

WOMEN'S ACCESS TO FOOD PRODUCTION RESOURCES AND THEIR CONTRIBUTIONS TO FOOD SYSTEMS: EVIDENCE FROM NYATIKE SUB-COUNTY, MIGORI COUNTY, KENYA

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Abstract

Women play a crucial role in ensuring sustainable food security and nutrition for many rural livelihoods in Kenya, but continue to face entrenched disparities in resource access and decision-making, which hinder their potential in food systems. Despite the persistent high rates of food insecurity and chronic food poverty, women in Nyatike Sub-County, Migori County, attempt to contribute to food systems despite limited access to land, credit, farm inputs, technology, and extension. To address the localized gap in gendered limitations on women's agency, this study examined the relationship between women's access to food production resources and their contributions to the region's food systems. Based on social role theory, supported by feminist political economy and empowerment theory for additional analytical contextualization frameworks, the study used a sequential explanatory mixed-methods design incorporating a multi-stage sampling design where Nyatike was purposively selected based on its food insecurity index, with four out of five divisions stratified across agroecological zones, with questionnaires administered to 391 farmers. Eleven in-depth interviews with agricultural officers and eight focus groups with farmers were conducted for contextual interpretation. Descriptive results showed widespread marginalization with 93% reporting women's insecure land access ($M = 1.99$, $SD = 0.575$), 96% reporting limited access to credit ($M = 1.58$, $SD = 0.643$), 66.3% reporting inadequate access to farm inputs ($M = 2.60$, $SD = 1.038$), 79.5% reporting limited access to training and extension ($M = 2.33$, $SD = 0.850$), and 71% reporting inadequate access to technologies ($M = 2.49$, $SD = 0.928$). Hierarchical regression revealed that women's agency, sociocultural norms, and access to resources explained 72.2% of the variance in women's contribution, with extension services ($\beta = .335$) and technology access ($\beta = .317$) being the strongest predictors. The study concludes that the structural and systemic inequalities that exist in Nyatike hamper women's contribution by severely suppressing local food production efficiency and restricting broader community-wide food system development. To turn women's labour into food production and increase household food security, this study recommends gender-responsive land tenure, customized credit facilities, improved farm input access, and exclusive training and extension.

Keywords: Women's access, Food production resources, Women, Food systems, Kenya

Introduction

Women play a central role in global food systems, contributing nearly half of the world's food production. However, as Davies (2023), the FAO (2023), and Laurence (2021) demonstrate, their participation is consistently constrained by unequal access to

production assets, decision-making authority, and institutional support. Even though they anchor household food security, Dysard et al. (2025) and Visser and Wangu (2021) find that women remain disproportionately vulnerable to food insecurity due to structural barriers that limit their yield capacity and

agency. This gap is acutely evident in sub-Saharan Africa, where women generate approximately 60–80% of total agricultural production but continue to face obstacles like insecure tenure and restricted credit (UN Women, 2023). Ultimately, these disparities expose a profound systemic paradox: those who supply the greatest physical labour are the same actors denied control over food production resources.

Agriculture continues to be a major economic engine in Kenya, generating approximately a third of the nation's total economic value. Within this landscape, women supply roughly 75–80% of the active labor force in smallholder systems, yet they remain systematically alienated from capital control (KLA, 2018; KNBS, 2023). National metrics confirm that women own a mere 1–6% of registered land titles, while only 27% hold property rights individually or jointly (KNBS & ICF, 2023). As the FAO (2023) highlights, these structural asset deficits directly compound rural vulnerability, leaving an estimated 70% of the populace facing moderate to severe food insecurity. To address this crisis, the state has introduced progressive statutory frameworks, including the Constitution of Kenya (GOK, 2010), the National Land Policy (Ministry of Lands, 2009), and the Agricultural Sector Transformation and Growth Strategy (Ministry of Agriculture and Livestock Development, 2019). Nevertheless, as national policy reviews show, deep implementation gaps remain because informal customary norms continue to dictate the real distribution of land tenure, credit networks, and sovereign decision-making authority.

These structural constraints manifest acutely at the sub-national level. As the Kenya National Bureau of Statistics (KNBS, 2019) documents, Migori County comprises a population of approximately 1.1 million people – 52% female – where over 70% of households depend strictly on agriculture and fishing for daily survival. Yet, this high labor concentration has not insulated the region from economic distress; the county's overall absolute poverty

rate hovers near 50%, structurally detached from the national food poverty baseline of 31.7% (KNBS, 2024). This localized resource trap fuels pervasive food insecurity. Ultimately, tracking these domestic shortfalls, the Migori County Government (2020) report warns that these intersecting resource deprivations have culminated in severe, visible levels of child malnutrition across rural sub-counties.

