MERCY CORPS | AGRIFIN

Gender Barriers in Access to Agricultural Information for Kenyan Women Smallholder Farmers

Gender Analysis Report

March 2024

Contents

Executive Summary

In Kenya, where agriculture is the cornerstone of the economy, achieving gender equity in this sector is paramount. This report explores the intricate dynamics of gender roles in Kenyan agriculture, with a particular focus on the challenges and barriers faced by women farmers in accessing vital agronomic and climate information.

Despite agriculture's significant contribution to Kenya's GDP, women, who constitute a substantial part of the agricultural workforce, often encounter marginalization in accessing critical resources and information. Key findings reveal that women frequently struggle to obtain information due to lack of awareness of sources, limited access to digital technologies and low digital literacy, language barriers, time constraints from household responsibilities, and costs of accessing digital platforms.

Gender roles, norms, and dynamics also impact women's decision-making ability related to climate adaptation. Cultural traditions restrict women's land ownership and control over finances in both Nyandarua and Machakos counties, limiting their agency despite carrying substantial farming workloads. While evolving, patriarchal norms often dictate that major decisions like crop cultivation and livestock sales require husbands' approval.environment in Kenya. It serves as a call to recognize, empower, and invest in women farmers, recognizing their pivotal role in unlocking Kenya's full agricultural potential.

The primary sources of climate information vary between counties. In Nyandarua, mobile phones are widely used, though digital literacy remains low among older women. Machakos utilizes a blend of radio, TV, extension officers and mobile platforms like Digishop. Women's groups play a vital role in disseminating information and fostering adaptation in both regions. However, disparities exist in agricultural support services and technological access between the counties.

Furthermore, the findings highlight the efforts to improve extension services for women farmers through technological interventions such as agricultural applications. Despite initiatives by KALRO to provide agricultural, market, and climate information through these applications, significant challenges persist, including ignorance, time constraints, and limited access to digital smartphones.

This indicates that while the tools themselves are promising, their impact on farmers is limited by various barriers.

As a prominent actor in the sector, the report emphasizes that AgriFin is strategically positioned to catalyze systemic transformation for women farmers in the target counties of Nyandarua and Machakos. By spearheading initiatives that enable women to effectively harness digital technologies as conduits for accessing agricultural information, AgriFin can play a pivotal role. This can be achieved through content curation tailored to localized contexts and needs, deftly leveraging multi-modal delivery channels. Additionally, forging collaborative partnership models that synergistically engage governmental entities, private sector stakeholders, media outlets, and grassroots community organizations will be instrumental in ensuring the sustainability of such interventions. Collectively, these comprehensive approaches hold the potential to empower women farmers at the county and regional levels, enhancing their capacity to make informed decisions, adopt climate-resilient practices, and ultimately elevate their agricultural productivity and livelihoods.

1. Introduction

1.1. Background Information

Kenya's vast landscapes, ranging from the coastal plains to the highlands, are a testament to its rich agricultural heritage. Agriculture is more than just a sector; it's a way of life for many Kenyans, influencing cultural practices, traditions, and daily routines.

When discussing agriculture, we must consider who is involved and what roles they play. Just like in many parts of the world, in Kenya, both men and women actively engage in farming. However, their experiences are not the same. This report seeks to shine a spotlight on the unique challenges and contributions of women farmers. Why focus on gender in agriculture? Simply put, understanding how men and women experience farming differently can help us find better ways to support everyone involved. For Kenya to thrive agriculturally, it is essential to ensure that everyone, regardless of gender, has the tools and opportunities they need to succeed.

The primary aim of this study is to delve into the experiences of women farmers in Kenya. We want to understand their stories, learn about the hurdles they face, and find out what can be done to pave the way for a brighter, more inclusive future in Kenyan agriculture.

In the sections that follow, we will take a journey into the fields and homes of Kenya, exploring the nuances of gender roles in farming, accessing information, and resources, and gaining knowledge. Through this exploration, we hope to offer insights that will guide future policies and practices to uplift women in agriculture.

1.2. Barriers to farmers' access to vital agronomic and climatic information in Kenya

Major climate shocks experienced in Kenya include floods, drought, and variable precipitation levels. Among these climate shocks, drought is the most common with 28 major droughts recorded in the country in the past 100 years (Gichangi et al., 2015; World Bank, 2016; Atieno et al., 2019).

To adapt to current and future climate change impacts, farmers can adjust their agricultural practices. Several adaptation options exist based on diversified farming methods, which are influenced by environmental, economic, institutional, cultural, and demographic factors. However, lack of access to relevant climate information and timely early warning messages are major barriers to effective adaptation (Mwongera et al., 2017). Recent research shows that access to accurate seasonal climate forecasts and agro-advisories 3-6 months in advance enables risk mitigation and more productive agriculture (Ambani & Percy, 2019).

Climate information services provide climate forecasts and agronomic advice to support farmers' decision-making under climate uncertainty (Tall et al., 2018). To realize the full potential of climate services, they must be tailored with strategic response options for adapting to climate risks (Rao et al., 2019). This information can inform decisions about land preparation, planting dates, crop varieties, harvest time, and marketing.

However, many technical, social, economic, and psychological challenges continue to inhibit smallholder farmers' access and use of climate services in Kenya, reducing their climate adaptation benefits (Ambani & Percy, 2019). Understanding these barriers remains key to improving the application of climate information in farm decisions (Tall et al., 2014). The value of climate services depends on them being accessible, accurate, relevant for decision-making, and supported by institutions for sustained provision and use (Mwongera et al., 2017).

1.3. Problem statement

Women farmers in Kenya, as in most of Sub-Saharan Africa, play a crucial role in food production and agricultural development. However, they often face unique challenges and barriers in accessing relevant and timely information that can enhance their farming practices and improve their livelihoods. It is crucial to understand the barriers and explore gender-driven modifications to contextualize content to make it more accessible for women and study the effect on uptake and engagement.

The primary goal of this assessment is to understand the key barriers limiting women smallholder farmers in Kenya from accessing essential agronomic and climate-related information, through primary data collection in target counties. By uncovering these challenges, the project seeks to propose gender-driven content modifications to ensure relevance, accessibility, and understandability for women farmers. The assessment adopts a gender-sensitive approach, considering the complex social, economic, and cultural factors shaping women's participation in Kenyan agriculture. Incorporating women farmers' perspectives and lived experiences is vital for developing content that genuinely meets their needs and realities.

The assessment will uncover multilayered gender roles, norms, and dynamics underlying restricted access to critical resources. Integrating insights from human-centered research and comprehensive gender analysis aims to craft a tailored framework for Kenyan women farmers - not just summarizing preferences but guiding stakeholders to disseminate climate information more effectively. Through this initiative, an inclusive digital agricultural landscape is envisioned where information flows freely, empowering Kenyan women smallholders.

1.4. Project goal, objectives, and research questions

The overarching goal of this assessment is to uncover the obstacles that restrict women smallholder farmers in Machakos and Nyandarua counties from accessing vital agronomic and climate-related information by conducting on-the-ground assessments.

Elucidating the nature and root causes of these barriers across geographic, gender, and livelihood segments will facilitate tailored and targeted solutions to enhance information availability and use. The learnings can inform strategies across sectors to unlock farmers' agency over agro-ecological decision-making.

Objective of the study

I. To identify the specific challenges that Kenyan women farmers face in accessing climate information services

II. To determine the impact of gender roles, norms, and dynamics on the ability of Kenyan women farmers to make decisions related to climate adaptation

III. To identify the primary sources of climate-related information for Kenyan women farmers

IV. To understand how Kenyan women farmers currently access and use climate-related information in their farming practices

V. To identify barriers to effective dissemination and utilization of climate-related information among Kenyan women farmers, and how these barriers differ across regions or communities

VI. To identify the preferences, needs, and communication channels of Kenyan women farmers regarding climate-related information and agricultural resources

Research Questions

I. What are the specific challenges that Kenyan women farmers face in accessing climate information services?

II. How do gender roles, norms, and dynamics impact the ability of Kenyan women farmers to make decisions related to climate adaptation?

