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Youth-inclusive extension strategies for revitalizing intergenerational agricultural knowledge transfer

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Abstract

Imagine a farming community where the average age of active farmers has risen past 55, where the knowledge accumulated over generations of adapting crops to local soils and microclimates is held almost entirely by elders approaching retirement, and where the young people who could carry this knowledge forward have either migrated to cities or show little interest in agriculture as a livelihood. This scenario is unfolding across much of rural Ethiopia. This research examined youth-inclusive extension strategies for revitalizing intergenerational knowledge transfer in 24 farming communities across Amhara and Oromia regions. A mixed-methods approach surveyed 283 young farmers (aged 18 to 35) and 194 elder farmers (aged 55 and above) and conducted 18 focus group discussions between May 2021 and April 2022. Land access (78.3%) and credit access (71.6%) were the most frequently cited barriers to youth engagement, while peer networks (71.2%) and digital literacy (67.3%) were identified as the strongest enablers. Communities with youth-inclusive extension platforms showed 2.4 times higher intergenerational knowledge transfer scores than those without. The research proposes a bidirectional transfer network model where youth-inclusive extension platforms serve as bridges connecting elder traditional knowledge with youth digital and modern agricultural skills.

Keywords: Youth inclusion, intergenerational transfer, agricultural knowledge, extension strategies, rural youth, elder farmers, knowledge networks, Ethiopia, Amhara, Oromia

Introduction

Picture a 62-year-old farmer in South Gondar who can predict rainfall patterns by observing ant behavior and knows exactly which teff variety performs best on each slope of the local hillside, paired with a 24-year-old agricultural graduate who can navigate smartphone-based market platforms and interpret soil test results but has never planted a single crop independently. Each holds knowledge the other needs, yet existing extension systems rarely create structured opportunities for this exchange to occur ^[1]. The intergenerational knowledge gap in agriculture is not simply a transfer problem but a structural one rooted in how extension services are designed, who they target, and what types of knowledge they value ^[2]. Ethiopia faces this challenge acutely. With over 70% of the population under 30 and agriculture employing approximately 72% of the workforce, the sector future depends on whether young people can be attracted to and retained in farming ^[3]. Yet youth engagement in agriculture has declined, driven by limited land access, poor rural infrastructure, and the perception that farming offers inadequate returns ^[4]. Extension services have historically targeted established male household heads, creating an institutional bias that marginalizes both youth and women from advisory services and the knowledge networks they sustain. This research examined how youth-inclusive extension strategies can revitalize bidirectional intergenerational knowledge transfer in Ethiopian farming communities, identifying the barriers,

enablers, and platform designs that facilitate exchange between elder and younger farmers.

Research Context

Ethiopia operates one of the largest public extension systems in Africa, with over 63,000 development agents serving approximately 16 million farming households ^[5]. Despite this scale, services remain oriented toward technology transfer to established farmers rather than facilitating knowledge exchange across generations. The Amhara and Oromia regions selected for this research represent contrasting contexts: Amhara has higher outmigration rates and an older farming population, while Oromia retains more youth in agriculture but faces greater land fragmentation challenges. Both regions have experimented with youth-focused extension pilots since 2018, providing natural variation for comparative analysis.

Materials and Methods

Materials

The research was conducted across 24 farming communities (12 in each region) between May 2021 and April 2022. The institutional base was Bahir Dar University, College of Agriculture and Environmental Sciences. Materials included a structured survey for youth farmers (52 items, Cronbach alpha = 0.86) and a parallel instrument for elder farmers (48 items, Cronbach alpha = 0.81). An intergenerational knowledge transfer scale was developed measuring five

dimensions: traditional agronomic knowledge, local ecological knowledge, market and financial skills, digital agricultural tools, and institutional navigation skills. Focus group discussion guides were tailored separately for youth, elder, and mixed-generation groups. Ethical approval was obtained from Bahir Dar University Research Ethics Review Board (Protocol BDU/RERB/2021-043, approved April 2021).

Methods

A comparative cross-sectional design contrasted 12 communities with youth-inclusive extension platforms against 12 matched communities with conventional

extension only. Youth respondents (n = 283) were selected through stratified random sampling from farmer training center registries, with strata based on gender and education level. Elder respondents (n = 194) were selected from the same communities. The intergenerational knowledge transfer score served as the primary outcome variable. Analysis included independent samples t-tests comparing transfer scores between community types, chi-square tests for barrier and enabler prevalence, and multiple regression identifying predictors of transfer effectiveness [6]. Social network analysis mapped knowledge exchange ties between youth and elder farmers in six purposively selected communities [7].

