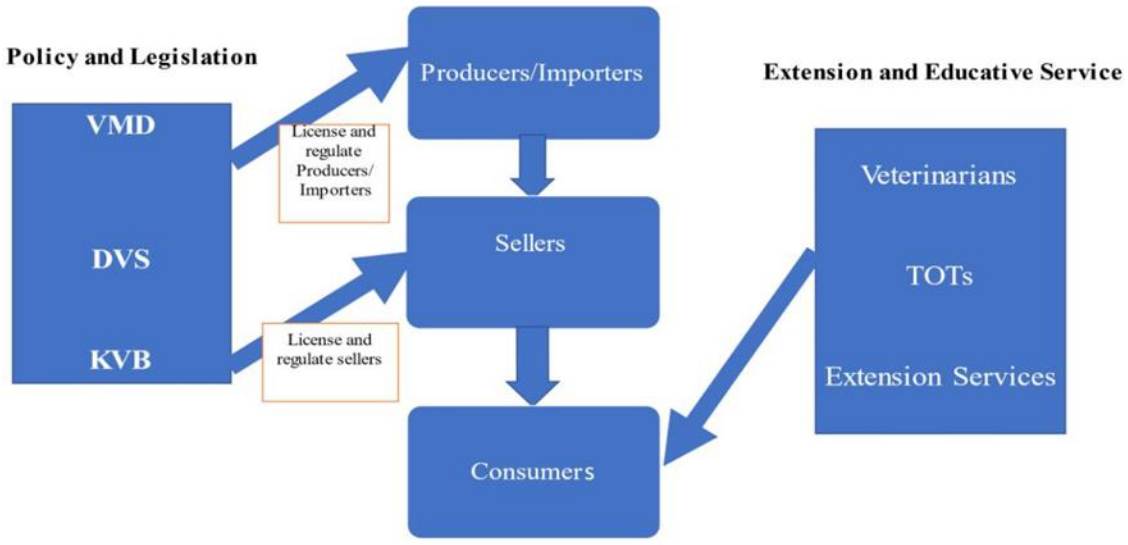

Figure 4.2: Newcastle Disease Vaccine Value chain map in Machakos town sub-county

4.2.1 Legislative and policy sector - laws, policies, regulations and institutional practices

The KVB, VMD and DVS make up the three national vaccine legislation and policymakers in Kenya. The KVB had employed chief executive officers and secretaries (9 women and 10 men), who worked on regulating veterinarians and para-veterinarians through registration, licensing, and field practice in Kenya, and ensured the delivery of quality veterinary services. This extended to the regulation of veterinarians that sold and supplied vaccines along the ND vaccine value chain.

As for the manufacturing, importation, distribution, prescription, and dispensing of the ND vaccines, were regulated by the VMD. Advise on the distribution and control of ND vaccines at the national and county levels of the government, was carried out according to the advice of the DVS. Majority of the end-users who participated in the ND vaccine value chain were women and men chicken farmers, however, as one moves up from the smallholder chicken farmers to the policy-makers along the ND vaccine value chain, there were fewer and fewer women.

4.2.2 Technical Sector

4.2.2.1 Vaccine manufacturers/producers and importers

There were government and private organizations that produced and imported ND vaccines in Machakos town sub-county. The Kenya Veterinary Vaccines Production Institute (KEVEVAPI), was a government-owned body that developed and produced ND vaccines. In addition, there were two main private companies that imported, supplied and directly distributed the ND vaccines to agrovets and other distributors who provided ND vaccines either to sellers or directly to the chicken farmers.

4.2.2.2 Distributors and sellers

Most of the sellers who provided ND vaccines to the end-users and offered veterinary extension services to the chicken farmers were agrovets who owned shops that sold chicken feeds and veterinary supplies. Majority of the agrovets divided their employees into two groups: those who delt with chicken feeds, and those who handled ND vaccines, who included veterinarians or animal health assistants that played a crucial role in providing ND vaccination services and use. In Machakos town sub-county, agrovets are set up within Machakos town, where more smallholder chicken farmers were able to access their services, making the business more profitable, instead of being situated in Kola and Kalama wards, which were located far away from Machakos town (Kola to Machakos town is 32.4km and Kalama to Machakos is 23.9km). Agrovets were an essential link in ensuring quality ND vaccines were handled efficiently, by maintaining proper cold chain to keep the ND vaccines refrigerated. However, women working in the agrovet shops end up facing more challenges compared to the men.

Challenges

Financial challenges: Some of the key informant participants reported that majority of the women were risk-averse when it came to finances, even though they had the knowledge and education to open agrovet shops. This was because majority of agrovet owners were men. On the other hand, some women reported that with the availability of capital, they would also start their agrovet shops. One female key informant that was an agrovet manager said that,

"The only thing that is hindering them from owning agrovet shops is lack of initial capital." (KII#9).

Another male key informant added,

"We have women who are technically competent, but they might be hindered by start-up capital. If finances and business management skills are given, I don't think there is anything that is hindering women from participating." (KII#10).

Access to agrovet positions: All the six agrovets (2-Men; 4-Women) and eight vaccinators (3-men; 5-women) who were part of the FGDs, reported that most of the hiring process at the agrovet shops were based on a recommendation from someone within a network, and not through job advertisements. This made it hard for women to be hired, as the pool of potential employees had more men than women veterinarians, thus making the competition high.

Gender based-opportunity: Sometimes, the job opportunities that were available at the agrovet shops were based on the type of work that needed to be done at a given time. For example, according to two female agrovet workers, women were not considered for some jobs because of them being perceived as men's jobs, as a female participant (agrovet worker) said that:

"You cannot have more women than men because of the labor needed in the shop, a lady cannot carry a sack of chicken feeds." (FGD#4).

Fewer female veterinarians: It was reported that Machakos county government together with the private practices employed fewer women veterinarians than men (31% female vs. 69% male) (Abdirahman et al., 2023). The veterinary practitioners in Kenya were classified into veterinary surgeons who had completed a five-year degree course and veterinary paraprofessionals who held a three-year diploma training in animal health. One male veterinary officer reported:

"*There are four veterinary surgeons; among them, there is only one woman. At the Diploma level, there are eight (four women). Among thirty certificate holders, only five are women."* (FGD#6).

4.2.2.3 Extension and educative services

Veterinarian/extension officers: Study findings showed that retired veterinarians had not been replaced in Machakos town sub-county, thus lowering the number of practicing veterinarians required to meet the need in the expected area of coverage in the field. This was because both public and private veterinary officers in the field had direct contact with the smallholder chicken farmers, and offered veterinary services that included the treatment of chickens and ND vaccination. However, due to the limited number of veterinary officers, traveling from one chicken farm to another was also a challenge. On the other hand, the study noted that not all smallholder chicken farmers hired the services of a veterinarian to vaccinate their chickens, since some preferred to do it themselves. These included some of the smallholder chicken farmers that had been trained by veterinary officers on how to solve problems related to chicken husbandry and diseases, as well as chicken rearing and ND vaccination.