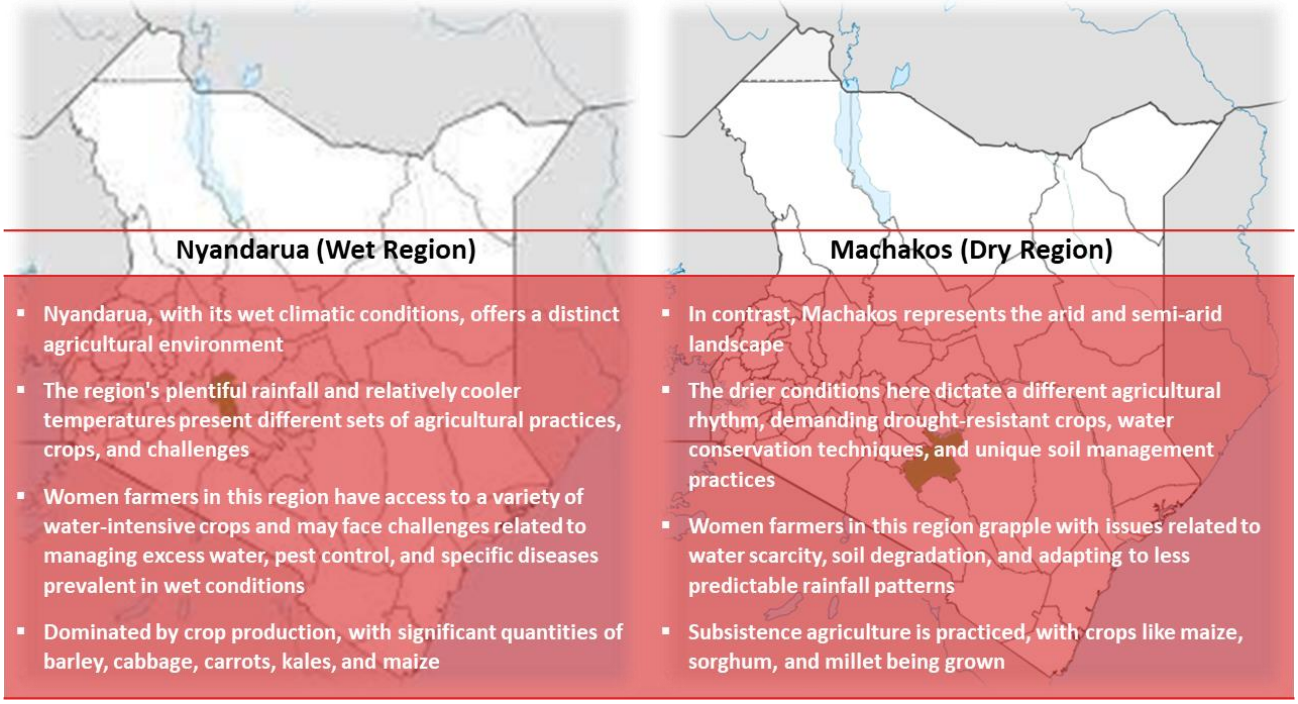
III. What are the primary sources of climate-related information for Kenyan women farmers, and how do they currently access and use this information in their farming practices? iv. What are the barriers to effective dissemination and utilization of climate-related information among Kenyan women farmers, and how do these barriers differ across regions or communities?

IV. What are the key preferences, needs, and communication channels of Kenyan women farmers regarding climate-related information and agricultural resources?

V. What are the roles and perspectives of relevant stakeholders, such as government agencies, NGOs, and community organizations, in supporting and empowering Kenyan women farmers in climate change adaptation?

2. Approach and Methodology

2.1. Target locations



2.2. Data collection and tools

Our initial research proposal had proposed conducting quantitative and qualitative and subsequent qualitative focus group discussions (FGDs). The quantitative survey was intended to gather demographic data to assist in selecting 50 FGD participants. However, we encountered a challenge due to the timing of our research coinciding with the agricultural season. This overlap posed substantial constraints in mobilizing the women smallholder farmers within the short timeframe of the field research, this concern was not only foreseen but was also communicated during the grant development process.

These mobilization difficulties, coupled with the tight timeframe, were principal factors in our decision to revise our methodological approach. They also influenced our decision to not proceed with the pilot of more nuanced content through the Sprout Platform, as initially proposed. To address this, we revised our methodology to a combined approach. In collaboration with local partners, we identified 30 women smallholder farmers who participated in both the quantitative and qualitative phases.

This integrated method compensated for the mobilization difficulties posed by the agricultural season and enabled us to complete the research within the allocated time. Despite the changes, we maintained our research objectives' integrity.

The combined approach complemented the results of the literature review ensuring the robustness of our findings and a deeper understanding of the experiences and perspectives of the women smallholder farmers in the context of our study.

I Focus Group Discussions (FGDs)

- ✓ Focus groups were conducted with 15 women smallholder farmers in each county to uncover community perspectives, experiences, and insights around barriers to accessing agro-climatic information
- ✓ The interactive setting encouraged open dialogue and allowed themes to emerge organically based on farmers' lived realities
- ✓ The moderators utilized semi-structured guides to investigate the farmers' agricultural and climate information requirements, the sources they currently access, difficulties faced in obtaining and applying the information, their level of trust in various information providers, and recommendations to enhance the existing information systems

II Key Informant Interviews (KII)

- ✓ Key informant interviews were conducted with three representatives: Machakos County and from Nyandarua County. The interviewees included a livestock officer, agricultural extension officer, and a market leader
- ✓ The interviews investigated perspectives on smallholder farmers' information needs, gaps and barriers, effectiveness of current information services, challenges in service delivery, gender-related constraints, and recommendations for improvement
- ✓ KIIs enabled gathering insights from actors within the agricultural information ecosystem based on their direct engagement with farmers and rural communities

3. Findings and Discussions

3.1. Focus group discussion findings

3.1.1. Social-economic profile

Two focus group discussions were conducted with women smallholder farmers - one in Nyandarua County and one in Machakos County. These counties were selected for study due to the major climate shocks experienced in the regions, including droughts, floods, and highly variable precipitation. Each focus group comprised 15 women farmers, for a total of 30 participants across the two counties. This balanced approach allowed for comparative insights into the barriers faced by women smallholders in semi-arid Machakos versus higher rainfall Nyandarua.

The study acknowledges the limitations posed by the small sample size. It suggests that while the findings provide valuable insights, they may not be entirely representative of the broader population. Future studies with larger and more diverse samples are recommended to validate and expand upon these findings.

A comparative analysis of different factors such as age, family size, farming experience, and farm size was carried out and the results are presented in Table 1 below. With regards to age, the mean age of women farmers in Machakos county (58 years) was relatively higher relative to Nyandarua county (49 years) and an overall mean age of 53 years. The age results in both counties are drawn from diverse ages of women farmers. This diverse spectrum implies a broad spectrum of women's experience and expertise in agricultural-related activities. However, the differences in mean age between the two counties are likely to indicate the various opportunities and challenges that women farmers face.

Family size also exhibited variation between the counties, with Machakos having an average family size of 7 members, while Nyandarua had an average of 6 family members. Regarding farming experience, Machakos presented a significantly higher mean farming experience compared to Nyandarua, where women farmers averaged 15 years of experience. These findings suggest that women in Machakos have been involved in farming for a longer period (30 years) and possess greater expertise, potentially facilitating easier access to information. Conversely, Nyandarua features women farmers with comparatively less experience (15 years). The wide range of farming experience provides an opportunity to learn from diverse past experiences, gain insights from mistakes, and benefit from the knowledge of women with varying years of experience regarding challenges and barriers in information access and decision-making.

The farm size was also found to be larger in Machakos (3.23 acres) compared to Nyandarua (1.63 acres). The land holding is relatively smaller in Nyandarua compared to

Machakos. This could be attributed to population density in Nyandarua County. However, this leads to more agricultural intensification in the area diminishing. Studies *(i.e., Andersson Djurfeldt, A., & et al. (2020). Sustainable Agricultural Intensification in Four Tanzanian Villages, Yaqoob, N., & et al. (2022). The effects of Agriculture Productivity, Land Intensification, on Sustainable Economic Growth)* show that in regions with smaller land holdings, farmers often face economic pressures to intensify their agricultural practices to ensure maximum productivity from the available land. This could involve techniques such as multiple cropping, intercropping, or using high-yield crop varieties, all of which contribute to agricultural intensification.