Within the county, women play a dominant role in agricultural labour, yet they face severe structural exclusion. As Odhiambo et al. (2021) and Onyango et al. (2024) demonstrate, traditional patrilineal inheritance systems and rigid socio-cultural norms continue to restrict female land ownership and limit women's influence over key income-related decisions. These unequal conditions manifest acutely in Nyatike Sub-County, a region where livelihood security is compromised by irregular rainfall, artisanal mining disruptions, and poverty rates surpassing 60% (County Government of Migori, 2022). Tracking this localized crisis, contemporary empirical evidence confirms that over 34% of Nyatike's households suffer from chronic food insecurity, a vulnerability fueled directly by severe climate-induced flooding and erratic rainfall cycles (Onyango, 2021; Parliament of Kenya, 2024).

These localized vulnerabilities underscore a broader structural pattern documented across agrifood literature. As Bryan et al. (2024), Djurfeldt (2020), and Dwomoh et al. (2023) consistently demonstrate, restricted access to land, financial loans, agricultural inputs, extension services, and modern machinery heavily limits women's contributions to food systems. This operational deficit persists primarily because informal socio-cultural norms continue to override statutory provisions. Consequently, even where national legal frameworks guarantee gender equality on paper, deep-seated customary rules continue to block women's effective control over food production resources (Errico, 2021; Fischer et al., 2021).

In analyzing these credit channels, Amugune et al. (2025), Ingutia and Sumelius (2024), and Mbudzya et al. (2022) demonstrate that across East Africa, female smallholders face steep barriers accessing capital due to collateral constraints and systemic exclusion from formal financial platforms, despite their heavy reliance on informal savings groups. Compounding this financial bottleneck, Awoke et al. (2025) and Nchanji et al. (2025) find that women remain disproportionately marginalized from receiving basic agricultural inputs, farm mechanization, state extension outreach, and climate-smart technologies due to institutional biases and domestic time constraints. Consequently, these structural inequalities prevent women from ascending into high-value food processing and marketing sectors, ultimately depressing their overall food production efficiency.

Although existing literature extensively documents gendered disparities in food production, a critical analytical limitation persists: most scholarship examines resource access in absolute isolation or at broad national levels, largely neglecting localized intra-household dynamics within unique rural Kenyan contexts like Nyatike Sub-County. Consequently, there remains a distinct scarcity of empirical, farm-level data mapping how women's agency, stubborn societal norms, and material resource access interact as a compounding matrix. Understanding this intersection is vital, as it directly dictates women's real capacity to influence household food security and ascend into commercial agricultural value chains.

To bridge these gaps, the general objective of this study was to analyze how women's access to food production resources shapes their contributions to food system outcomes – measured as a 5-point Likert-scale composite score tracking local production, food security, decision-making, and marketing domains as the primary dependent variable in Nyatike Sub-County, Migori County, Kenya. Specifically, the study evaluated how this core outcome was predicted by women's access to five

critical production indicators: (1) land, (2) financial credit, (3) agricultural inputs, (4) training and extension services, and (5) labour-saving technologies. To guide the inferential modeling, the study tested the overarching null hypothesis (H_0) that women's access to these five food production resources does not have a statistically significant predictive influence on their contributions to food system outcomes.

Rather than a gender-disaggregated comparative trial, these five indicators were evaluated through the lens of community-level perceptions. Because gender norms in rural patriarchal settings are socially constructed and co-reinforced by both sexes, the study purposefully sampled both male and female respondents.

This approach did not aim to compare individual male and female resource ownership, but rather used both sexes as key informants to capture a holistic, community-wide understanding of the social relations, norms, institutions, roles, and power structures that collectively govern women's resource rights. Consequently, the analysis focused on diagnosing the prevailing gendered social and institutional context that dictates women's experiences and food system participation to resolve this localized problem situation.

The research methodology, data collection tools, and analytical approaches utilized to look into these associations are described in the section below.

Methodology

The study used a sequential explanatory mixed-methods design (Creswell & Plano Clark, 2017), where quantitative data were collected and analyzed first, followed by qualitative methods to get deeper insights. The quantitative phase involved structured surveys to identify patterns and measure women's access to land, credit, farm inputs, extension services, and decision-making power. This phase generated statistically analyzable and generalizable findings.

Rather than executing a standard gender-disaggregated comparative trial aimed at measuring individual bivariate variations between male and female respondents, this study purposefully adopts a systemic gender lens. This approach allows the study to evaluate how community-level institutional structures and customary perceptions actively govern women's resource rights. To operationalize this lens, the study anchors its analysis on Social Role Theory, examining how societal expectations and institutional arrangements shape gendered resource distribution. Critically, evaluating these social dynamics reveals a stark divergence between statutory frameworks and customary practices, where enforcement remains weak and community-wide norms dominate land allocation and control.

