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Gendered access patterns to agricultural extension information across different cropping systems

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Abstract

Not all cropping systems exclude women equally. In Tanzania's Arusha region, gender gaps in extension access differ markedly between cereal-based and horticultural farming systems. This research compared gendered extension access patterns among 248 farming households across six extension indicators in both cropping systems from October 2023 to July 2024. In cereal systems, men outsourced women by an average of 35.9 percentage points across all indicators. In horticultural systems, the gap narrowed to 18.6 percentage points. Women in horticulture scored 56.7% on information access compared to just 42.3% in cereals, and their market linkage scores were 48.6% versus 28.4%. Credit access showed the widest gender gap in both systems. The cropping system effect was significant after controlling for education, household wealth, and distance to extension offices. These findings suggest that the nature of the crop, particularly its commercial orientation and women's traditional involvement, mediates the gender gap in extension access.

Keywords: Gendered access, agricultural extension, cropping systems, gender gap, cereal farming, horticulture, extension information, Tanzania, women farmers, market linkages

Introduction

Does the type of crop a household grows affect who gets extension advice? Evidence from across sub-Saharan Africa shows persistent gender gaps in extension access, with women receiving roughly 5-7% of total extension contacts in some countries ^[1]. But these aggregate figures may mask important variation across farming systems. Cash crops, export horticulture, and food staples each involve different labor divisions, market structures, and cultural norms that could widen or narrow gender gaps ^[2].

In Tanzania, extension services reach an estimated 14% of farming households, with significant male bias in contact frequency ^[3]. Yet anecdotal reports suggest that women in vegetable and flower production access extension more readily than those in maize or sorghum farming. If true, this pattern has implications for how extension services target their gender equity efforts ^[4].

This research systematically compared gendered extension access across cereal-based and horticultural cropping systems in Arusha region. The objectives were to quantify gender gaps in six extension access dimensions, compare gap magnitudes between cropping systems, and identify factors explaining the system-level differences ^[5].

Theoretical Framework

This research applies Kabeer's ^[6] social relations framework, which argues that gender inequalities are produced through institutional rules, norms, and practices within specific contexts. The framework predicts that cropping systems with different market orientations, labor

norms, and value chain structures will generate different patterns of gender-based exclusion from extension services. Commercial horticulture, where women have historically greater market presence, may provide institutional pathways that reduce access barriers compared to traditional cereal systems.

Material and Methods

Material

A cross-sectional comparative design was used with 248 farming households in Arusha region: 128 in cereal-dominant areas (Monduli and Karatu districts) and 120 in horticulture-dominant areas (Arumeru and Meru districts). Within each household, both the primary male and primary female decision-maker were interviewed separately. The research was conducted between October 2023 and July 2024 at the School of Agricultural Sciences, Nelson Mandela African Institution, Arusha, Tanzania. A structured questionnaire measured six extension access indicators. Ethics clearance was obtained from the Nelson Mandela African Institution Research Ethics Committee (Protocol NMAI-REC/2023/041, September 2023) ^[7].

Methods

Extension access was measured across six dimensions: information access, training participation, input access, market linkages, technology adoption, and credit access. Each was scored as a percentage of maximum possible engagement. Gender gaps were calculated as male score minus female score in percentage points. Two-way ANOVA

assessed gender, cropping system, and interaction effects. Multiple regression controlled for confounding variables [8].

Ethical Considerations

Informed consent was obtained separately from male and female respondents in Swahili. Interview responses were

kept confidential between household members. All data were anonymized during analysis. Participants were free to skip questions or withdraw without consequence.

Results

Table 1. Extension Access Scores by Gender and Cropping System (%)

Indicator	Men-Cer	Wom-Cer	Gap-Cer	Men-Hort	Wom-Hort	Gap-Hort
Information	78.4	42.3	36.1	74.8	56.7	18.1
Training	72.1	38.6	33.5	68.4	52.3	16.1
Input Access	68.3	31.2	37.1	62.1	44.8	17.3
Market Links	64.7	28.4	36.3	71.3	48.6	22.7
Technology	71.2	34.8	36.4	66.7	47.2	19.5
Credit	58.6	22.7	35.9	54.2	36.4	17.8
Gender x System interaction: all $p < 0.01$						

Gender gaps were consistently smaller in horticultural systems (16.1-22.7 pp) than in cereal systems (33.5-37.1 pp). The interaction between gender and cropping system

was significant across all six indicators, confirming that the type of farming mediates the extent of gender-based exclusion.