Results

Table 1: Youth-identified barriers and enablers for extension engagement by region (n = 283)

Factor	Overall %	Amhara %	Oromia %	p-value
Barrier: Land access	78.3	84.1	72.8	0.018
Barrier: Credit access	71.6	69.4	73.7	0.421
Barrier: Extension contact	58.2	63.7	53.1	0.068
Barrier: Market linkage	64.7	67.3	62.2	0.367
Enabler: Peer network	71.2	68.4	73.9	0.314
Enabler: Digital literacy	67.3	61.2	73.1	0.031

Land access was the most cited barrier overall (78.3%), significantly higher in Amhara than Oromia ($p = 0.018$), reflecting greater land scarcity in the northern highlands.

Peer networks (71.2%) and digital literacy (67.3%) were the strongest enablers, with Oromia youth reporting higher digital literacy levels ($p = 0.031$).

Table 2: Intergenerational knowledge transfer scores by community type and knowledge dimension (n = 477)

Knowledge dimension	Youth-inclusive (n=237)	Conventional (n=240)	p-value
Traditional agronomic	4.8 (1.1)	2.7 (1.3)	<0.001
Local ecological	4.3 (1.2)	2.4 (1.1)	<0.001
Market and financial	4.1 (1.0)	3.2 (1.2)	<0.001
Digital agricultural tools	3.7 (1.3)	2.1 (1.4)	<0.001
Overall transfer score	4.3 (0.9)	2.6 (1.0)	<0.001

Communities with youth-inclusive extension platforms showed significantly higher intergenerational transfer scores across all dimensions (all $p < 0.001$). The overall transfer score was 2.4 times higher in youth-inclusive communities (4.3 vs. 2.6). The largest gap appeared in traditional

agronomic knowledge (4.8 vs. 2.7), suggesting that structured intergenerational platforms were particularly effective at facilitating elder-to-youth traditional knowledge flow.

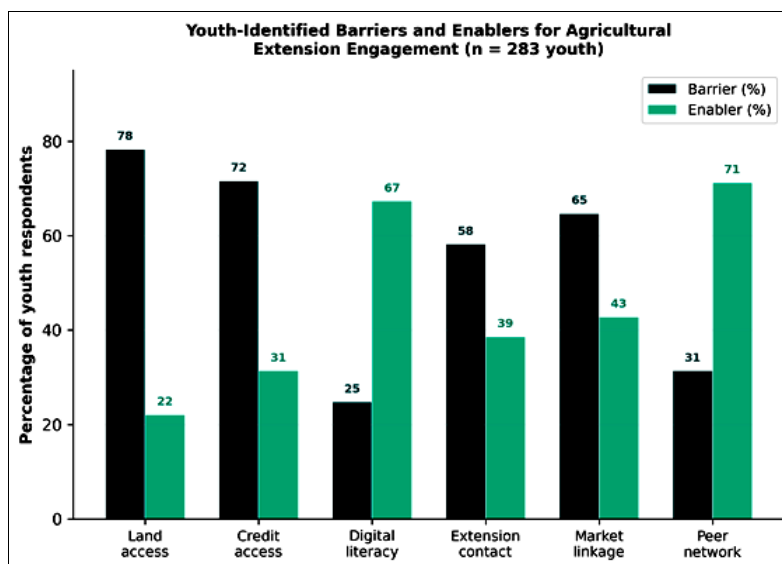


Fig 1: Youth-identified barriers and enablers for agricultural extension engagement (n = 283)

The bar chart reveals an asymmetric pattern: structural factors (land, credit, market) dominated as barriers, while social and skills-based factors (peer networks, digital literacy) dominated as enablers. Extension contact appeared

as both a barrier (58.2% lacked adequate contact) and a potential enabler (38.6% who had contact rated it positively).