Community vaccinators (Trainer of Trainers-TOTs): There were two different categories of community vaccinators, who included diploma holders that had received their college certification and vaccination license from KVB. These vaccinators were legally allowed to sell ND vaccines and vaccinate chickens for other smallholder chicken farmers in the community, while training them on how to vaccinate their own chickens. The other community vaccinators included some of the smallholder chicken farmers who had been trained on ND vaccination by veterinarians, so that they could be able to train other farmers on the same. However, since these farmers were unlicensed by the government, they were prohibited by law from vaccinating chickens that belonged to other farmers, because their knowledge on vaccination procedures were limited. But they were allowed to vaccinate their own chickens, as they trained other smallholder chicken farmers to vaccinate for themselves, thus they were important resources for farmers, and were respected in the community.

4.2.2.4 Smallholder chicken farmers (consumers)

The ND vaccine end-users comprised of large-scale and small-scale chicken farmers, who purchased ND vaccines from the agrovets, and were required to maintain the cold chain until the ND vaccine reached the farm and was administered to the chickens. A cold chain was often maintained by placing the ND vaccine in a thermos filled with ice cubes, which was then

transported by the farmer or a courier on a motorbike to the chicken farm. Afterwards, the farmer either vaccinated the chickens directly or hired the services of a veterinarian officer. The efficacy of the ND vaccine depended heavily on its handling and the ability to maintain the cold chain until the use point, however, most of the times you found that this was the point where the quality and efficacy of ND vaccines were compromised.

This was reported by both the smallholder chicken farmers and agrovet workers, as most of the farmers were women who came from far to buy the ND vaccine, thus predisposing them to loss of the vaccine's efficacy, since they did not have much access to the required vaccine cold chain. Both women and men chicken farmers encountered various challenges that affected the vaccination of chickens against ND, such as: access to vaccines, vaccine cost, knowledge about vaccine use, and insufficient agrovet shops.

Challenges

Access to vaccines: Most of the smallholder chicken farmers identified limited access to ND vaccines as one of the challenges in the rural areas of Kola and Kalama, due to insufficient agrovet shops and increased prices of vaccines in the village. There were few agrovets in the rural areas, so most of the chicken farmers were forced to travel long distances from Kola to Machakos town, 32.4km away, and from Kalama to Machakos town was 23.9km away. This was a significant barrier for accessing the ND vaccines, as smallholder chicken farmers were forced to purchase them from agrovet shops in Machakos town. One female participant from FGD#4 said:

> *"It is difficult to access the vaccines due to the long distance to Machakos urban center to purchase the vaccines."*

Another female participant from FGD#4 reported:

> *"Inaccessibility of agrovets, i.e., most of them are in Machakos town, none around Kalama village, and the ones around sell at expensive prices."*

Vaccine packaging and costs: High vaccine costs were also reported by most women and men chicken farmers as a major barrier to ND vaccination, as the vaccines were sold for 250 KES to 350 KES in vials of one hundred doses or more, which increased the cost for the smallholder chicken farmers who had less than 100 chickens. Vaccination costs were further exacerbated by

cost of transportation to and from Machakos town to purchase the ND vaccines, as well as additional costs if a veterinarian had to vaccinate the chickens. This was according to one female participant who stated that,

> *"At the same time, I might call over the vet doctor to treat my livestock, but I do not have the money to pay him. Therefore, why should I call him? When I know that I cannot afford his services. The problem is lack of money."* (FGD#2).

Limited knowledge on ND vaccination: Smallholder chicken farmers had limited knowledge on the schedules and administration procedures to follow when vaccinating their chickens against ND. The chicken farmers were also concerned about the linkage between the cold chain and quality of the ND vaccines, and were equally unsure of how to maintain the vaccine cold chain, as one female farmer explained:

> *"Vaccines expire by the time one gets back home; this is also because most of us do not own refrigerators, as the vaccines need refrigeration."* (FGD#1).

This was a paramount concern shared by many, as storing and transporting ND vaccines at recommended temperatures from the point of manufacture to the point of use, was a problem in the rural community where electricity is scarce, unreliable, and sometimes unavailable. Although the number of smallholder chicken farmers who reported using ND vaccines was very low, the majority of the VVC end-users were smallholder chicken farmers who participated along the ND-VVC by vaccinating their own chickens.

4.3 Gender roles associated with women and men on chicken farming activities and uptake of ND vaccines and veterinary services

The study adopted the first principle of the Moser framework on gender roles identification/ triple role tool that involved mapping the gender division of labor, by asking 'who does what? (March et al., 1999), as Caroline Moser identified the triple role for women consisted of reproduction (household-related and child care); production (farm work or engagement in other economic activities); and socio-cultural (community based) functions (Moser, 2014). The recognition of women's triple role – with the aim of ensuring that tasks were equally valued – the study was able

to highlight work that was often ignored in gender roles associated with women on chicken farming activities, uptake of ND vaccines and veterinary services at the village level (Bolt & Bird, 2003).

The objective of the study sought to describe that a village was made up of households that formed spaces for human intersectionality, where women and men were assigned different gender roles, with competing interests and inequalities in access to and control over chicken farming resources (Allan & Crow, 2001; Niamir-Fuller, 1994), instead of a homogenous group of women and men living under one roof.

From the study findings, women contributed the most to chicken farming roles and activities compared to men, as they made most of the decisions related to chicken feeds, cleaning of the chicken house, chicken brooding and slaughtering; chicken health and treatment, providing disease prevention measures, marketing of the chickens and the products; distributing and sharing chicken workload among household members.

Study results aligned with published data, which showed that women performed most of the productive work related to chicken farming, as confirmed by a female participant from FGD#3*:*

> *"We don't have much freedom, since most of the time men say that domestic activities are ours, like taking care of the animals, chickens, farming and watching the children."*

However, most publications argue that women performed most of the chicken farming work compared to men, and yet, did not enjoy the benefits and control over the chicken farming resources that came from their productive work, as most of their unpaid work were not recognized either, even after the women performed all the day to day activities related to chicken rearing, caring, feeding, cleaning, health and (Aklilu, 2008). Women were also known to invest much of their time in roles such as chicken rearing, but rarely in activities that brought revenues as compared to men (Galiè et al., 2019)**.** In addition, women provided other types of unpaid reproductive labor such as food preparation, feeding of young children, breastfeeding, child social stimulation and monitoring, collecting and treating water, collecting cooking fuel, managing household (and children's) hygiene (Bhalotra & Umana-Aponte, 2010)**.** This was agreed upon by one of the male participants from FGD#3:

> "*For the men, you know that we are usually behind in our work, because we find that our wives have already woken up as early as 5am in the morning, to prepare the children for*

school, while we are still sleeping. She will then open the chicken coup for them to scavenge around the homestead, take care of her domestic chores, and prepare the husband for the day, even though he has nowhere to go. The man will go roaming in the village, and come back in the evening expecting to find the meal ready and heads to bed, while the wife will sleep late, preparing for tomorrow morning."