Table 1. Demographics for the participants

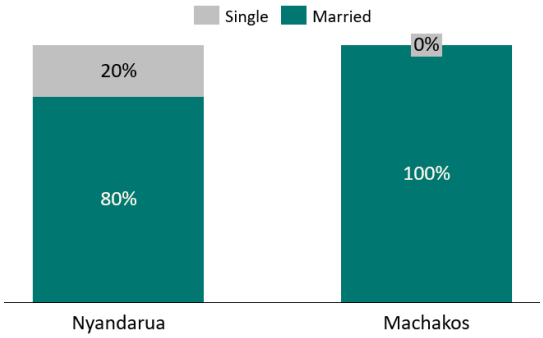
- The Machakos women had a higher mean age of 58 years versus 49 in Nyandarua
- Machakos women also had more farming experience, with a mean of 30 years versus 15 years in Nyandarua
- However, the Nyandarua women farmers operate smaller land holdings, averaging 1.63 acres compared to 3.23 acres in Machakos, likely due to higher population density driving agricultural intensification

Indicator	Nyandarua	Machakos	Overall
Age	49.1 (15, 18.4)	58.2 (15, 10.9)	53.6 (30, 18.4)
Family size	5.8 (15, 2.8)	7.4 (15, 2.6)	6.6 (30, 2.8)
Years of experience	15 (15, 14.5)	30.4 (15, 8.8)	23 (30, 14)
Farm size (acres)	1.63 (15, 1.3)	3.2 (15, 1.3)	2.4 (30, 1.5)

(n, SD)

Every woman interviewed in Machakos County is married, whereas only 80% of the women interviewed in Nyandarua are married (Fig. 1). In Nyandarua, 20% of the interviewed women are single. The insights gleaned from focus group discussions further highlight the prevailing lack of autonomy among women when it comes to making farming or investment decisions without consulting their husbands. While there are instances of shared decision-making, most women face constraints in key areas such as animal sales and crop cultivation. This underscores a substantial deficit in the empowerment of women within the agricultural domain, particularly regarding decision-making. Additionally, this dynamic introduces complications in the effective utilization of agricultural information, as women may defer implementing strategies while awaiting approval from their husbands. Nonetheless, it's worth noting that in Nyandarua, some women farmers are taking proactive steps by independently making decisions and planning agricultural activities for themselves.

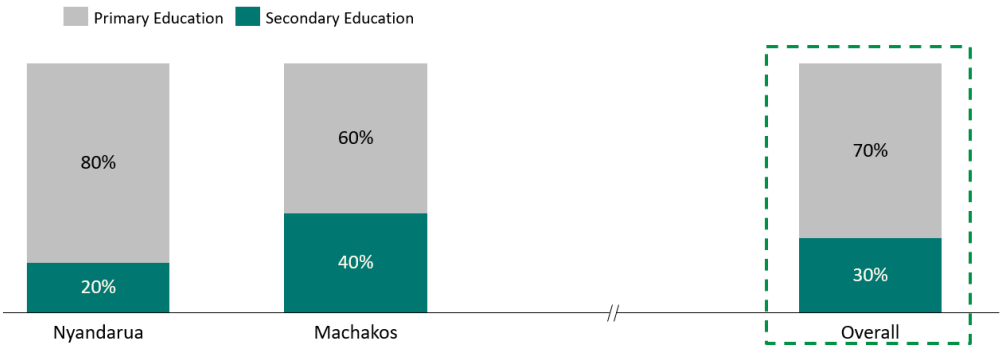
Figure 1. Marital status



Female farmers in both Nyandarua and Machakos counties have achieved primary school education level (Fig. 2). This suggests that they have fundamental knowledge in agriculture, but the majority lack a more advanced educational background in the field. However, in Machakos County, slightly less than half of the farmers have completed secondary school, indicating a higher proportion of women farmers with a broader skill set compared to those in Nyandarua. This finding somewhat aligns with data on gender parity from Kenya Basic Education Booklet 2020, where the Gender Parity Index* at secondary level of education for Nyandarua and Machakos stands at 1.051 and 1.111 respectively. Consequently, women farmers in Machakos are more likely to adopt modern agricultural practices and access agricultural information, especially concerning climate change, compared to their counterparts in Nyandarua. This is primarily due to the fact that basic literacy skills play a significant role in the adoption of digital solutions. Studies *(i.e., Bai, Q., Chen, H., Zhou, J., Li, G., Zang, D., Sow, Y., & Shen, Q. (2023). Digital literacy and farmers' entrepreneurial behavior)* also show that digital literacy can positively influence farmers' entrepreneurial behavior.

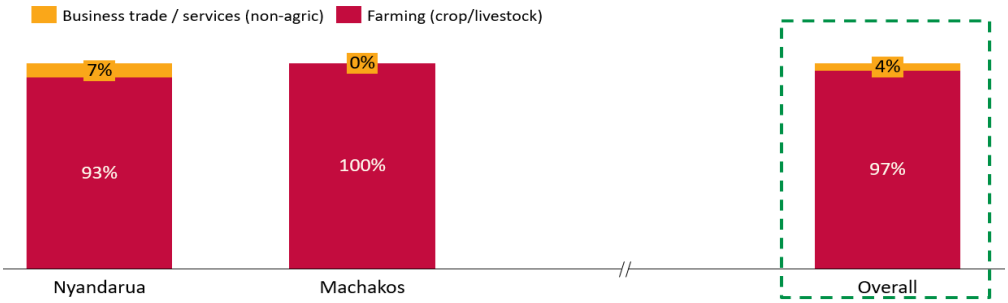
**The Gender Parity Index (GPI) indicates parity between Women and Men. A GPI of less than 1 suggests women are more disadvantaged than men in learning opportunities and a GPI of greater than 1 suggests the other way around.*

Figure 2. Education level of women farmers



Regarding the livelihood activities of women farmers in both counties, a significant majority are actively engaged in both crop and livestock farming, while only a small percentage participate in non-agricultural activities such as business and trade (Fig. 3). The findings highlight a substantial presence of women in the production nodes of the agricultural value chain. However, their limited involvement in non-agricultural activities may expose them to potential vulnerability concerning market information.

Figure 3. Livelihood activities of the farmers

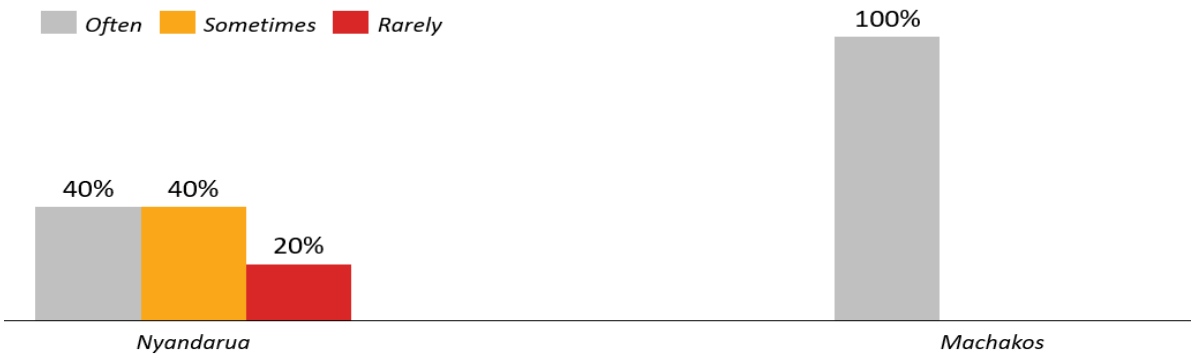


Nyandarua County's agroecological zone, renowned for its suitability for horticulture farming, offers diverse opportunities for women to engage in various aspects of the agricultural value chain beyond mere production. This environment fosters women's participation in trade, leveraging their involvement in horticulture.

Figure 4 below illustrates the occurrence of drought in the two counties. Nyandarua County experiences various instances, with occurrences often reaching 40%. This frequent pattern may pose recurring challenges, potentially disrupting agricultural activities for women farmers, and leading to lower production yields, consequently contributing to food insecurity in the area. Additionally, the impact of drought is significant for women, who play a primary role in food production. Studies show women farmers can be disproportionately affected by climate change due to various socio-economic and cultural factors. A study in Malawi noted how a change in the timing of rains as well as the frequency of rainfall has negatively affected women farmers because it is closely linked to the division of tasks and duties in households (Murray et al. 2016).

In contrast, Machakos County frequently faces droughts, with a 100% occurrence. This places a heavier burden on women farmers as they need to devise strategies to cope with prolonged drought situations in their region. For example, in the case of droughts, women now have to spend more time fetching scarce water from far away water points. Additionally, women find it harder to leave agriculture and look for economic opportunities away from home due to their household responsibilities hence they have to deal with climate changes as opposed to men who have more options open to them. Furthermore, the persistent droughts adversely affect livestock and crops, resulting in food shortages. There is a pressing need for concerted efforts to assist farmers in mitigating drought occurrences, particularly by promoting climate-resilient agricultural practices and enhancing dryland water management.

Figure 4. Drought occurrence



3.1.2. Access to information and resources

The FGDs delved into the detailed discussion of the primary challenges that women face in accessing agricultural information. Among the identified issues, a notable concern was the lack of awareness regarding where to find relevant agricultural information. Additionally, older participants faced difficulties due to limited access to digital smartphones, and even if they possessed them, a majority lacked the necessary skills to utilize these devices for accessing agricultural information.