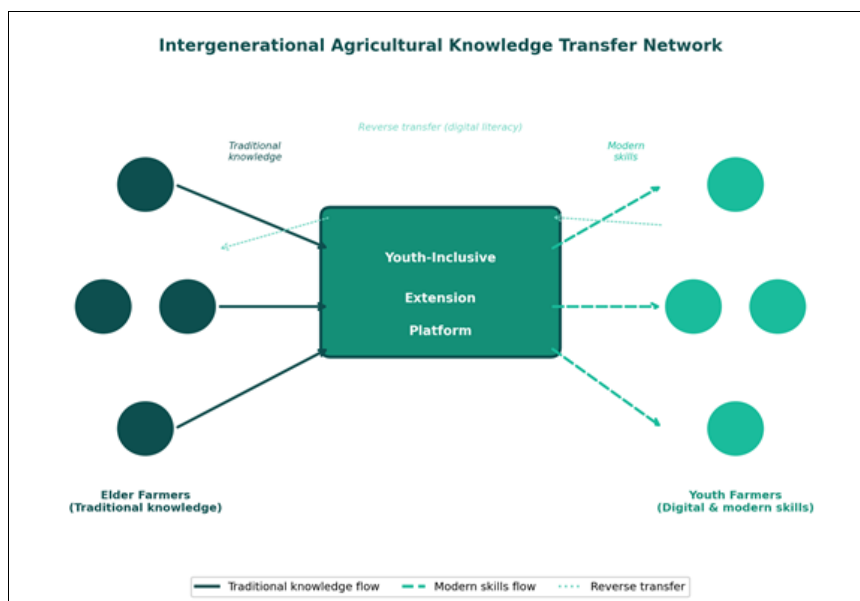


Fig 2: Intergenerational agricultural knowledge transfer network with youth-inclusive extension platform as bridging mechanism

The network model shows bidirectional knowledge flows mediated by youth-inclusive extension platforms. Traditional knowledge flows from elder to youth farmers (solid arrows), while modern digital and market skills flow from youth to elders (dashed arrows). The reverse transfer of digital literacy from youth to elders (dotted arrows) represents an underutilized pathway that youth-inclusive platforms can activate.

Comprehensive Interpretation

The 2.4-fold difference in knowledge transfer scores between youth-inclusive and conventional communities indicates that platform design substantially influences intergenerational exchange. The bidirectional nature of transfer is critical: youth bring digital skills and market knowledge, while elders contribute traditional agronomic and ecological understanding. Neither generation holds a complete knowledge set, making structured exchange platforms essential rather than optional.

Discussion

The dominance of structural barriers (land and credit) over informational barriers echoes findings from Sumberg and colleagues^[8] showing that youth engagement in agriculture is constrained less by knowledge gaps than by asset access. Extension services alone cannot resolve land tenure or credit constraints, but they can design programs that help youth navigate these barriers through collective farming models, lease arrangements, and linkages to youth agricultural financing schemes^[9].

The effectiveness of youth-inclusive platforms in facilitating traditional knowledge transfer is particularly significant given concerns about the loss of indigenous agricultural knowledge^[10]. Elder farmers in focus groups expressed that

they had few structured opportunities to share accumulated knowledge with younger generations, and that extension meetings dominated by technical content left little space for traditional knowledge exchange. Youth-inclusive platforms that deliberately create intergenerational dialogue around both modern and traditional practices address this gap^[11].

Future Directions

Longitudinal tracking of youth-inclusive extension participants would determine whether early engagement translates into sustained agricultural careers. Research on digital platforms that facilitate remote intergenerational mentoring could extend the model to youth who have migrated to urban areas but retain interest in agricultural investment. Comparative research across different Ethiopian regions and other East African countries would test whether the bidirectional transfer model generalizes beyond the Amhara and Oromia contexts examined here.

Limitations

The cross-sectional design cannot establish causality between youth-inclusive platforms and higher transfer scores. Self-selection into youth-inclusive communities may bias comparisons. Self-reported knowledge transfer may not accurately reflect actual knowledge acquisition. The two-region sample may not represent conditions in pastoral or urban-peripheral farming systems elsewhere in Ethiopia.

Conclusion

This research demonstrated that youth-inclusive extension strategies significantly enhance intergenerational agricultural knowledge transfer. Communities with dedicated platforms showed 2.4 times higher transfer scores across all knowledge dimensions. The bidirectional transfer

model recognizes that both elder and youth farmers hold essential knowledge for sustainable agriculture, and that structured exchange platforms are necessary to connect these complementary knowledge bases. Addressing structural barriers to youth engagement, particularly land and credit access, remains essential for translating knowledge transfer into sustained agricultural participation among young farmers.

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