The study captured different opinions and experiences involving participation of both women and men in chicken farming activities at the village level. The aim, as shown in table 4.3a below, was to determine whether both women and men chicken farmers felt that women were fully participating in the uptake of ND vaccines, and accessing veterinary services for vaccinating chickens against ND outbreaks at the household level.

Table 4.3a: Participation of men and women in chicken farming activities

ACTIVITIES	PERCENTATGE	
	MEN	**WOMEN**
Feeding of chickens	58.9	92
Health of chickens	68.4	88.8
Chicken disease preventive measures	57.7	60.3
Cleaning chicken house	38.1	90.2
Slaughter chickens	45.4	64.3
Breeding chickens	39	65.2
Marketing of live chickens and chicken products	40.3	59.4
Selecting which chicken species and breeds to rear	28.6	33.3
Sharing chicken farming workload among household members	75.4	96

As indicated on the table above, smallholder women farmers were constantly carrying out the highest percentage of the chicken farming activities at the household level, such as 92% of women feeding the chickens, compared to 58.9% of the men smallholder farmers. The men were rarely

discussed as helping the women with the chicken farming activities, as only 38.1% of the men cleaned the chicken house, compared to 90.2% of the women smallholder farmers. On the other hand, both the women and men smallholder farmers were quite involved in the chicken disease preventive measures at the household level, with 60.3% and 57.7% respectively.

4.3.2 Participation and access to vaccines/preventive care and information

The WELI survey questionnaire findings showed that participants who answered questions regarding chicken farming activities were mostly women, since a significantly higher proportion of women than men were found to be participating in 6 out of the 9 important chicken rearing activities above. The study findings also showed that majority of the smallholder chicken farmers experienced challenges such as: (62%) lack knowledge regarding chicken health and diseases, while (91%) lack access to cold-chain for ND vaccine storage, and (90%) had limited access to veterinary services in their community (Kaluwa et al., 2022). As a result, the overall number of chickens reportedly lost to ND in the last 12 months were substantial, at approximately 5.5% per household (Kaluwa et al., 2022). The WELI survey also sought to find out the gender roles of women and men along the VVC and results showed that slightly a lower proportion of women (32.5%) were able to administer the vaccines against ND, compared to (37.8%) of men.

Data collected in this study using the additional ND vaccine module in the WELI survey questionnaire, found that (62%) of the smallholder chicken farmers were not vaccinating their chickens against ND, and felt they had limited knowledge regarding chicken health and diseases. An overwhelming proportion (91%) of study participants did not have access to cold-chain storage (a prerequisite for the use of the ND vaccine), and rarely, if ever reported going to a veterinary doctor. These results were supported by recently collected data showing low ND vaccine adoption rates among smallholder chicken farmers in Kenya (Renault et al., 2019).

4.3.3 Participant's definition of empowerment

In community development practices, social-cultural factors played many different roles in influencing women's access and control over chicken farming resources, ND vaccines and veterinary services, whereby, findings from the study found that 8.5% of women and 12.2% of

men had access to information regarding chicken vaccination in the community. However, these findings could be influenced by some of these socio-cultural factors that served to empower communities, while others could result in their disempowerment. This research study described the empowerment level of smallholder chicken farmers using three domains, namely: intrinsic agency, instrumental agency, and collective agency, which combined 13 roles (WELI indicators) commonly played out in community development practices.

4.3.3.1 Intrinsic Agency

This was a process by which one developed a critical consciousness of their own rights, aspirations and capabilities, which referred to the 'power within.' In this study the participants' intrinsic agency was assessed using four indicators on: self-efficacy, autonomy in the use of income from agricultural and non-agricultural activities, respect among household members and their attitudes about domestic violence.

Table 4.3b: Participants attaining adequacy in terms of intrinsic agency

	DUAL HOUSEHOLDS (%)		P-VALUE
	MALE	FEMALE	
Autonomy in income use	81.1	68.5	0.019
Self-efficacy	67.4	64	0.55
Attitudes about domestic violence	81.1	85.7	0.282
Respect among household members	62.1	50	0.041

The study found that overall, at least half of the participants had attained adequacy in all the four indicators (Table 4.3b), as the performance of women and men varied by indicator. There was no significant difference between self-efficacy and attitudes about domestic violence indicators, however, the percentage of men achieving adequacy in terms of autonomy in income use (p-value

= 0.019) and respect among household members (p-value = 0.041), was significantly higher compared to women at a 5% level of significance.

4.3.3.2 Instrumental agency

This referred to one's ability to take strategic action to achieve their self-defined goals, also known as 'power to.' This study used inputs from participants on ownership of land and other assets, access to and input on decisions concerning credit, overall productive decisions, control over use of income in the household, input in productive decisions relating to chickens, ability to visit important locations outside the home and work-life balance.

Table 4.3c: Participants attaining adequacy in terms of instrumental agency

	DUAL HOUSEHOLDS (%)		P-VALUE
	MALE	FEMALE	
Input in productive decisions - household	66.3	86.7	<0.010
Input in productive decisions – chickens	61.1	92.3	<0.001
Ownership of land other assets	95.8	89.5	0.063
Access to and decisions on credit	93.7	94.1	0.895
Control over use of income	78	82.5	0.316
Work balance	59	26.2	<0.001
Visiting important locations	62.1	49.7	0.035

It was worth noting that input in productive decisions related to chicken production in (Table 4.3c) above, as well as input in productive decisions related to other household activities, were mostly measured in terms of women's labor contributions to productive activities. The study noted that the percentage of women reported to have achieved adequacy in terms of input in productive decisions within the households, including chicken farming activities, was significantly greater

compared to men (p-value < 0.001). However, when it came to work-life balance (p < 0.001) and the ability to visit important locations outside the household (p = 0.035), we found a greater proportion of men doing better compared to the women.

4.3.3.3 Collective agency

This described the ability of a group of united people to coordinate in line with a common narrative, in order to pursue common goals (Brünker et al., 2019). The study findings (Table 4.3d) showed that women were significantly more engaged in their community based social networks, because a significantly greater percentage of women compared to men were members of both general community groups (p-value<0.001) and influential groups (p-value<0.001).