To properly analyze this divergence, the study necessitates the retention of foundational national statutory baselines, specifically the Constitution of Kenya, the Ministry of Land National Land Policy, and landmark publications from the Kenya Land Alliance. While contemporary literature is prioritized elsewhere, these older, foundational documents are deliberately preserved as the authoritative legal benchmarks required to examine local governance structures.

The subsequent qualitative phase deployed in-depth interviews (IDIs) and focus group discussions (FGDs) to explore participants' lived experiences, deep-seated cultural norms, and institutional barriers that explained the specific statistical patterns observed in the initial survey data. By building qualitative inquiry directly onto the foundational quantitative results, this design maximized structural validity through analytical complementarity, providing both population-level breadth and contextual depth. Concurrently, this integrated dual-strand approach ensured a comprehensive, empirically grounded understanding of female smallholders' access to productive resources and the overlapping socio-cultural factors governing it.

The study was carried out in Nyatike Sub-County, a region characterized by diverse agro-ecological zones, including fertile uplands, lakeshore lowlands, and areas prone to soil degradation and flooding (County Government of Migori, 2022). The local economy is primarily agriculture- and fisheries-based, with women playing a central role in crop production, post-harvest activities, and market trade, although their control over land, inputs, and income is often constrained by patriarchal norms and customary tenure systems (Ministry of Agriculture Livestock Fisheries and Cooperatives, 2021). The sub-county's environmental and socio-economic conditions make it a relevant context for examining women's access to productive resources and participation in local food systems.

The study population comprised 14,665 households engaged in food production in Nyatike Sub-County, Migori County, based on census data (KNBS, 2019). A sample size of 391 households was determined using Yamane's (1967) formula for finite populations. A multi-stage sampling approach was employed to enhance representativeness.

First, Nyatike Sub-County was purposively selected out of nine sub-counties based on its high food insecurity index. Second, using stratified purposive sampling to capture comprehensive local variation, four administrative divisions – Karungu, Kaler, Got-Kachola, and Nyatike – were selected out of a total of five divisions within the sub-county. The basis of stratification required selecting these four specific divisions to reflect balanced demographic, economic, and geographical variations within the study area. Within each selected division, two locations were randomly chosen as data collection sites, where households were systematically selected using stratified random sampling to ensure proportional representation of male- and female-headed households across community clusters. Quantitative survey data collected from these households were systematically supplemented with qualitative data gathered through

focus group discussions and in-depth key informant interviews for holistic contextual interpretation.

As argued by the FAO (2023), Mapedza (2024), and Rietveld et al. (2023), gender norms in rural patriarchal settings are socially constructed and reproduced through the interactions, behaviours, and expectations of women and men within households, communities, and institutions. Consequently, the study purposefully interviewed both male and female household heads. The inclusion of both sexes was not intended to facilitate a statistical comparison of male and female resource ownership. Rather, both women and men were treated as key informants whose perspectives were essential for understanding the social relations, gender norms, institutional arrangements, roles, and power structures that shape women's contributions to food systems. This approach enabled the study to capture intra-household and community-level perspectives, thereby providing a more comprehensive understanding of gender dynamics while minimizing sampling bias.

Data were collected using a semi-structured questionnaire administered to 391 household heads, capturing both quantitative and qualitative information on women's access to land, credit, farm inputs, extension services, and household decision-making. Qualitative data were supplemented with eight focus group discussions (8–12 participants each) and key informant interviews with agricultural officers, local administrators,

and farmer representatives. Combining these methods enabled the study to examine measurable patterns in resource access alongside participants' lived experiences, providing a more comprehensive understanding of women's roles in local food systems. Consequently, the analytical focus remains anchored on diagnosing the prevailing gendered social and institutional context that shapes food system participation.

Quantitative data were analyzed using descriptive statistics to summarize patterns and hierarchical regression analysis to examine relationships between women's access to resources and household decision-making. Qualitative data were analyzed through thematic analysis, providing contextual insights and helping to interpret and validate the quantitative findings.

The analyses generated both descriptive and inferential insights into patterns of resource access and their influence on women's contributions to food systems. The findings from these analyses are presented and discussed in the following section.

Results and Discussions

Descriptive Statistics of Women's Access to Food Production Resources

Table 1 presents the descriptive statistics of women's access to key food production resources.