Language barriers were also identified as a significant hurdle in accessing agricultural information. The information available was often presented in a language unfamiliar to the participants, leading to difficulties in comprehension. Moreover, women, primarily occupied with household chores and farming responsibilities, faced constraints in accessing mass media channels like televisions. The demands of their busy schedules delayed their access to information, restricting their time to utilize such channels effectively. Consequently, they missed out on crucial agricultural information, important updates, and recommendations conveyed through mass media channels.

While overcoming the challenge of limited access to agricultural information, women in Machakos County have utilized an online platform called Digishop, enabling direct communication with service providers. However, despite its potential as a solution, a significant number of women expressed concerns about the high cost of airtime, restricting their consistent use of the platform. Although certain challenges are universal, some are specific to women. In Machakos County, women enjoy comparatively easier and faster access to agricultural information than men, often facilitated by their organized group structures that facilitate agricultural training and information dissemination.

Digishop, an online-to-offline digital marketplace platform used by some of Mercy Corps AgriFin partners such as Shamba Pride, serves as a pivotal tool for smallholder farmers, especially women in Machakos and Makueni Counties to access agricultural information, quality inputs, insurance, financing and other credible agriculture services in local/rural communities. Shamba Pride uses Digishop to provide tools and technology to agri-retailers/dealers or agents who then scale the services to farmers. The platform's group

usage underscores the importance of collective learning in areas where women's education levels might not suffice for individual message interpretation. Through group interactions, women can clarify and discuss the content of advisory messages received via SMS, enhancing their understanding and application of agricultural advice and extension services. Agricultural extension officers and agro-dealers/agri-retailers play a critical role in this ecosystem by clarifying and augmenting the information provided by Digishop, thereby ensuring comprehensive access to agricultural knowledge.

Despite active involvement in farming and animal husbandry, women face restrictions in decisions related to activities such as animal sales and the cultivation of specific crops unless authorized by their husbands. This highlights a lack of empowerment for women in agriculture, particularly in decision-making. Furthermore, it introduces complexities in the utilization of agricultural information, as women may postpone implementing strategies while awaiting approval from their husbands.

3.1.3. Gender roles and norms

Despite the crucial role gender plays in agricultural transformation, persistent gender roles and norms continue to pose challenges. Both FGDs revealed an evolving landscape of gender roles and norms in agriculture. The findings highlighted notable distinctions between Nyandarua and Machakos in terms of how cultural norms impact women's participation in farming decisions. In Machakos, women play a significant role in crop farming decisions, occasionally consulting with their husbands on livestock farming matters. Conversely, in Nyandarua County, women take on more substantial farming responsibilities due to most men engaging in off-farm activities. However, land ownership rights remain predominantly with men, reflecting a deeply entrenched tradition limiting women's access to land ownership.

Overall, men tend to be more involved in the marketing and selling of both crops and livestock. Women participate in these activities only with the knowledge and approval of their spouses. Women predominantly engage in day-to-day farming activities such as feeding animals, planting, and land preparation. However, when the farm produce is ready for market, men often take control, determining selling prices and dictating where to sell the products. In some cases, women are left unaware of the actual proceeds from their hard work, impacting their finances negatively.

Respondents noted that these norms have adverse effects on their finances. While women may have valuable insights on what to plant, men are reluctant to allow them to make planting decisions, limiting their income. Additionally, even though women contribute significantly to farm work, they rarely receive the full proceeds from the farm, as men assume control. This leaves women financially constrained when seeking funds for subsequent farming projects. The challenge of limited land ownership rights further hinders women farmers' financial access.

These findings further show the need for focused interventions and policies to address gender inequities and support gender-transformative approaches to empower women in decision making in information access.

3.1.4. Climate information, barriers, and challenges

The survey sought to establish whether climate information was accessible to women farmers in both Nyandarua and Machakos. The sources to climate information are key in ensuring women receive such information and enhances their ability to adapt to climate changes. When probed on how they received climate information, the respondents in Nyandarua revealed that they primarily received the information through mobile phones and other media sources. This reveals that women can access technological connectivity that further aids them in accessing real-time climate change updates. Mobile phones have become instrumental in providing climate information with such messages giving a wide range of information from planting time, weather forecasting, and market access.

On the other hand, climate information is relayed mainly through radio, TV, extension officers and mobile phone messages in Machakos. The involvement of agricultural extension officers i.e., in Digishop ensures information delivery reaches a wide range of farmers. This information is likely to be contextualized for their specific needs and locality as opposed to mobile phone messages. Agricultural extension officers play a critical role that extends beyond Digishop, collaborating closely with farmer-facing organizations to ensure the clarity and applicability of agricultural messages. Their involvement is fundamental in bridging the information gap, providing personalized guidance to farmers, and enhancing the effectiveness of platforms like Digishop by offering additional support and context to the digital content.

Organizing women into groups has proven essential for disseminating climate information and fostering effective learning among group members. Harnessing the collective knowledge of these groups makes it easier to help women adapt to climate change and take proactive steps to reduce its impacts. This strategy of group organization is successfully employed in both Nyandarua and Machakos counties, serving as critical channels for community engagement and the distribution of climate information and agricultural advisories. This approach significantly enhances the comprehension and actionable response to conveyed messages among group members, thereby strengthening the effectiveness of climate information dissemination efforts across both regions.

However, notable disparities exist in information reliance between the two counties, reflecting differences in agricultural support services and technological advancements. In Nyandarua, women primarily use mobile phones for information access, although digital literacy remains low. In Machakos, there is a discernible integration of both traditional and modern information sources, resulting in a more comprehensive approach to disseminating information.

Women in Machakos County face specific barriers when accessing climate information, including language and financial constraints. A majority noted that the information is presented in English, a language often challenging for the elderly to comprehend. Consequently, they need personal interpreters, which can be difficult to arrange. This underscores the importance of utilizing local languages in media that disseminates climate information.

The findings further revealed that the main climate change challenges include prolonged droughts, excessive rainfall, fungal diseases, and inadequate finances, affecting both crop and livestock farming. In terms of accessing climate change information, barriers such as the high cost of airtime, internet interruptions, power outages, and a lack of access to digital smartphones were identified.

3.2. Key informant interview findings

Key informant interviews were conducted with three representatives: one from Machakos County and two from Nyandarua County. The interviewees included a livestock officer from Machakos County, an agricultural extension officer from Nyandarua County, and a market leader also from Nyandarua County.

The selection of these three key informants from the two counties aimed to gather diverse perspectives across crop and livestock value chains on the on-ground realities, needs and barriers related to agro-climatic information access and use by farmers in their respective regions. All three affirmed the critical role played by women in agriculture in their counties.

3.2.1. Gender norms and roles

A further probe into the gender norms and roles based on social factors revealed that women in Nyandarua County have limited control over their farm resources especially those that are married since these resources are considered family-owned and only the household head, the man take control. This limits them in practicing farming and since most are trained, the knowledge they acquire goes to waste. The low level of decision-making capacities is a great hindrance to women's participation in agriculture. Results also indicated a wide range of constrain on women coming from other household responsibilities. This alone adds more weight to women's time management.

Similar observations were made in Machakos County, where gender norms exerted a notable impact on women's decision-making in agriculture. The distinguishing factor is that unlike in Nyandarua, there are specific short-term crops considered as "women's crops," over which women have complete control of both the produce and proceeds. Examples include cabbages, carrots, and onions. Conversely, long-term crops are predominantly managed by men, characterized by substantial financial requirements and land purchases.

Societal norms and practices are gradually evolving but continue to heavily influence women's decision-making in agriculture. Evolving activities allowing women to

participate in decision-making processes, as highlighted in the survey, include land ownership, income generation, particularly from milk sales, and access to climate information.

A noteworthy shift in gender dynamics is evident in Machakos, where women predominantly lead farming activities due to men's engagement in off-farm employment. The results also indicate that women have a higher percentage of land access compared to Nyandarua, even though they lack ownership. The findings underscore the significant influence of cultural norms on women's involvement in agricultural decision-making. In Machakos, deeply entrenched traditions restrict women's roles and decision-making abilities. Specifically, women are limited from owning certain livestock species (cows) and can only own animals such as goats and poultry.

3.2.2. Accessibility and resource availability

Digital literacy

The findings on digital literacy in the two counties reveal some shared challenges among women farmers, however, there are some variations in the level of digital literacy in the study areas among the farmers.