Table 4.3d: Participants attaining adequacy in terms of collective agency

	DUAL HOUSEHOLDS (%)		P-VALUE
	MALE	FEMALE	
Group membership	73.7	92	**<0.001**
Influential Group membership	52.6	72.7	**<0.001**

The study showed that the overall results from the empowerment domain levels above, indicated that at least 80% of women achieved adequacy in 5 out the 13 roles which included:

(i) membership in community groups,
(ii) access to credit products and services,
(iii) decisions regarding asset ownership,
(iv) attitudes against domestic violence, and
(v) control over income use.

while men achieved 80% adequacy in 4 out of the 13 roles:

(i) decisions regarding asset ownership
(ii) access to credit products and services
(iii) attitudes against domestic violence, and

(iv) decisions regarding income use

Participants described empowerment in terms of their ability to access or control resources or make decisions, as one of the participants illustrated this through the following quote:

> "*Empowerment is doing something that will help me in future. By future I mean from your program I understand that the chicken I rear can help me in future. And also, my husband cannot demand to know the reason I am selling the chickens."* (FGD#3).

While another participant added:

> *"I feel empowered because when I don't have cash and I have my poultry I can sell them. If I sell 10 that is 10,000 KES, and at least I can settle some of the bills I have. So, empowerment comes from the income I get from them."* (FGD#1).

From the WELI survey questionnaire, participants generated many ideas on what was needed to improve smallholder chicken farmers' empowerment, such as economic independence, increased knowledge and skills on ND vaccination, increased access to chicken farming resources, networking and ability to influence household decision-making process. On the other hand, the graph below (Figure 4.2.3), was used to identify the main factors that contributed to disempowerment of smallholder chicken farmers in this study. The size of the bar showed the extent to which that indicator contributed to disempowerment, the bigger the bar, the higher the contribution. For the smallholder women farmers, work balance contributed the most to disempowerment followed by, visiting important locations, respect among household members, self-efficacy and autonomy in decision making and membership in influential groups. The indicators that contributed to men's disempowerment included membership in influential groups, input in productive decisions, work balance, self-efficacy, respect among household members, control over use of income, and visiting important locations.

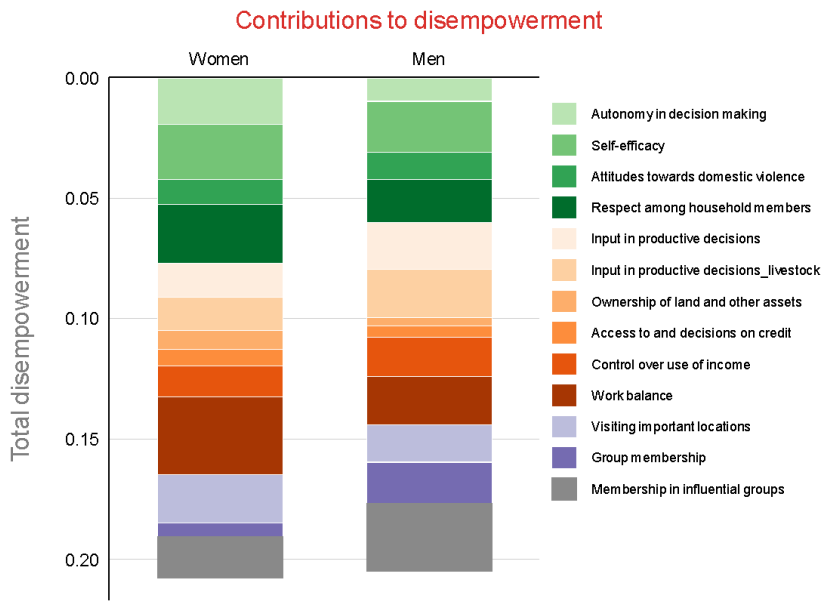

Figure 4.3: Contributions to disempowerment

4.4 Socio-cultural factors that influence women's and men's access and control over chicken farming resources, ND vaccines and veterinary services

This study presented data from 6 FGDs that addressed the five USAID Domains for Gender Analysis: 1) gender roles, responsibilities and time use; 2) access to and control over assets and resources; 3) cultural norms and beliefs; 4) laws, policies, regulations and institutional practices; and 5) patterns of power and decision-making (*USAID Kenya Final Gender Analysis Report March 2020*, n.d.). The FGDs were composed of 48 participants (8 participants per group), and were conducted with at least three facilitators, where the researcher facilitated the discussions, while the other facilitator recorded observational notes during the discussions, and the third facilitator acted as a translator whenever there was a need.

All FGDs included the study of sustainable livelihood assets that consisted of the 5 forms of capital (personal, human, social, financial and physical capital), which provided livelihood opportunities for smallholder chicken farmers, and contributed net benefits to other livelihoods along the ND-VVC (Natarajan et al., 2022).

In relation to the participatory exercise on the access to (ability to use and benefit from specific resources) and control over (being able to make decisions over the use of resources you benefit

from) resources (time, goods, services and means) (UN Women, 2020), such as the 5 forms of capital, the study used the following concepts and definitions (Murray & Ferguson, 2001):

1. **Human capital**: individual skills, knowledge, education, health, and leadership, which when combined, allowed smallholder chicken farmers to engage in promoting ND vaccination skills through community trainings.
2. **Social capital**: connections that women and men chicken farmers could draw upon to achieve their goals, by building a foundation of networks and contacts through family support, friendships and political participation that enhances their support systems, making it easier for them to develop other assets.
3. **Personal capital**: self-esteem and self-confidence, related to the values and self-perception held by women and men, and exerted strong influence on personal motivation and transformation.
4. **Financial capital**: income, savings and financial security were essential capital base for the security of smallholder chicken farmers and their families, as well as transformation and development.
5. **Physical capital**: natural resources, basic infrastructure, information, equipment and chicken farming production inputs needed to support sustainable livelihood assets through the provision of security, shelter and food.