Table 1

Descriptive Statistics of Women's Access to Key Food Production Resources

Item Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Standard Deviation
Women's access to land for farming	35 (12.8%)	219 (80.2%)	7 (2.6%)	12 (4.4%)	0 (0.0%)	1.99	0.575
Women's agricultural credit access	131 (48.0%)	131 (48.0%)	5 (1.9%)	6 (2.2%)	0 (0.0%)	1.58	0.643
Women's access to farm inputs	18 (6.6%)	163 (59.7%)	6 (2.2%)	81 (29.7%)	5 (1.8%)	2.60	1.038
Women's access to agricultural training & extension	16 (5.9%)	201 (73.6%)	6 (2.2%)	49 (17.9%)	1 (0.4%)	2.33	0.850
Women's access to appropriate technologies/ equipment	14 (5.1%)	180 (65.9%)	12 (4.4%)	66 (24.2%)	1 (0.4%)	2.49	0.928

The descriptive results indicate substantial and persistent systemic barriers in women's access to key food production resources in Nyatike Sub-County, with marked institutional constraints observed across land, credit, inputs, extension services, and agricultural technologies.

Regarding secure access to land, more than nine in ten respondents (93%) either disagreed or strongly disagreed that women farmers have secure access to land for farming. Only about 4.4% agreed, and none strongly agreed. The low mean score ($M = 1.99$, $SD = 0.575$) illustrates that land insecurity is widespread and deeply entrenched across the sub-county. Given that land is the primary productive asset in rural agricultural systems, this lack of tenure security effectively strips female smallholders of the spatial sovereignty required to independently adopt modern productivity strategies or initiate capital-intensive farm investments.

The overwhelming consensus on women's lack of secure land access points to a systemic, rather than an isolated barrier, in Nyatike Sub-County. This finding is consistent with studies by Mwawuda & Nyaoke (2015) and Onyango et al. (2024), which demonstrate that patriarchal land tenure systems in Migori continue to override formal legal provisions that guarantee gender equality in land rights. Such patterns suggest a divergence between statutory frameworks and customary practices, where enforcement remains weak and community-wide norms dominate land allocation and control.

From the perspective of Social Role Theory, this exclusion reflects entrenched prescriptive gender roles co-reinforced across the community that assigns land ownership exclusively to patriarchal lineage heads, thereby socially positioning women as dependent labourers rather than autonomous owners (Beriso et al., 2023; Eagly & Wood, 2012). Complementing this, a feminist political economy lens highlights how unequal control over productive assets reproduces broader structural inequalities, limiting women's bargaining

power and economic agency within rural households and communities (Andersson et al., 2022; Coral et al., 2026).

In terms of wider developmental implications, agricultural literature indicates that the absence of secure land rights directly undermines women's contribution to local food systems. Without tenure security, female smallholders are structurally constrained and less likely to invest in productivity-enhancing practices such as soil conservation, irrigation, or crop diversification, a dynamic that macro-level studies link to compromised food production outputs and household food availability (Magara et al., 2026; Mbudzya et al., 2022; Odiyo & Gatobu, 2025).

Qualitative focus groups contextualized this statistical trend, with participants explaining how customary practices actively enforce land insecurity. As one widow shared: *"Women can't inherit land. Even widows like me must remarry in the same clan to be allowed to cultivate"* (Female Participant 001, FGD 3). This narrative explains the 93% quantitative land deprivation by illustrating how women's agricultural tenure is structurally bound to marital status, forcing female farmers into dependent social roles within the patriarchal lineage to retain basic cultivation rights.

Access to agricultural loans or credit facilities shows an even more striking pattern. An overwhelming 96% of respondents disagreed or strongly disagreed that women can easily access credit, with nearly half (48%) strongly disagreeing. Only about 2% expressed agreement. The very low mean ($M = 1.58$, $SD = 0.643$) indicates a strong and consistent perception that financial exclusion is pervasive. These findings suggest that both formal and informal financial systems remain largely inaccessible to women farmers in Nyatike Sub-County, reinforcing structural barriers to their effective participation in food production.

This financial exclusion has direct implications for women's agricultural autonomy as limited access to

credit hinders women's ability to purchase farm inputs, adopt improved technologies, expand food production, or absorb economic shocks. In this way, macro-level agricultural literature establishes that financial exclusion not only restricts individual productivity but also weakens household food security and the broader functioning of local food systems. This structural linkage aligns directly with the arguments of Ngugi (2025), Msangi (2025), and Fowowe (2023) who maintained that women's limited ownership of titled land systematically excludes them from formal agricultural finance due to collateral requirements.

Viewed through Social Role Theory, this exclusion is sustained by institutional social scripts shared throughout the local community that view women as riskier subsistence producers rather than commercially viable farmers, thereby shaping lending practices that perceive them as higher-risk clients (Eagly & Wood, 2012). Extending this analysis, a feminist political economy perspective reveals how financial systems are embedded within broader structures of asset inequality, where unequal land ownership translates directly into unequal access to capital (Addison et al., 2026; Bin-Humam et al., 2025). This interconnectedness underscores that credit constraints are not merely financial but are rooted in deeper structural inequities.