In Nyandarua, digital literacy is restricted, particularly among elderly women who encounter challenges accessing market and online information due to lack of knowledge. This issue is exacerbated by inadequate access to smartphones and internet connectivity, especially in rural areas. Most farmers predominantly depend on traditional communication channels, such as radio and television, highlighting a preference for conventional modes of information dissemination over digital methods.

In contrast, women farmers in Wanjohi area of Nyandarua county exhibit a higher level of digital literacy. On a scale of 1 to 10, the ease of access of information through digital channels is rated at 5 out of 10 indicating that the farmers are well versed with the technological advancements in agriculture. Nevertheless, there still exist some challenges that face women farmers such as remoteness, limited exposure, and ignorance. Compared to men, women have less frequent access to markets revealing a gap in digital literacy impacts in the long run. Even so, with much more exposure to technology and provision of education will enable women gain the necessary digital literacy skills in accessing information.

From the two study areas, Machakos has a low digital literacy level among its women farmers. This could possibly be attributed to the fact that, beliefs that traditional information received is more than sufficient, no motivation for reading through the digital messages and preference for mass media communication channels. As such, this largely hinders their digital literacy abilities, especially in searching for climate-related information and investment opportunities. This calls for context-specific dissemination avenues based on age and other barriers unique to women.

Extension services

The findings regarding the provision of extension services highlighted variations in how women farmers accessed these services in the two study areas. KALRO has implemented interventions to enhance extension service delivery to women farmers by offering an agricultural application that disseminates agricultural, market, and climate information. However, challenges such as ignorance, time constraints, and limited access to digital smartphones hinder the effective utilization of these services. This suggests that while the tools are viable, there are numerous barriers that limit their impact on farmers.

In Nyandarua, the inadequate number of extension officers covering the four locations poses a challenge to service delivery. Currently, there is only one ward extension officer serving all four wards, indicating a significant human resource gap in extension service provision. With only one extension officer, not all farmers can be reached, potentially leading to a delayed dissemination of crucial information.

Contrastingly, Machakos emphasizes the importance of extension services, particularly for group-based projects organized by most women farmers. The results indicated that the most utilized forms of extension services in Machakos are field demonstrations, farmer training sessions, and field days. These training sessions involve various stakeholders, ensuring that farmers receive the services they need promptly. However, despite the high provision of extension services in Machakos, there are still gaps in areas such as entrepreneurship, financial planning and management, and business planning services.

Financial services

Financial services play a crucial role in sustaining production and ensuring the longevity of businesses. In the Wanjohi area of Nyandarua, the financial environment for women farmers appears less favorable. The survey revealed a gender-based disparity in financial decision-making, primarily influenced by societal norms assigning these roles to men. Limited access to financial resources and the perception of men as family breadwinners, granting them autonomy in financial decision-making, contribute to this divide. Consequently, men are better positioned to make decisions and instigate changes regarding financial matters, while women often lack the necessary finances to implement preventive measures against climate change. This further impedes their full participation in agriculture, particularly affecting older women.

On the positive side, women farmers in Nyandarua seem to have improved access to financial resources. Financial institutions like Equity Bank and women's funds actively support these farmers in their agricultural endeavors. Through organized groups, women can access essential funds, especially when they hold key decision-making roles. This empowers them in decision-making and collective management of their farming operations. Financial institutions provide various services to women farmers, including input provision, credit access, and other farming needs. However, a notable challenge is the occasional practice of men receiving payments on behalf of their wives, highlighting the persistence of gender norms in the region.

In Machakos, a more differentiated and supportive financial landscape exists, with institutions such as Equity Bank and the Machakos Universal Traders Sacco (UTS) offering services to women farmers. These financial institutions actively contribute to enhancing the financial literacy of women farmers by providing financial training and offering tailored loan packages specifically suited for women engaged in agricultural activities.

3.3. Hypothesis tested

Table 2: Tested hypothesis

	Critical points	Hypothesis tested
Individual level	Education levels (digital skills)	Women with lower education levels are less likely to possess advanced digital skills compared to those with higher education levels
	Affordability and relevance of digital technologies to women farmers	Limited access and usage of digital technologies are correlated with issues of affordability and relevance
	Knowledge about where to find information	Women with limited knowledge about where to find information are less likely to use digital technologies effectively
	Mobility	Limited mobility due to household responsibilities hinders access and usage of digital technologies
	Confidence in seeking information	Lack of confidence in seeking information is a barrier to the effective use of digital technologies
Household-level	Control of assets and decisions in a household	Male control of assets and decisions in the household is negatively correlated with female empowerment in decision-making processes
	Power relations and gender dynamics	Unequal power relations and gender dynamics contribute to disparities in resource allocation within households
	Spousal support	Lack of spousal support is associated with social and cultural norms and affects women's adoption of digital services
	Time poverty	Household responsibilities and time poverty disproportionately affect women, limiting their opportunities for personal development and participation in productive farming activities
Community-level	Social and cultural norms	Social and cultural norms limit women's roles negatively and impact their participation in agricultural activities
	Participation in farmer groups	Low women participation in farmer groups is linked to barriers such as social norms, lack of representation
	Role models and peers	The lack of women role models and peers contributes to the limited engagement of women in agricultural activities

	Security and gender-based violence	Security concerns and gender-based violence act as significant barriers to women's active involvement in agriculture
Organizational level	Extension content	Agriculture extension services not tailored to women hinder their access to crucial information and resources
	Delivery methods	Delivery methods not tailored to women's preferences and not considering social and cultural norms contribute to low utilization of agricultural services by women
	Networks and associations	Male-dominated networks and associations limit women's access to information, resources, and opportunities in the agriculture sector
	Leadership roles	The lack of women in leadership roles within the agriculture sector hinders the advancement and participation of women in this field
	Policies and programs	Gender-blind policies and programs contribute to the perpetuation of gender disparities in the agriculture sector
Enabling Environment-level	Gender transformative policies	The absence of explicit gender-transformative policies limits the positive impact of addressing gender disparities in the agriculture sector
	Education system	Gender gaps in literacy and education contribute to disparities in economic opportunities and access to resources
	Digital divide	The gender digital divide is linked to disparities in access to information, economic opportunities, and social participation
	Sex-disaggregated data	The lack of sex-disaggregated data hinders the identification and understanding of gender-specific challenges, limiting the effectiveness of policies and interventions

3.4. Opportunities for women farmers

The survey also examined opportunities that benefit women farmers in agriculture in both Nyandarua and Machakos counties, as outlined in Table 3.

Table 3: Existing opportunities, media approaches, digital strategies and success models

	Nyandarua	Machakos
Opportunities	○ Deploying local mass media outlets like radio and television stations that broadcast messages in regional languages, such as Inooro TV, for the dissemination of agricultural information ○ Implementing non-digital strategies, including civic education initiatives and the creation of posters for advertising purposes ○ Utilizing digital social media platforms to convey agricultural information specifically targeted at young women and youth ○ Showcasing accomplished women farmers through media channels to inspire and educate others.	○ Informal gatherings that facilitate easy access to information, thanks to the use of local languages and smartphones ○ Utilization of traditional media and extension methods for information dissemination ○ Learning from successful initiatives and programs, such as Digicow, and addressing specific challenges faced by farmers. Furthermore, conveying this information in local languages through SMS for better comprehension ○ Leveraging digital support from startups, such as partnerships with entities like KUZA, which offer digital assistance through projectors to visualize educational and training content
Media approach	○ Places greater emphasis on utilizing local television and radio stations for both digital and non-digital interventions. The optimal time for conveying information is during the evening from 7 pm & in the morning between 7:30 am and 8:00 am	○ Places higher priority on radio and collaborates with startups to enhance digital support
Digital strategies	○ Digital initiatives focus on engaging young women in agriculture via targeted social media, like Facebook and WhatsApp. Tailored content includes success stories, agronomic advice, and market insights, with interactive elements like Q&A sessions for active participation.	○ Focusses more on collaborations with startups for financial and digital support
Success models	○ Majorly rely on showcasing successful farmers and civic education	○ Women farmers learn from various initiatives: Informal women groups have been targeted for instance by KUZA which has provided them with a projector that is in-built with all the training packages so that they can run any training that they want digitally

3.5. Future implications of role of women in digital agriculture

The emergence of digital agriculture is gradually influencing how farmers conduct their agricultural activities. In the digital era, information is predominantly disseminated through digital platforms such as social media, mobile applications, and digital search engines. The future trajectory of digital agriculture appears to be playing a central role among women farmers in the two visited counties. Most women farmers have taken the initiative to seek information using smartphones.

For optimal use of ICTs among women farmers, emphasizing platforms and tools that are easily accessible and user-friendly is crucial. This involves utilizing SMS-based information dissemination, mobile applications with intuitive interfaces, and interactive voice response systems. Additionally, we recommend integrating local dialects and languages into digital content to improve comprehension and engagement.