After explaining to the participants about the 5 forms of capital, with clear examples on the differences between access to and control over resources, participants were asked to rank their access to each of the five forms of capital on a scale from zero to ten. Zero represented the lower score and ten the highest score. When participants had agreed on the rank, the score was recorded on a graph on the flip chart laid on the floor. The same exercise was carried out in relation to the control over the five forms of capital. The average score of the 6 FGDs was then calculated, as indicated in the graphs below:

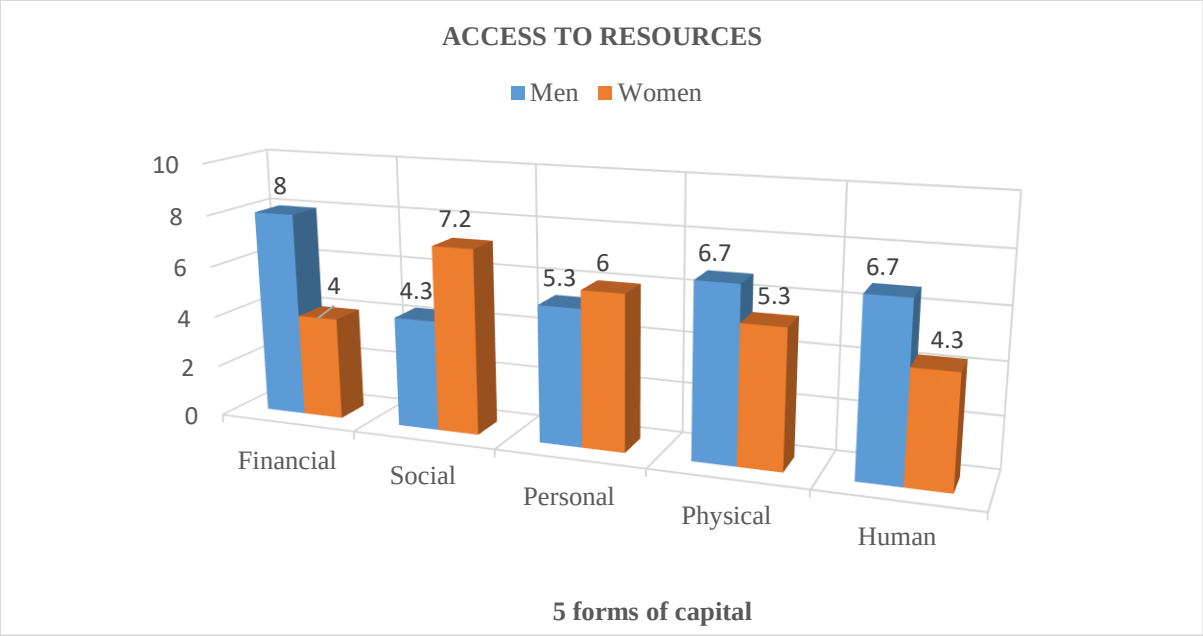

Figure 4.4a: Women's and men's access to the 5 forms of capital

Despite reports that women had a key role in smallholder chicken farming and production, women's control had traditionally declined when productivity increased, and they ended up not having access to and control over the resources and chicken products they need (Njuki & Sanginga, 2013), as shown above (figure 4.4a). The study figure indicated that men had more access to 3 out of the 5 forms of capital, which included: financial, physical and human capital, compared to women who had more access to social and personal capital. As for the control over resources, the research study findings (figure 4.4b) below indicated that men had control over 4 out of the 5 forms of capital, which included: financial, personal, physical and human capital, while women had slight control over social capital.

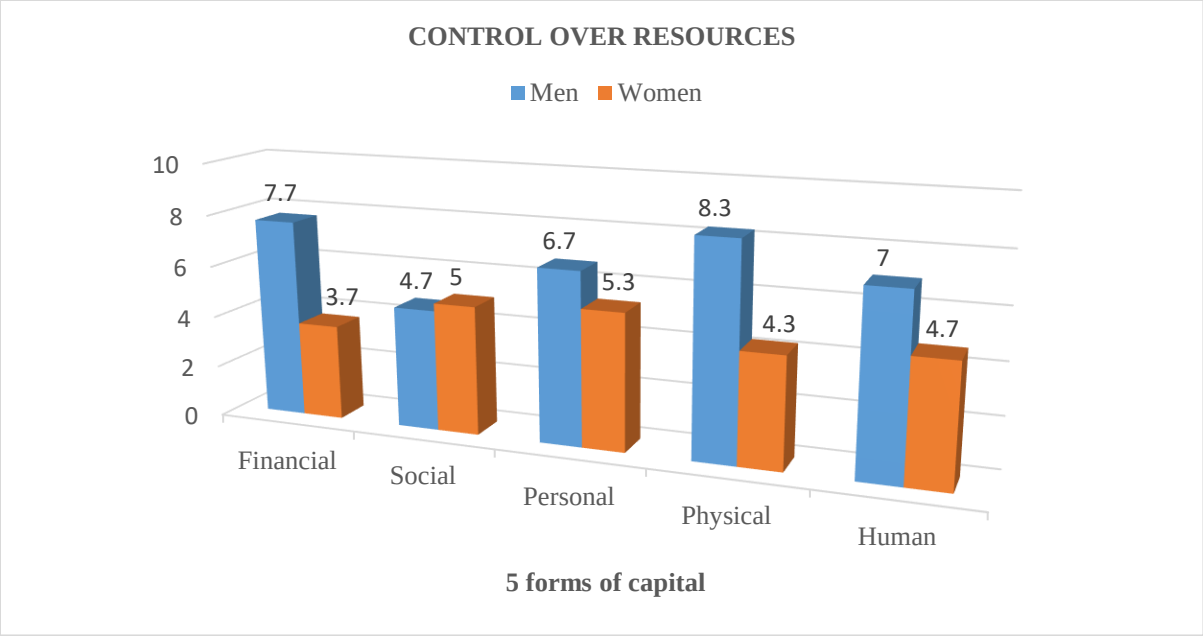

Figure 4.4b: Women's and men's control over the 5 forms of capital

The overall statistical analysis presented on the two graphs above, showed that men had a higher access to and control over most of the resources in the human, financial and physical capital, while women had slightly more access and control over the resources on personal and social capital. However, the gap between the access to and control over resources appeared to be larger when it came to the financial and physical capital that could be accessed by women but significantly controlled by men.

This was because men are seen as the providers and head of the household, therefore, women needed consent from their husbands to utilize the financial resources they had access to, because anything the men did not approve of could cause conflict within the household. Study findings also indicated that men are more trained and qualified to handle ND vaccines, thus having more access and control over human resource knowledge and skills, even though women were the ones spending more time at home taking care of the chickens.

Overall men control assets such as large animals that include cattle or camels that can be sold for substantial amount of money, and this makes women more dependent on their husbands, as they have access and control over small animals such as chickens that do not provide enough money to meet their basic needs, as well as maintain sustainable chicken farming and uptake of Newcastle vaccines and veterinary services. This was consistent with evidence presented across the literature,

showing that smallholder chicken farmers at the household levels varied globally, with women and children being in charge of extensively raising chickens, while men were more likely to own and control large animals and chicken production (Alders & Pym, 2009; Bagnol, 2009).