Qualitative focus groups explained this structural nature of this exclusion, particularly around collateral requirements tied to land ownership. As one participant explained: *"We pool our money every week in the table banking group, and it helps when the children need school fees, or I need to buy a single sack of maize seeds. But when I want to expand my farm or buy the equipment that could really make us profitable, the banks demand land titles and large collateral that my husband controls. We work so hard every day on the farm, but without access to proper agricultural loans, we are stuck doing the same small things, unable to grow our businesses."* (Female Participant 004, FGD 8)

This narrative directly explains the 96% quantitative credit barrier by illustrating the stark boundary between micro-level informal workarounds and macro-level formal financial structures. It demonstrates that while table banking helps bridge immediate subsistence demands, formal commercial credit remains structurally inaccessible because asset-based requirements, like land titles, remain firmly under patriarchal control, thereby trapping female farmers in low-scale production cycles.

In relation to equal access to farm inputs such as seeds, fertilizers, and tools, more than two-thirds (66.3%) of respondents disagreed that women have equal access. However, nearly one-third (31.5%) agreed or strongly agreed. The mean score ($M = 2.60$, $SD = 1.038$) is slightly higher compared to land and credit, suggesting relatively greater variation in experience. While inequality remains the dominant pattern, this variation suggests that some women are able to access inputs through alternative pathways such as informal markets, group-based savings schemes, or targeted development interventions. Nonetheless, the prevailing perception continues to indicate structural disadvantage in Nyatike Sub-County.

Unequal access to farm inputs represents a critical constraint on women's food production efficiency, as inputs are central to improving yields and transitioning beyond subsistence farming. Institutional literature indicates that limited access restricts women to low-input, low-output production systems, creating an asset deficit that macro-level studies directly link to constrained household food availability and market participation. This finding is consistent with Tadewos and Kuma (2025) and Njuki et al. (2022) who argue that financial exclusion and resource inequality directly translate into an input gap that disproportionately affects women farmers. This pattern has also been observed in other rural contexts, where limited access to land, finance, and extension services prevents them from

acquiring improved farm inputs (Buehren, 2023; Nyberg et al., 2025).

Viewed through Social Role Theory, this disparity reflects entrenched norms that associate modern, input-intensive food production with men, while positioning women within subsistence-oriented roles (Eagly & Wood, 2012). At the same time, an empowerment perspective highlights that access alone does not guarantee effective utilization; women may still face constraints in decision-making regarding the acquisition and use of inputs within the household (Lee et al., 2025; Njuki et al., 2023). This underscores the importance of distinguishing between nominal access and actual control over food production resources.

Qualitative focus groups explained this structural barrier, with participants unpacking how formal distribution channels operate. As one participant shared: *“Sometimes inputs come from the government, but they are given to the men in the village. If we ask, they say ‘talk to your husband.’”* (Female Participant 004, FGD 2)

This narrative explains the 66.3% quantitative input gap by demonstrating how external institutional delivery systems actively reinforce Social Role assumptions, routing critical production resources through male lineage heads and undermining women's nominal access at the local level.

Concerning access to agricultural training and extension services, more than three-quarters of respondents (79.5%) disagreed or strongly disagreed that women regularly receive training or advice from extension officers. Only 18.3% agreed or strongly agreed. The mean score ($M = 2.33$, $SD = 0.850$) reflects limited but slightly varied responses. This suggests that extension services are not reaching women adequately, despite their central role in food production. Limited exposure to training may further widen systemic productivity gaps across local food production.

This finding points to a critical information bottleneck that constrains women's agricultural effectiveness in Nyatike Sub-County. Extension services are a key channel for disseminating knowledge on improved farming practices, climate adaptation, and efficient resource utilization; thus institutional literature notes that their absence directly limits women's capacity to enhance productivity and compromises household food security (Begum et al., 2025; Kalogiannidis & Syndoukas, 2024; Lecoutere et al., 2023).

This confirms the assertions of Adebayo and Worth (2024) and Sambo and Huseby-Lie (2025), who highlight persistent institutional biases within agricultural extension systems that prioritize male farmers as primary recipients of technical knowledge. In many cases, extension delivery mechanisms, such as male-dominated farmer groups, scheduling constraints, and mobility limitations, systematically exclude women, even when they are actively engaged in farming.

Viewed through Social Role Theory, this marginalization reflects and reinforces entrenched social scripts that associate technical expertise and innovation with men, while relegating women to traditional, labour-intensive agricultural roles (Eagly & Wood, 2012; Ngugi et al., 2025). These norms not only shape access to extension services but also influence perceptions of women's legitimacy as knowledge recipients and agricultural decision-makers.