In Machakos, women farmers are actively embracing digital platforms for accessing information related to finance, agricultural technology, and entrepreneurship. In Nyandarua, a significant number effortlessly connect digital information to their farming technologies and even conduct research. While transitioning to digital information dissemination for women farmers is underway, it is essential to acknowledge existing barriers. Due to varying literacy levels and limited access to smartphones, adopting a hybrid approach that combines modern and traditional modes of information dissemination is advisable.

The formation of women's groups provides another avenue to ensure women have access to relevant and timely information. While simultaneous learning is crucial, training key officials, leadership teams, and lead farmers on accessing and conveying this information to members is a more practical approach. Training key leaders not only enhances efficiency but also encourages capacity-building initiatives in agriculture through empowerment. These leaders can serve as lead farmers, mentors, and facilitators, conveying crucial information to their members on behalf of various stakeholders.

Digital technology and transition tend to favor younger women due to their access to mobile phones and ease of navigating information searches compared to older women. Targeting young women through innovative digital technologies, who can then relay this information to older farmers, is essential. However, the content and messages conveyed should be in a language easily understood by all age groups, preferably in local languages for the older generation.

4. SWOT Analysis Based on Gender Assessment in Nyandarua and Machakos

Nyandarua

Strength	Weakness
Active involvement of women in agricultural activities Establishment and coordination of women farmers into groups to facilitate the exchange of climate-related and agricultural information, as well as training. Organized groups enable women to secure funds for input provision, credit, and other farming necessities Presence of financial institutions supporting the agricultural endeavors of women farmers financial entities such as Equity Bank, Kenya Women Finance Trust microfinance, and women development funds play a crucial role in this support Access to climate, market, and agricultural information facilitated through various interventions by KALRO Proficiency in digital literacy skills, with a rating of 5 out of 10 for ease of access to information through digital channels	Limited proficiency in digital literacy skills, particularly among elderly women farmers, which hampers the effectiveness of online platforms Insufficient agricultural extension officers to aid in information dissemination Language barriers, particularly in the delivery systems of climate and agricultural information; Local dialects prevail in communication, making it challenging for smallholder farmers, particularly those with limited formal education, to grasp complex concepts related to climate and agriculture when technical language is employed Insufficient access to financial services Restricted control over farm resources, often considered as family-owned, thereby limiting the decision-making ability of women farmers
Opportunity	**Threats**
Dissemination of agricultural information by delivering essential details to farmers, either through weather forecasts or SMS alerts Provision of advisory services to address gaps in advice left by extension officers Establishment of platforms to bring farmers together Investment in training programs, particularly focusing on technical terms used in climate change and agricultural activities	The impact of climate change poses a threat to agricultural productivity Despite producing organic goods, women farmers encounter difficulties in securing reliable and consistent market access Climate change and erratic rainfall patterns disrupt farming due to unpredictable weather conditions The insufficient coverage of agricultural extension services, exemplified by only one ward extension officer covering four wards, poses a threat to the delivery of extension services Dependence on traditional information dissemination channels may lead to a digital divide, restricting access to the advantages of real-time and customized climate information

Machakos

Strength	Weakness
Active participation of women in agricultural endeavors Extensive skill set and adeptness in adapting to climate change Substantial farming experience Presence of financial institutions dedicated to supporting women farmers' agricultural initiatives. Financial entities, such as Equity Bank and Machakos Universal Traders Sacco (UTS), play an active role in enhancing the financial literacy of women farmers by providing customized loan packages and financial education Varied array of information outlets. Women farmers utilize both conventional channels (mobile and online platforms) Establishment of women's groups fostering the exchange of information on climate changes Availability of extension services facilitated through group-based projects, with field demonstrations, farmer training, and field days being the most frequently employed forms of extension services	Land ownership rights are restricted to men Restricted access to financial resources hampers women farmers' capacity to invest in agricultural pursuits Language barriers exist when accessing climate-related and agricultural information conveyed using technical terms (this appears in both countries but more pronounced in Machakos) The high cost of airtime serves as a barrier to accessing information from online digital platforms While women farmers are the primary producers, their decision-making authority on land utilization is limited Deficiencies in extension services pertain to entrepreneurship, financial management, and business planning
Opportunity	**Threats**
Distributing vital agricultural information, whether through weather forecasts or SMS alerts. Leveraging diverse experiences: Variances in age and farming background provide a chance for women to learn from one another through knowledge exchange Initiatives focusing on investing in digital literacy programs to improve the accessibility and utilization of online platforms for agricultural information Advancing and endorsing climate-resilient agricultural practices in response to frequent drought incidents Raising awareness regarding the roles undertaken by all household members	The occurrence of drought, which poses a threat to agricultural productivity Climate change and erratic rainfall: Unpredictable weather patterns disrupt farming activities Cultural practices, including gender norms, disadvantage women farmers by limiting their land ownership rights Fragile extension service linkages Gender inequalities in resource access, with women facing more disadvantages than men Men exert control over selling prices and dictate market channels, restricting the involvement of women farmers in marketing and selling decisions

5. Conclusions and Recommendations

1.1 Conclusions

Smallholder farmers in Kenya constitute a diverse demographic, with their challenges and experiences varying significantly depending on the prevailing climate conditions. Recognizing this diversity is crucial for gaining insights into the distinct coping strategies and vulnerabilities encountered by these farmers.

A noteworthy discovery from the study underscores that women in regions characterized by a wet climate exhibit a greater diversity in their livelihood sources. This diversification can be attributed to the abundance and variety of both agricultural and non-agricultural opportunities in wet climates, providing a more stable foundation for a wide range of farming and economic activities.

In contrast, women in arid regions seem to be more susceptible to climate shocks, primarily because of an excessive reliance on a single farming enterprise. This overreliance likely stems from the limited options available in harsh and unpredictable arid environments, where only a few crops or farming activities can thrive.

Based on the assessment, the study presents its results in the following key areas:

- The specific challenges that Kenyan women farmers face in accessing climate information services in Nyandarua and Machakos Counties, Kenya.
- The impact of gender roles, norms, and dynamics on the ability of Kenyan women farmers to make decisions related to climate adaptation.
- The primary sources of climate-related information for Kenyan women farmers, and how they currently access and use this information in their farming practices.
- The barriers to effective dissemination and utilization of climate-related information among Kenyan women farmers, and how these barriers differ across regions or communities.
- The preferences, needs, and communication channels of Kenyan women farmers regarding climate-related information and agricultural resources.

5.1.1. What are the key barriers faced by women farmers in accessing climate information?

The examination of specific challenges faced by Kenyan women farmers in accessing climate information services in Nyandarua and Machakos Counties, Kenya, uncovers significant operational hurdles. These challenges manifest across multiple dimensions, including a lack of awareness regarding where to find relevant agricultural information, limited access to digital smartphones and digital literacy skills, language barriers impeding comprehension, busy schedules of women farmers managing both household chores and farming, which restrict their access to real-time information, and the high cost of airtime for subscribing to information platforms like Digishop. Importantly, these challenges extend beyond the immediate production node of the value chain and have far-reaching implications for broader market access and the gender-transformative aspects of the agricultural landscape in the counties.

5.1.2. How do gender roles, norms, and dynamics impact women farmers' decision-making about climate adaptation?

An exploration of the influence of gender roles, norms, and dynamics on the decision-making capacity of Kenyan women farmers regarding climate adaptation reveals persistent challenges within the two counties. Cultural norms play a significant role in shaping women's involvement in overall farming decisions. Despite shouldering substantial farming responsibilities in Nyandarua, women face cultural restrictions on land ownership and access to finances. In Machakos, women dominate farming activities, but entrenched traditions limit their ability to own livestock, make purchases, and exercise decision-making authority. Consequently, these constraints have negative implications, restricting women farmers from accessing finances and exercising complete control over them. Therefore, despite the training women may receive, their inability to make decisions or access finances hinders the realization of their visionary projects.

5.1.3. What are the primary sources of climate-related information for women farmers, and how do they access and utilize it?

The examination of accessibility and utilization of climate-related information also yielded varied findings across the two counties. In general, the primary sources for accessing climate-related information included mobile phones, mass media (TVs and radios), extension service providers, and learning from other farmers. Most women farmers in the study utilized mobile phones to obtain climate-related information, accessing it through methods such as short message texts, online searches, and social media platforms. While extension service provision served as another avenue for disseminating information, challenges related to it included insufficient staff to cater to a broad range of farmers. For instance, in Nyandarua County, one ward officer was expected to serve a region consisting of four wards. These tools have played a crucial role in providing real-time climate updates to farmers, facilitating learning, promoting positive adaptation to

climate changes, and fostering the adoption of new technologies related to climate changes.