This was also evident from the response of participants in FGD#2, when the facilitator inquired on whether women had the power and control to make decision in their households:

Facilitator: "*Why can't women make the decisions on their own to own their own chickens?"*

Participant: "*This is because the man is the head of the house."*

Facilitator: "*Why are women not the head, is it because they are less intelligent, less strong or working less?"*

Participant: "*For example, if I decide to sell the chickens without consulting the man, I might be beaten and chased away from my home, because the man assumes that I am using the income from the sell for my own personal needs, and not for the benefit of the home."*

Facilitator: "*Therefore, it is not only a sign of respect and lack of confidence, there is fear also in making decisions. What I am trying to understand from you is how do you explain these differences, who made these rules that men need to be the head, and women always need to fear the opinion of the man?"*

Participant: "*According to our traditions and culture, that is the way it has always been."*

Facilitator: *Do you think it is possible to change the traditions and culture?"*

Participant: "*Yes, it is possible."*

Therefore, the ability of a woman to take control of her own personal assets, and to determine the path she wishes to take for the realization of her goals and her own self-worth in life, is a measure of her empowerment, according to various authors (Annas, 1993; Farnworth et al., 2020; Kabeer, 1999; Sen, 1990). Women's empowerment enhances their ability to improve their decision-making power, attain instrumental outcomes, such as improved household well-being: (increased

productivity, food security and livelihoods) (Carlson et al., 2015; Vaz et al., 2016), and attain greater control over their chicken farming resources, and their bodies (James-Hawkins et al., 2018). The following socio-cultural factors influenced women's decision-making power to access and control chicken farming resources:

4.4.1 Support from family and friends

At the household and community level, different family members and friends provided support on different chicken farming activities, with women and children being mainly in charge of raising chickens, while men were more likely to own and provide physical support related to chicken farming activities. At the same time, children were the ones who were readily available to help their mothers with the household chores and chicken farming activities before going to school, and after coming back from school. The smallholder women farmers agreed that children were a very important part of the family, and their assistance with the household duties and chicken farming activities, lightened the burden women experience with chicken farming responsibilities and daily workload, as a female farmer stated:

> *"My daughter usually helps me with the household chores, like feeding the chickens early in the morning, before she heads off to school."* (FGD#3).

4.4.2 Cooperation

In some of the households, women experienced challenges such as limited cooperation from their husbands on the access to and control over resources for chicken farming and uptake of ND vaccines. Some of these challenges were brought about by gender division of labor, whereby, reproductive tasks are culturally assigned to women and leadership tasks assigned to men at the household level. This was confirmed by a female farmer from (FGD#3):

> *"We don't have that freedom, most of the time men say that domestic activities are ours, like raising chickens and taking care of children. If women go to those trainings, no one will take care of the household. But there are also other men who don't allow their wives to attend such training."*

4.4.3 Partnership and collaboration

Most of the smallholder women farmers who joined local farmer groups felt that this was one of the strategies available for them to collaborate with each other and form partnerships that gave them more access to and control over their chicken farming resources, by using these groups as a safety net to protect against men taking over control of their large flocks of chickens after they increased in number. These groups were also formed as a means of collateral for accessing savings and credit services, where smallholder women farmers had to be guaranteed by other group members, which provided the women with basic financial capital for expansion of their chicken flocks, purchasing ND vaccines and paying for veterinary services. This was confirmed by a female farmer who commented that:

> *"Most of the time women are the ones who buy chickens, and this is after they get their money either from group merry-go-round, or their own chicken farming activities. But when it reaches at home, men take over and become owners with their own interests."* (FGD#3).

4.4.4 Networks and interconnectedness

Forming networks and understanding the social relations between men and women farmers, and their implications for keeping chickens, created interconnectedness that promoted the importance of access, control and benefits of chicken farming resources at the household and community levels, as one of the male agrovets noted:

> *"We used to have a small network for running our agrovet businesses, with only a few farmers to vaccinate their chickens against ND, compared to now, that our networks have grown, and we are benefitting from vaccinating more chickens against ND, since we started working with more groups of farmers and networking within ourselves."* (FGD#6).

Therefore, chicken vaccination projects that targeted the control of ND in the communities, had generally raised the financial capital received from chicken products, which in turn benefited community vaccinators and smallholder chicken farmers in the community, as one of the female vaccinators had previously mentioned in FGD#4:

"This is also because the knowledge that we had gained from college on the importance of vaccinating chickens against ND was there, but I never did it practically. That was a skill I learnt in school, and after being introduced to new people and forming networks with groups of farmers, I benefitted from practically vaccinating chickens against ND and earning some income." (FGD#4).

4.4.5 Community challenges faced by smallholder chicken farmers

Participants revealed that smallholder chicken farmers faced numerous challenges in chicken farming and access to ND vaccination (Table 4.4), including a lack of access to training and education, and a lack of resources to engage in ND vaccination. One smallholder female farmer explained:

"If we have the opportunity to be trained, we can do that [chicken production] work. The big problem is the lack of education for us. Men have a lot more opportunities than women. Most of the time men have that opportunity to walk around, but women do not have it. From the government, there are a lot of men vet officers than women." (FGD#3).

Stakeholders interviewed for this study believed SHGs could be used to improve knowledge about chicken farming activities and access to ND vaccines and veterinary services. Another smallholder female chicken farmer, who was a leader of a SHG, explained during a KII that SHGs could provide a platform to train smallholder chicken farmers on chicken farming management and ND vaccination.

Common themes that emerged from KIIs regarding the different challenges smallholder chicken farmers faced in carrying out chicken farming activities and ND vaccinations, were represented on the table below**.** The theme was followed by the number of times it was mentioned across the 16 KIIs, followed by a representative quote

Table 4.4: Common challenge themes

Theme	No	Examples

Smallholder chicken farmers relying on herbal medicine to treat chicken diseases, because they do not have the money to buy ND vaccines	2	"Because of the cost of these drugs and the agrovets is very far in our area we just use the local plants like aloe vera, we used it to insert in the water where the chicks are drinking from, and I also give local cow milk [to prevent disease]." (Financial capital)
Gender inequality limits smallholder chicken farmers from accessing education and working in the community	5	"Those things [gender bias] happens a lot. Most of the people [women] don't want to work because maybe these bosses will want to sleep with them, in fact there was a time I left job because of such." (Personal capital)
Smallholder chicken farmers experience limited access to financial income for purchasing ND vaccines or starting an agrovet business	8	"Especially in Machakos, it's the rent of these houses [to start an agrovet business] are expensive." (Financial capital)
Limited knowledge, training, access to licensing, and infrastructure needed to support a cold chain prevent smallholder chicken farmers from engaging in ND vaccine commerce	6	**Interviewer:** which kind of licensing is required to buy and sell ND vaccines? **Participant:** you have a training in animal health, then you must have a premise that will be inspected and confirmed that it meets the requirements, for example if you want to deal with ND vaccines, before we give you a license apart from being qualified and retained by the Kenyan veterinary board, we will have to confirm that you have the storage facilities to maintain the cold chain before we license you. (Physical capital)

The findings of this study corroborated those by (Bagnol et al., 2012), who found that majority of women and men smallholder farmers in most countries, did not always have tools to address gender issues and integrate a gender perspective in their farming. Similarly, (Ahlers et al., 2009) observed that although smallholder chicken farmers had a lot in common, most women and men had different interests in relation to the chicken farming resources they had access to and control over, due to their different, even contradictory interests in chicken farming. At the same time, (Abura, n.d.) indicated that since information on the ND vaccine value chain was generally lacking, most of the smallholder chicken farmers were not aware that ND can be controlled by vaccination (Kingori et al., 2010). As a consequence, sometimes SHGs of smallholder chicken farmers were

targeted with trainings on chicken health and ND vaccination, so as to take on the role of community vaccinators (Bagnol et al., 2013), which provided them with local pathways for accessing the 5 forms of capital resources, and information needed on chicken farming. They concluded that having access and control over the 5 forms of capital improved uptake of ND vaccines and veterinary services by smallholder chicken farmers.