Qualitative focus groups explained these information bottlenecks, with participants detailing the operational biases they encounter. As one participant shared: *“Sometimes they organize trainings, but we women can't attend because we're too busy with cooking, cleaning, and taking care of the children. By the time we're free, the training is already over.”* (Female Participant 004, FGD 2)

This narrative explains the 79.5% quantitative exclusion by demonstrating how extension delivery channels interact with domestic workloads. It illustrates that

prescriptive social scripts, which bind women to rigid household reproduction roles, create insurmountable scheduling conflicts that block female farmers from participating in technically oriented external training.

Similarly, for access to appropriate farming technologies or equipment, over 71% disagreed or strongly disagreed, while about one-quarter (24.6%) agreed. The mean ($M = 2.49$, $SD = 0.928$) indicates moderate variability but an overall negative perception. These findings suggest that mechanization and labour-saving technologies remain largely inaccessible to women farmers in Nyatike Sub-County, thereby reinforcing continued reliance on manual, labour-intensive farming practices and limiting potential efficiency gains in food production.

The finding points to a persistent technology gap that contributes to women's time poverty, physical drudgery, and reduced agricultural efficiency. In practice, empirical studies demonstrate that the absence of mechanization and improved tools constrains productivity, slows farm operations, and reduces the scale of production that women can manage. This finding aligns with Tadewos and Kuma (2025) and Njuki et al. (2022) who argue that agricultural technologies in many rural contexts are often aligned with male-dominated farming activities, thereby systematically excluding women from productivity-enhancing innovations. As a result, macro-level patterns show that women remain concentrated in manual production systems that yield lower returns despite their significant labour contribution.

Viewed through Social Role Theory, this exclusion reinforces prescriptive roles that cast women as manual labourers while reserving technical and motorized tools for men. Technological tools and mechanized farming practices are often culturally associated with masculinity, while women are normatively positioned as manual labourers responsible for routine, low-technology agricultural tasks (Eagly & Wood, 2012; Kansanga & Dinko, 2025). This gendered framing not only limits women's access to technologies but also shapes

household and community perceptions regarding who is entitled to use such equipment.

Qualitative focus groups explained this technological exclusion, with participants detailing how gendered boundaries restrict equipment use. As one participant shared: *"We hear about new tools and improved seeds at the market, but we cannot afford them or even find them nearby. Sometimes it feels like these innovations are not meant for women like us."* (Participant 002, FGD 2)

This narrative directly explains the 71% quantitative technology gap by demonstrating how supply chain distance and financial exclusion reinforce deep-seated social scripts. It illustrates that when labour-saving innovations are structurally and culturally coded as male assets, female smallholders face a double barrier of physical inaccessibility and internalized exclusion, trapping them in traditional, manual production systems.

Taken together, the findings reveal a consistent and mutually reinforcing pattern of gendered disparities in access to key food production resources, land, credit, farm inputs, agricultural extension services, and appropriate technologies in Nyatike Sub-County. Across all indicators, women face structural constraints that limit their ability to fully participate in and benefit from food production systems. Land and credit emerge as foundational barriers, with insecure tenure and financial exclusion restricting women's capacity to invest in sustainable food production.

These constraints cascade into reduced access to farm inputs and technologies, further limiting productivity and reinforcing reliance on low-input, labour-intensive farming systems. At the same time, limited access to extension services restricts women's exposure to technical knowledge and innovation, thereby constraining their ability to improve farming practices and respond to emerging agricultural challenges.

Viewed through Social Role Theory, these patterns reflect entrenched gender norms that shape differential access to food production resources by positioning men as primary economic actors and women as subordinate labour providers. Such norms influence not only ownership and control of assets but also access to information, services, and technologies, thereby reinforcing women's constrained roles within agricultural systems.

While broader structural and institutional factors further contextualize these inequalities, the findings demonstrate that socially constructed gender roles remain central in shaping women's access to resources and their capacity to contribute to food systems. Consequently, women's contributions remain limited not by lack of involvement, but by systemic constraints

that reduce their food production efficiency, weaken household food security, and undermine the resilience and sustainability of rural food systems in the study area.

While the descriptive findings highlight widespread structural constraints in access to key food production resources, they do not fully explain the baseline levels of the outcome variable or the relative influence of these predictors. To establish this baseline, descriptive statistics were computed for the four Likert-scale items comprising the primary dependent variable. As shown in Table 2, these items were aggregated to generate the overall composite score reflecting women's baseline contributions to local food system domains across production, food security, decision-making, and marketing.