5.1.4. What are the barriers to the effective dissemination and utilization of climate-related information among women farmers?

A survey into the barriers to effective dissemination and utilization of climate-related information revealed distinct results. While women farmers in Nyandarua county relied on mobile phone technologies as their primary source for climate related information, women farmers in Machakos county preferred a combination of traditional and modern sources such as radio, TVs, extension officers and mobile phones. Women groups seem to be instrumental in both regions in provision of climate-related information and fostering adaptation to climate changes. However, a key challenge that came out is the disparities witnessed in information access in agricultural support services and technological advancement in both counties. Digital literacy also was a varying challenge in both counties with Nyandarua exhibiting a scenario of mixed challenges such as low skills while Machakos faced a lower digital literacy which was attributed to cultural beliefs and preferences. With regards to extension provision, while this was a key source of information, inadequate staff was a challenge relating to it in both regions. Other key challenges that strongly came out were limited access to smartphones, poor internet coverage, power outages, costly subscription fees and airtime, and language barriers to information being passed across.

5.1.5. What are the preferences, needs, and communication channels of women farmers regarding climate-related information and agricultural resources?

The study examined the preferences, needs, and communication channels of Kenyan women farmers regarding climate-related information and agricultural resources. This involved conducting a comprehensive analysis of the various communication channels they utilized and the reasons behind their preferences. In the evolving landscape, digital presence is crucial, leading to a preference for online platforms through mobile phones to search for climate-related information and agricultural updates. One preferred communication channel in Machakos is the online innovative platform Digishop, aiding women in overcoming climate-related challenges by providing real-time updates. While older women farmers still favor traditional communication methods like radios and TVs, it is essential to deliver information in their local languages for better resonance. In Machakos, collaborations with startups and learning from successful initiatives such as Digicow are embraced and preferred by farmers. This underscores the need for tailored media strategy interventions in each region, aligning with the preferences of women farmers.

5.2. Effectiveness of the Sprout Platform and other digital tools in addressing gender barriers

The results suggest that digital platforms, specifically Digicow and Digishop, have been utilized by women farmers in both the humid and ASALs regions in Kenya. In humid areas, Digicow has been utilized by the women farmers to gain access to agricultural information related to their livestock farming. However, women farmers in the region have continuously faced digital illiteracy among the elderly women. As such, the usage of the platform may be limited due to the literacy challenge. In the ASAL regions, women farmers have explicitly used Digishop to communicate directly with their service providers, hence a positive platform for them to access agricultural and climate-related information. Their communication predominantly focuses on accessing crucial agricultural and climate-related information. They seek guidance on sustainable farming practices, inquire about climate-resilient crops, and gather insights on weather patterns and market trends. The platform facilitates this interaction mainly through user-friendly interfaces such as SMS, ensuring accessibility even on basic mobile phones.

Women farmers have reported positive feedback such as information access, communication with service providers and access to both input and produce markets. However, its effectiveness may be limited due to the high cost of airtime. This implies that in as much as the Digishop platform is effective in providing a direct communication channel, financial barriers may limit its consistent usage among the women farmers.

Sprout plays a pivotal role in crafting scientific content tailored to the specific needs of smallholder farmers, with a focus on customization. This specialized content is subsequently disseminated through farmer-facing organizations. The study underscores the vital contribution of integrated delivery mechanisms in facilitating women farmers' access to information. To effectively reach smallholder farmers, creators and curators of content must devise innovative dissemination approaches. This may include collaboration with peer farmers who comprehend the content and can provide translations for group understanding. Moreover, the involvement of women farmers in the platform's enhancement, aligning it with their needs and preferences, becomes crucial to ensuring their ownership and active utilization of the platform.

5.3. Exploration of market linkages and financial services about gender barriers

The findings on financial services in both the humid and ASAL regions offer valuable insights into the gendered dynamics of financial decision-making, resource access, and the support extended by financial institutions. Women farmers in these two regions have benefited from the assistance provided by Equity Bank, Machakos Universal Traders, Kenya Women Finance Trust microfinance, and county women development funds. These institutions play a pivotal role in supporting women farmers, and organized groups further enable collective access to funds and services, including input provision and credit access. Tailored loan packages designed to meet the specific needs of women engaged in agriculture have been instrumental. The institutions have also significantly

contributed to enhancing the financial literacy of women farmers through various training programs.

Despite these positive aspects, challenges faced by women farmers in the regions should be acknowledged, including issues like payments being received by husbands, poor financial management, and limited access to services for women. While exploring different market linkages, the project should delve into barriers to market entry for women farmers, diverse pricing dynamics, and negotiating power. Beyond traditional banking services, the project could consider exploring diversified financial services such as investment platforms, leveraging organized women groups and cooperatives, and incorporating digital financial services like Mpesa to provide a more comprehensive financial landscape for the farmers.

5.4. Recommendations for policy and program

Part of the recommendations suggested include;

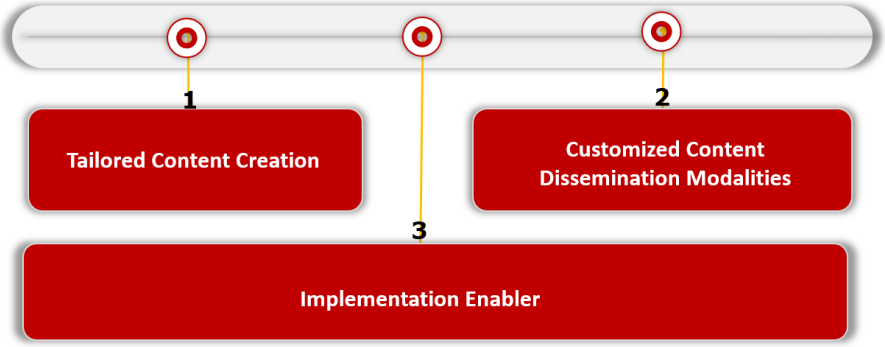
- Align digital tools with existing structures such as farmer groups, producer organizations, and cooperatives, leveraging their roles and responsibilities. Digital tools offer convenience for women farmers in accessing information and resources. Through these alignments, various responsibilities and networks can be established, serving as information hubs. Integrating digital tools with organizations ensures a seamless flow of information to women farmers.
- The integration of digital tools can greatly benefit Savings and Credit Cooperative Organizations (Saccos) by enhancing accessibility, efficiency, data-driven decision-making, and resilience to climate change. Access to finance is pivotal for farmers, enabling them to invest in their farms, adopt modern technologies, and leverage digital solutions, ultimately leading to improved farming practices, increased productivity, and enhanced resilience to climate change. Saccos play a crucial role in providing finances to farmers, and their development at the ward level creates strong connections for women farmers to access funds, enhancing their ability to address financial challenges and mitigate against climate change (World Bank, 2016). By leveraging digital solutions, Saccos can fulfill their crucial role in providing financial services to farmers, particularly women farmers, and contribute to sustainable agricultural development at the ward level. Through proper linkages between Saccos and farmers, facilitated at the ward level, easy access to finances can be ensured, further empowering farmers to invest in their farms and adopt innovative practices to adapt to changing climate conditions.
- Collaborate and promote stakeholder engagement to effectively disseminate information to women farmers. Involving various stakeholders ensures that women farmers have access to real-time and relevant information, contributing to the sustainability of agricultural activities by making support readily available.

- Prioritize civic education, especially in chief baraza[1] meetings, to create awareness among farmers regarding existing policies and regulations. Many farmers in the study lack the necessary skills and information on policies and regulations affecting their ability to carry out various agricultural activities. Barazas and community meetings provide an opportune platform to disseminate such information to women farmers.

[1]Baraza is a communal gathering utilized as a platform to raise awareness, address community issues, share essential information, and empower citizens to identify and suggest solutions to concerns.

5.5. Specific Recommendation for AgriFIn/Sprout

The research highlighted specific opportunities for AgriFIn/Sprout to promote and create system-level change for women's use of digital technologies. These fall under three key pillars.