4.5 Local pathways available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services

The study participants identified a number of local pathways for women to access the information needed on effective chicken farming activities, together with the uptake of ND vaccines and veterinary services along the ND vaccine value chain.

4.5.1 Community trainings and workshops

The study found that lack of knowledge and awareness on ND vaccines discouraged chicken farmers from uptake of ND vaccines, within most communities at the village level, as confirmed by one of the male community health workers:

> *"We had farmers who wanted their chickens to be vaccinated, but were not aware of anyone who can vaccinate them. And also, they were not aware of why we were vaccinating the chickens. So, after we went and we trained them, on vaccination, and the importance of vaccination, the women started to vaccinate their chickens to prevent them from diseases like ND."* (FGD#5).

The findings above showed that local pathways available for women and men to access the information needed on chicken farming, uptake of ND vaccines and veterinary services included: community workshops, trainings, barazas and SHG meetings. Study results indicated that smallholder chicken farmers were able to improve their access to information on chicken farming activities, uptake of ND vaccines and veterinary services in their community, after undergoing community trainings on chicken health and ND vaccination, and the workshops they attended on gender equality along the ND-VVC, under the main project implementation programmes

4.5.2 Community group meetings

Participants were able to identify that previously, vaccination of chickens against ND was a major challenge for the Machakos town sub-county government, however, one of the male community health workers indicated that:

> *"When we came from college after finishing our education, we were able to contribute to the provision of extended services and community trainings on how to handle chickens. And also, we were introduced to the different groups of farmers in the communities, so more farmers are aware of us, and it made it easier to have direct communication with the farmers during community meetings and barazas."* (FGD#4).

Another female community health worker added:

> *"We used to do ND vaccination of one household per month, because we were not interacting with groups of farmers, we were usually called to homesteads of farmers who wanted to vaccinate their chickens, and we were mainly known through word of mouth, from one individual farmer to another, but now we are vaccinating chickens for more farmers in groups."* (FGD#6).

At the same time, women who joined local farmer SHGs felt that this was one of the pathways available for them to have more control over the ownership of their chickens, and they were able to use these groups as a safety net to protect against men taking over control of their large flocks of chickens after they increased in number. These groups were also formed as a means of collateral for accessing savings and credit services, where smallholder chicken farmers had to be guaranteed by other group members, which provided the women with basic financial capital for expansion of their chicken farms, purchasing ND vaccines and paying for veterinary services. This was confirmed by one of the participants from FGD#4:

> *"Nowadays we get some chances of doing vaccination, because when you train the group of farmers about the importance of ND vaccination, they get the concept, they get the information, then, some of them start requesting for their chickens to be vaccinated against ND. And then, when you arrange with them, you get to vaccinate their chickens. So, after the trainings, we are accessing some more women farmers, to be able to vaccinate their chicks."*

Smallholder chicken farmers were also able to access community workshops and training programs faster if they were within groups, which they relied on as a social support system. They felt that group memberships were providing opportunities for them to access trainings and information on chicken farming, together with access to financial resources through SHG savings and loans for purchasing farm land, chickens and ND vaccines, as well as connections to veterinary services by paying for their services during community ND vaccine campaigns.

4.5.3 Information Education and Communication (IEC) materials

Study results found that some vaccines became ineffective when farmers vaccinated their chickens against ND, due to limited knowledge on proper handling of ND vaccines by the smallholder chicken farmers. As a result, the main project developed ND vaccination calendars that were distributed to the smallholder chicken farmers, to provide information on proper handling of ND vaccines and a schedule for tracking vaccination of chickens against ND outbreak.

Smallholder chicken farmers in SHGs were targeted with appropriate information, and educated on chicken husbandry and ND vaccination trainings by using the vaccination calendars, so that they could vaccinate their own chickens against ND. In turn, the vaccination calendars provided the women with local pathways for information needed on chicken farming and uptake of ND vaccine schedule, which were used to train other smallholder chicken farmers in the community, as shown in figure 4.5 below.

Figure 4.5: Training of smallholder chicken farmers using ND vaccination calendar

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter presents a summary of study findings. It also provides conclusion and recommendations for research, policy and programme action.

5.1 Summary of the findings

The overall goal of this study was to investigate the gender perspectives on chicken farming and uptake of Newcastle vaccines and veterinary services in Machakos town sub-county, Machakos county, Kenya. Specifically, the study sought to: describe the gender roles associated with women and men over chicken farming activities, ND vaccine value chain and veterinary services at the village level; examine the socio-cultural factors that influence women's access and control over chicken farming resources, ND vaccines and veterinary services; and to establish available local pathways for women to access the information needed on chicken farming activities, and ND vaccine value chain in Machakos town sub-county, Machakos County.

From the study findings which adopted the first principle of the Moser framework on gender roles identification, a significantly higher proportion of women than men were found to be participating in 6 out of the 9 important chicken rearing activities, whereby they made most of the decisions related to chicken feeds, cleaning of the chicken house, chicken brooding and slaughtering; chicken health and treatment, providing disease prevention measures, marketing of the chickens and the products; distributing and sharing chicken workload among household members. On the other hand, the overall results from the empowerment domain levels, indicated that at least 80% of women achieved adequacy in 5 out the 13 roles which included: membership in community groups, access to credit products and services, decisions regarding asset ownership, attitudes against domestic violence, and control over income use. At the same time, men achieved 80% adequacy in 4 out of the 13 roles on decisions regarding asset ownership, access to credit products and services, attitudes against domestic violence, and decisions regarding income use. It is worth noting that input in productive decisions related to chicken production and other household activities, were mostly measured in terms of women's labor contributions to productive activities. Therefore, the percentage of women reported to have achieved adequacy in terms of input in productive decisions within the households including chicken farming activities, was significantly greater compared to men (p-value < 0.001). However, when it came to work-life balance ($p <$

0.001) and the ability to visit important locations outside the household (p = 0.035), we found a greater proportion of men doing better compared to the women.