Table 2

Women's Contribution to Food Systems

Item Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Standard Deviation
Increased women's contribution to agricultural production in the community	36 (13.2%)	115 (42.1%)	13 (4.8%)	94 (34.4%)	15 (5.5%)	2.77	1.210
Increased women's contribution to food security in the community	47 (17.2%)	131 (48.0%)	38 (13.9%)	52 (19.0%)	5 (1.8%)	2.40	1.039
Increased women's decision-making in agricultural activities in the community	38 (13.9%)	138 (50.5%)	11 (4.0%)	76 (27.8%)	10 (3.7%)	2.57	1.142
Increased women's involvement in marketing and selling agricultural products in the community	47 (17.2%)	129 (47.3%)	4 (1.5%)	79 (28.9%)	14 (5.1%)	2.58	1.217

Source: Field Data 2025

The descriptive results for the dependent variable reveal that a majority of respondents perceive women's current contributions to food system domains as severely restricted by the community's structural limitations. More than half of the respondents (55.3%) disagreed that there is an increase in women's contribution to food production, though a notable 39.9% agreed, yielding the highest mean among the indicators ($M = 2.77$, $SD = 1.210$). This negative trend worsens regarding food security, where nearly two-thirds of the community

(65.2%) disagreed that women's contributions are optimized ($M = 2.40$, $SD = 1.039$).

Crucially, this perceived suppression of food system contributions matches the community's governance trends. Nearly two-thirds of respondents (64.4%) disagreed that women experience increased decision-making authority in local production activities ($M = 2.57$, $SD = 1.142$). Similarly, 64.5% disagreed that women have achieved greater involvement in marketing and selling food products ($M = 2.58$, $SD = 1.217$).

Taken together, these metrics provide clear empirical proof that the community views women's contributions as structurally bound. This baseline confirms that the outcome variable fluctuates in response to institutional barriers, setting up a mathematically sound baseline for the inferential modeling.

To determine the precise statistical relationships between these baseline outcomes and the studied

predictors, a hierarchical regression analysis was conducted. This model examines the extent to which women's agency, sociocultural norms, and access to resources predict their overall contribution to food systems in Nyatike Sub-County.

Hierarchical Regression Results

Table 3 presents the results of the hierarchical regression analysis.

Table 3

Hierarchical Regression Model Summary for Women's Contribution to Food Systems

Model	Predictors Added	R	R Square	ΔR^2	Adjusted R Square	F	Sig.
1	Women's Agency	.790 ^a	.624	—	.617	88.50	<.001
2	+ Sociocultural norms	.829 ^b	.688	.064	.682	117.57	<.001
3	+ Resource access	.850 ^c	.722	.034	.717	138.55	<.001

The hierarchical regression analysis shows that women's agency factors, sociocultural norms, and access to food production resources collectively have a strong and statistically significant influence on the outcome variable.

In Model 1, women's agency factors alone explained 62.4% of the variance ($R^2 = .624$, $p < .001$), indicating that more than three-fifths of the changes in the dependent variable are associated with intra-household characteristics. When sociocultural norms were added in Model 2, the explanatory power increased to 68.8%, with an additional 6.4% of variance explained ($\Delta R^2 = .064$, $p < .001$), demonstrating that gender norms and cultural expectations independently shape outcomes beyond household-level dynamics.

In Model 3, the inclusion of resource access variables further increased the explained variance to 72.2% ($\Delta R^2 = .034$, $p < .001$), indicating that nearly three-quarters of the variation in the outcome variable is accounted for by the combined predictors. This progressive increase in explanatory power demonstrates that the outcome is shaped by multiple interacting structural and resource-based factors rather than a single determinant.

While the model summary provides insight into the overall explanatory power of the variables, it does not indicate the relative contribution of each predictor. Table 4 presents the regression coefficients, showing the direction and strength of the relationship between each independent variable and women's contribution to food systems.

Table 4

Standardized Beta Coefficients and Significance Levels for Predictors of Women's Contribution to Food Systems

Predictor	β	t	p
Extension services	.335	8.149	.000
Technology access	.317	8.569	.000
Credit/loans	.179	4.660	.000
Farm inputs	.224	5.233	.000

The regression coefficients from the final hierarchical model indicate that all resource access variables are positive and statistically significant predictors of women's contributions to food systems, highlighting the critical role of asset accessibility. Extension services emerged as the single most powerful predictive driver within the model ($\beta = .335$, $p < .001$),

This statistical dominance demonstrates that structural resources, individual agency, and localized social support networks are ultimately insufficient if female producers lack technical knowledge. Without targeted agronomic training, female smallholders cannot effectively capitalize on or manage other acquired agricultural assets. Consequently, our model reveals that technical literacy functions as the primary mechanism of economic success, directly dictating the efficiency with which all other structural resources, such as land equity and financial credit, are utilized in the field.

This argument expands upon the work of Alam et al. (2024) and Bryan et al. (2024), who demonstrate that extension support provides farmers with the vital baseline information required for modern agronomic practices, climate adaptation, and pest management. Ultimately, these empirical trends indicate that when training channels are blocked by rigid mobility limitations, women are starved of these essential skills, systematically reducing their capacity to innovate and enter commercial markets (Adebayo & Worth, 2024; Lodin et al., 2019). (Adebayo & Worth, 2024; Lodin et al., 2019).