1. Tailored Content Creation

- **Localized and Contextualized Content**:
  - Conduct needs assessments and participatory workshops to identify specific information needs, learning preferences, and knowledge gaps of women farmers across counties.
  - Collaborate with agricultural content creators active in the region, local extension workers, community leaders, and women farmer groups to contextualize Sprout content based on regional variations in agricultural practices, climatic conditions, and cultural norms.
  - Develop the digital content in various formats (text, audio, video, interactive modules) covering topics based on detailed need assessment i.e., climate-smart agriculture practices, crop management, livestock care, financial literacy, and market information.
  - Translate content in local languages and dialects, incorporating familiar terminology, storytelling techniques, and visuals that resonate with the target audience. Leveraging traditional knowledge and success stories from within the communities will also enhance the relevance and credibility of the digital content.
- Participatory Content Creation and Curation:
  - Establish a network of women farmer "content champions" who can contribute their experiences, best practices, and insights to the content development process.
  - Conduct participatory content design workshops, involving women farmers in the ideation, storyboarding, and production of digital content. Collaborate with farmers, extension agents, local communities, and leaders to co-create contextualized advisories and align content with local norms and practices.

2. Customized Content Dissemination Modalities

- **Multi-Channel Content Delivery**:
  - Conduct a thorough survey with larger sample size to determine what works best for the different segments of women farmers of the counties considering the channels preferred, digital literacy levels and accessibility in order to be able to recommend a suitable combination of channels for each target group.
  - Develop a content delivery strategy that entails the use of multiple platforms including mobile apps, IVR, social media, community radio, and in-person seminars. This will mean that Sprout content is optimized for the different avenues of delivery, considering data consumption, audio/visual quality, and user interface design.
  - Leverage Sprout to curate and distribute tailored content through partnerships with farmer-facing organizations (FFOs), women agency*, and extension services.

**Women agency is group women who have an understanding of their local region, a strong social network, and a deep commitment to community development.*

- **Personalized and Adaptive Content Delivery**:
  - Explore ways to leverage data analytics and machine learning techniques to personalize content recommendations based on individual farmer profiles, preferences, and contextual factors (e.g., location, crop types, weather patterns).
  - Explore ways to support adaptive learning algorithms which would ensure the adjustment of content delivery speed, format, and complexity according to the user's grade of engagement, comprehension, and feedback.
- **Facilitated Content Dissemination and Adoption (leverage ICT strategically)**:
  - Partner with local community organizations, women agency, and extension services to ease the availing of digital content.
  - Facilitate equipping community facilitators and lead farmers with the necessary skills and resources to guide women farmers in effectively utilizing digital content and tools.
  - Develop methods to monitor and modify the material as well as its delivery channels to mirror the feedback of the users.

3. Implementation Enabler (approaches and strategic partnerships)

- **Promote Gender-Transformative Approaches**:
  - AgriFin could further introduce gender-transformative approaches through which traditional gender roles and the idea of decision-making power as a right for men only are being challenged.
- **Establish Public-Private Partnerships**:
  - Implement digital literacy training programs in partnership with Ministry of Agriculture and local organizations to build women farmers' skills in accessing online information via mobile phones and other technologies. Exploring interactive formats like workshops, tutorials, and peer learning.

  - Collaborate with government entities such as the Ministry of Agriculture, mobile network operators, and farmer-facing organizations that use mobile technology-based communication to reach women farmers who have limited to no internet access.
- **Engage with Research Institutions**:
  - Collaborate with universities, research centres, and think tanks to conduct female-responsive research, data gathering, and impact assessment of digitally focused interventions.
- **Cultivate Partnerships with Media and Communication Channels**:
  - Connect with community radios, TV stations, print media, and social media sites to propagate customized content and awareness programs for women farmers.
  - Partner with social media influencers and digital content creators by organizing county-level advocacy programs on digital tool and service adoption among youth and women.
- **Collaborate with Governmental Agencies**:
  - Coordinate with local government as well as community influencers to mobilize the needed stakeholders' support on the grass-root base level of the digital initiatives.
  - Enlist ministries of agriculture, rural, and gender development to design digital initiatives that are aligned with national policies and agendas.
  - Advocate for digital literacy and contextualized gender-responsive extension services in agriculture to be incorporated into national development plans and budgets at the national level. (i.e., capacity building, awareness creation campaigns)
- **Strategic Partnership with Ag Service Providers**
  (To introduce emerging digital products and services to women farmers)
  - Partnering with service providers to create a digital environment that offers financial support, market access, and agricultural inputs for women farmers. This includes connecting women to financial services like credit, savings, insurance, and payments to build assets and improve economic well-being. It also involves providing access to marketing platforms for selling agricultural yields, as well as mechanization services to reduce workloads. Additionally, introducing special incentives like lower fees or discounted prices for women users to increase their digital adoption and usage.

AgriFin can undertake participatory needs assessments in the target counties to develop localized, contextualized content across various formats, enabling women to effectively leverage digital technologies.

AgriFin can implement a multi-platform content dissemination strategy and forge partnerships with local organizations (i.e., public, and private), women's groups, and extension services to drive outreach, adoption, and utilization of the digital content developed through training community facilitators and lead farmers. Furthermore, strategic partnerships with agricultural service providers will be cultivated to create a

supportive digital environment offering financial support, market access, and agricultural inputs specifically designed for women farmers.

This approach will enhance the accessibility, relevance, and impact of the digital initiatives, ultimately empowering women farmers at the county/regional level to make informed decisions, adopt sustainable practices, and improve their agricultural productivity and livelihoods.

6. High-level Framework on Content Creation and Dissemination

Drawing upon the key findings and proposed recommendations within content development, and delivery, a comprehensive framework has been established with the objective of devising a personalized approach that addresses the varied needs and preferences of women farmers in Kenya regarding the receipt of agricultural and climate-related information, thereby fostering a more inclusive and impactful system.

Below are key considerations for content creation and dissemination:

1	**Understanding the Target Audience**			
	Age Groups	Education Level	Location *(Rural, Semi-Urban, Urban)*	
2	**Technological Landscape**			
	Mobile Usage *(type of phone and utilization)*	Internet Connectivity	ICT	
3	**Communication Modalities**			
	Local Languages	Community Engagement *(Leveraging community networks and groups)*	Radio, Television, and Mobile *(SMS, USSD)*	
4	**Content Delivery**			
	Interactive Content	Visual and Audio Content	Short-form Content *(digestible and considering women time constraints)*	
5	**Tailoring to Agricultural Seasons**			
	Seasonal Relevance *(aligning with the agricultural calendar)*	Localized & Actionable Climate Content	Early Warning Systems *(for drought-prone areas)*	
6	**Capacity Building and Training**			
	Training Workshops *(to increase tech adoption and digital literacy)*		Blended Extension Services	
7	**Partnerships and Collaboration**			

	Government	NGOs	Private Sector Actors	
	Feedback Mechanisms, Monitoring and Evaluation			
8	Two-way Communication *(feedback loop)*	Adaptability *(adjusting content delivery approach as needed)*	KPIs	Continuous Improvement *(regularly assess / refine framework)*

The influence table below shows key drivers to consider (environmental, technological, infrastructural, socioeconomic, legal, institutional, sociocultural, and demographic) to reach overall goals/outcomes and eventually achieve impact among women smallholder farmers in Nyandarua and Machakos; *reduced gender disparity in access to information, empowerment, economic growth (increased productivity/income)*.

Drivers

Demographic	Science & Technology	Socioeconomic	Sociocultural	Environmental	Regulations	Infrastructure	Institution
• Small holder Women farmers in the study areas	• Mobile applications such as Digishop • Level of digital literacy among the women farmers • Financial technologies through digital payments	• Limited financial capabilities • Limited knowledge and skills on digital literacy • Majorly deal with crop and livestock farming	• Women are restricted from owning land • Women do much unpaid work, and household chores. • Women do not make major agricultural decisions.	• Climatic change • Drought occurrences	• Licensing fees • Resource allocation disparities	• Comms infrastructure • Inadequate land for production	• National and county Governments and NGOs)

Main Actors & Activities

Producer Group	Digital Information	Financial Institution	Retail & Market Systems
• Farmers' groups • Community-Based Organizations (CBOs) • Self Help Groups	• Digicow • Digishop • Mobile apps • Social media platforms	• Equity bank • Machakos Universal Traders Sacco • Kenya Women Finance Trust	• Farmers and producer groups • Financial Institutions • Government regulatory authorities • Vendors and food outlets • Farmers cooperatives

Outcomes

Transparency, inclusion, and participation of women farmers	Adoption and implementation of women's transformative approaches	Strengthened accountability	Strengthened capacity of implementing partners
• Access to information • Equity in access • Representation • Community involvement • Collaborative initiatives	• Gender-responsive policies and programs • Awareness and attitude change • Access to resources and opportunities	• Regulations and standards compliance • Transparency of decision-making	• Training & skills dev't • Institutional capacity • Resource mobilization

Impact

Climate Resilience, Reduced Gender Disparity in Access to Information, Women Empowerment, Women's Economic Growth


MERCY
CORPS
AGRIFIN