Women and men had different needs influenced by social-cultural factors that played many different roles in influencing women's access and control over chicken production resources, ND vaccine and veterinary services in the community. Include summary findings on the socio-cultural factors here.

The findings showed that 8.5% of women and 12.2% of men had access to information regarding chicken vaccination against ND in the community. On the other, these findings could be influenced by some of these socio-cultural factors which served to empower communities, while others resulted in their disempowerment. Thus, from the study, work balance contributed the most to disempowerment of smallholder women farmers, followed by: visiting important locations, respect among household members, self-efficacy and autonomy in decision making and membership in influential groups. On the other hand, participants generated many ideas on what was needed to improve women's empowerment, such as economic independence, increased knowledge and skills on vaccination, increased access to resources such as owning more chickens, more networking and ability to influence household decision-making process.

Study findings revealed that smallholder women farmers faced numerous challenges in chicken farming activities and access to ND vaccination, including limited access to trainings, education, and resources to engage in uptake of ND vaccination. On the third last objective, study findings revealed that community trainings, workshops, self-help group meetings, and IEC materials (remember to give details on IEC materials as suggested in the relevant section) were some of the local pathways available for women to access the information needed on the chicken farming activities and uptake of ND vaccines and veterinary services. In addition, women who joined local farmer self-help groups (SHGs), felt that this was one of the pathways available for them to have more control over the ownership of their chickens, and they were able to use these groups as a safety net to protect against men taking over control of their chicken farming products. Women were also able to access chicken farming management training programs faster if they were within groups, which they relied on as a social support system. They felt that group memberships were empowering to them, providing opportunities for them to access trainings, information, resources and connections with other chicken farmers and participants along the ND vaccine value chain.

5.2 Conclusion

The study concludes that chicken farmers continued to encounter several challenges in coping with productive and reproductive gender roles culturally assigned in the community; limited access and control over chicken production resources, ND vaccines and veterinary services; and minimal knowledge on local pathways available to access the information needed on chicken farming activities, and ND vaccine value chain in their community. These challenges were due to inadequate institutional support and inefficient management, despite efforts made by various government and private institutions, such as the Ministry of Agriculture, Livestock and Fisheries and NGOs, to promote the chicken production industry through provision of chicken farming information and development of ND vaccination skills.

This allowed the study to consider that not all chicken farmers experienced the same challenges and demands placed on them in accessing the ND vaccine value chain, but also on unequal division of labor within the household level. In as much as access and control over chicken production resources affected both men and women, the study concluded that the burden of reproductive roles and uptake of ND vaccines at the household level was left to women alone, which in turn limited the time available for other activities, thus making them substantially less productive because they had limited access to resources such as community trainings and financial capital, including education and income generating activities. Thus, leading not only to a productivity gap between men and women, but also to broader inequality, as women got less recognition for the roles they played in chicken farming activities, uptake of ND vaccines and veterinary services along the vaccine value chain.

Therefore, gender roles must be understood, concerning livelihoods and the wider human security context in often ‘hard’ rural development environments. The achievement of women farmers in terms of access to a small number of chicken flocks necessary for survival and basic domestic use, was linked to the role of social relations in binding households and communities together. From the foregoing, the better-off tend to have better access and control over chicken production resources under normal conditions, and are more able to cope under socio-cultural challenges, unequal gender roles and limited knowledge and information on chicken husbandry and ND vaccine value chain. This was through mobilizing a range of assets that poor households did not

obtain, which in turn created a wider range of access choices and reduced the time and drudgery involved in the uptake of ND vaccines and veterinary services.

5.3 Recommendations

Based on the aforementioned, the study makes the following recommendations:

- There is a need to empower both women and men to actively participate in all processes of the ND vaccine value chain, such as manufacture and production of vaccines, supply of vaccines to the agrovet shops, distribution of the vaccines to the end-user (chicken farmers), and the use of the ND vaccines by the farmers at the household level.
- Since the triple role for women consists of reproduction (household-related and child care); production (farm work or engagement in other economic activities); and socio-cultural (community based) functions, the non-governmental organizations working on gender equality and women empowerment related interventions in Machakos town sub-county, need to approach uptake of ND vaccines and veterinary services from a gender perspective lens of smallholder chicken farmers.
- The fact that smallholder women farmers are primarily responsible for keeping chickens and managing chicken diseases for the household, means that initiatives geared towards improving uptake of ND vaccines and veterinary services should be equally directed toward women farmers, both individually and collectively, instead of the mainly targeting male-dominated channels such the community farm elders associations and committees.
- The Machakos town sub-county government and other local development partners, should also ensure that women and men chicken farmers are engaged and represented fairly in the decision-making and design process at the county level. This will ensure their unique needs, challenges and coping mechanism are reflected in the entire initiative in a gender transformative manner, which in turn makes county government services from the Ministry of Livestock Development department more easily accessible to ND vaccine users, particularly women, who because of cultural norms, security or family commitments are less likely to travel long distances (sometimes in dangerous locations), queue for extended periods (sometimes days), outside multiple government offices, or confront officials demanding bribes.

- In the rural areas the average education and training level of smallholder women farmers is lower than that of the men, leading to unequal access to and control over the 5 forms of capital (personal, human, social, financial and physical). Education and capacity-building are an important tool to address this early gap, especially in situations where girls experience challenges and obstacles in accessing quality education, or where educational and training programmes do not take into account women's diverse needs.
- Various key areas of policy intervention include options on introducing laws on movable collateral and improving land tenure by vulnerable groups, especially women, to improve access to and control over the 5 forms of capital.
- Support training and capacity-building programmes of both women and men chicken farmers, in order to close gender gaps in the uptake of ND vaccines and veterinary services along the vaccine value chain.

5.4 Areas for further studies

In terms of research, a study looking at social capital and networks as a form of coping with the equal participation of both women and men farmers in the uptake of ND vaccines and veterinary services in Machakos town sub-county, Machakos county, Kenya, should be conducted.

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ANNEX

ANNEX 1: CONSENT FORM

Informed Consent.doc

ANNEX 2: THE STANDARDIZED WOMEN'S EMPOWERMENT IN LIVESTOCK INDEX QUESTIONNAIRE

WELI_questionnaire with vaccine module

ANNEX 3: FOCUS GROUP DISCUSSION GUIDE

FGD for gender and chicken VVC.do

FGD for decision making.docx

FGD for vaccine value chain.docx

FGD for vaccinators.docx

ANNEX 4: KEY INFORMANT INTERVIEW GUIDE

KII guide for farmers.docx

KII for VVC stakeholders.docx

KII for community and women leaders.