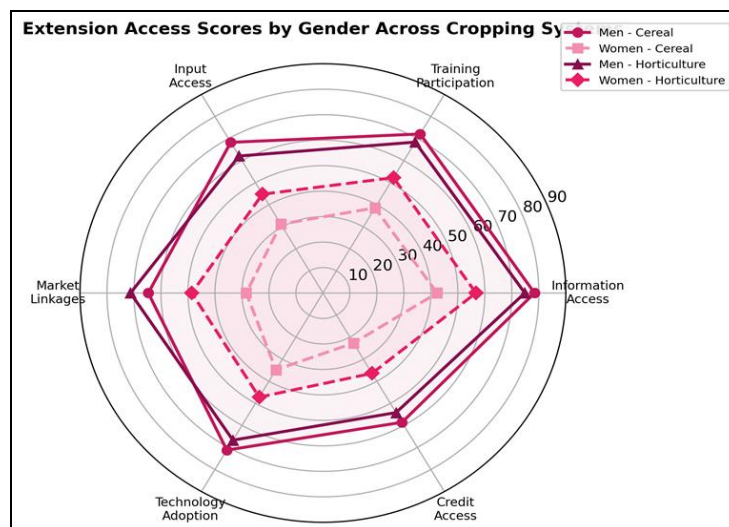


Fig 1: Extension access scores by gender across cereal and horticultural cropping systems

The radar chart shows men's scores forming a consistently larger polygon than women's in both systems, but the gap

narrows visibly in horticulture. Women in horticulture approach men's cereal scores on several indicators.

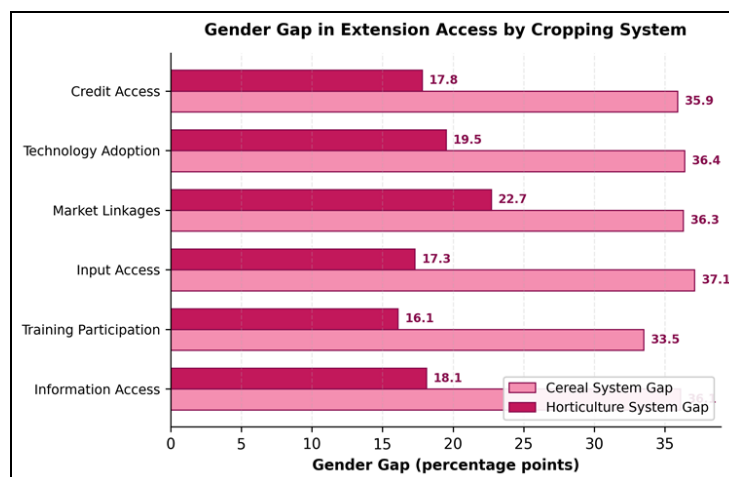


Fig 2: Gender gap magnitude in extension access by cropping system across six indicators

Cereal system gaps (pink bars) consistently exceeded horticulture gaps (darker bars) by roughly double across most indicators. Market linkages showed the smallest relative narrowing between systems.

Discussion

The finding that horticultural systems produce smaller gender gaps challenges the assumption that extension gender inequity is uniform across farming contexts. Women's traditionally stronger market presence in vegetable and flower production appears to create institutional pathways, market contacts, buyer relationships, cooperative memberships, that partially offset exclusionary norms^[9]. This aligns with Doss's^[10] argument that women's crop involvement shapes their engagement with agricultural support services.

The credit access gap was widest in both systems, pointing to structural barriers in financial institutions that cropping system effects alone cannot overcome^[11]. Extension services may need to partner with microfinance providers to address this particular dimension. Market linkages showed the smallest relative improvement in horticulture, possibly because male-dominated wholesale networks persist even when women are active producers^[12].

These patterns suggest that extension gender strategies should be system-specific. In cereal areas, fundamental access barriers need addressing first. In horticultural zones, narrower interventions targeting credit and market linkage gaps may be more efficient.

Limitations

The two-district-per-system design limits generalizability. Cropping system classification was based on dominant crops, though most farms grew mixed crops. Self-reported extension access may differ from actual contact records. The cross-sectional design cannot establish whether cropping system choice causes access differences or correlates with other factors.

Conclusions

Gender gaps in extension access varied significantly across cropping systems in Arusha, Tanzania. Horticultural systems showed narrower gaps than cereal systems across all six measured indicators. Women's established market roles in horticulture appear to create access pathways absent in traditional cereal farming. Extension agencies should tailor gender strategies to specific cropping contexts rather than applying uniform approaches. Addressing credit access barriers requires action beyond extension systems alone. Future research should track whether narrowing access gaps translates into reduced productivity differences between men and women farmers.

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