Technology access was the second strongest predictor ($\beta = .317$, $p < .001$), suggesting that labour-saving tools may enhance productivity and efficiency. This implies that improved access to appropriate technologies can reduce labour constraints and enable greater participation in food production and related value chain activities. This aligns with evidence that gender productivity gaps in Sub-Saharan Africa are largely driven by unequal access to productive inputs (Clay & Yurco, 2024; Kinkingninhou Medagbe et al., 2020) and that limited access to equipment constrains women's labour efficiency (Masset et al., 2023; Piedrahita et al., 2025). Similarly, technology adoption has been shown to improve market participation and profitability among smallholder farmers (Bird, 2024; Xaba et al., 2026).

Farm inputs ($\beta = .224$, $p < .001$) significantly influence participation, highlighting the importance of access to seeds, fertilizers, and other resources. This suggests that improved access to inputs can enhance women's food production efficiency and enable greater participation in food systems. Evidence from sub-Saharan Africa shows that structural resource disparities persist due to unequal access to inputs, socio-economic constraints, and structural barriers such as social norms and institutional limitations. (Adam et al., 2021; Boudalia et al., 2024; Odiyo & Gatobu, 2025; Piedrahita et al., 2025).

Access to credit ($\beta = .179$, $p < .001$) remains an important factor in enabling investment and expansion among women farmers. This finding suggests that financial inclusion plays a critical role in enhancing women's capacity to adopt improved inputs, scale production, and respond to economic shocks. It is consistent with studies showing that financial exclusion limits women's agricultural engagement (Adebayo & Worth, 2024; Ingutia & Sumelius, 2024; Jindo et al., 2023).

In summary, the findings show persistent and interrelated structural constraints in access to essential food production resources, thereby affecting women's contributions to food systems in Nyatike Sub-County. The descriptive results highlight widespread resource asymmetries in land, credit, inputs, extension services, and technology access, while the hierarchical regression analysis confirms that these factors, along with women's agency and sociocultural norms, significantly shape their agricultural contributions. Overall, the findings support the study's objective of analyzing how women's access to resources affects food system outcomes by highlighting that women's limited engagement in food systems is mostly caused by structural limitations rather than individual capacity.

Conclusion and Recommendations

The study concluded that women's contributions to food systems in Nyatike Sub-County are structurally bound by

community-wide institutional barriers rather than individual capacity. Regarding the primary objectives, the descriptive findings revealed severe, deep-seated constraints across all resource areas. There was widespread consensus on women's insecure land access, pervasive financial exclusion from credit facilities, and severe disadvantages in obtaining farm inputs, regular training, and labour-saving technologies.

When these indicators were tested collectively through hierarchical modeling, the results demonstrated that resource access significantly influenced outcomes. Within this framework, extension services and technology access emerged as the primary and most powerful predictive drivers of women's food system contributions, followed closely by farm inputs and credit access. Conversely, secure land access functioned as a foundational structural antecedent with a lower relative predictive weight, anchoring the model rather than driving active seasonal variance. Consequently, the study concluded that addressing nominal resource availability alone is insufficient. Interventions must target the collective social architecture and institutional rules that govern women's resource rights to optimize local food production efficiency and enhance broader household food security.

Based on these findings and conclusions, this study recommends targeted, interconnected policy interventions to address the five studied objective domains. First, to resolve foundational land insecurity, the national Ministry of Lands, Physical Planning, and Urban Development, in coordination with the Migori County Land Registry, must aggressively enforce statutory frameworks protecting women's inheritance and property rights. Local customary institutions should support this through community-level dialogues designed to bridge the gap between formal laws and traditional land allocation.

Second, formal rural financial institutions, commercial banks, and agricultural cooperatives should develop

customized, low-interest credit schemes. These financial products must bypass traditional land title collateral requirements by utilizing alternative security mechanisms, such as group-based savings records or crop-sharing histories, thereby eliminating the barrier created by land disinheritance.

Third, to bridge the input gap, the Migori County Department of Agriculture, Livestock, and Fisheries should introduce targeted input subsidy programs and decentralized distribution networks. These interventions must ensure timely, affordable access to certified seeds and fertilizers directly within remote smallholder communities to circumvent commercial bottlenecks.

Fourth, given that information delivery is the strongest accelerator of participation, the Migori County Government must restructure its agricultural outreach architecture. This involves designing exclusive, gender-responsive training and extension schedules that explicitly accommodate women's unique household roles, care responsibilities, and local mobility constraints.

Finally, these restructured outreach efforts must be coupled with expanded and subsidized access to appropriate labor-saving equipment for primary processing and post-harvest storage. Ensuring that women retain actual household control over these mechanical tools is essential to maximize their overall efficiency, lower time poverty, and enhance productivity within the local food production system.

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