







## Not a Decline but a Constraint: An analysis of youth agricultural engagement in Malawi using nationally representative data

Sylvia David Kachola<sup>a,d,\*</sup> , Donald Makoka<sup>b</sup> , Loveness Gloria Phiri<sup>c</sup> ,  
Christopher Chombo<sup>d</sup> 

<sup>a</sup> The French Institute for Demography Studies (INED), European Doctoral School of Demography, Aubervilliers, Paris, France

<sup>b</sup> Makoka and Associates, Research and Development Policy, P.O. Box 750, Lilongwe, Malawi

<sup>c</sup> Department of Agricultural Economics and Agribusiness Management, Egerton University, P.O. Box 536–20115, Nakuru, Kenya

<sup>d</sup> Department of Economics, University of Malawi, P. O. Box 280, Malawi

### ARTICLE INFO

#### Keywords:

Youth livelihoods  
Agricultural engagement  
Structural constraints  
Land access  
Extension services  
Malawi

### ABSTRACT

Youth engagement in agriculture is often described as declining, yet evidence from many parts of the Global South shows that participation is shaped more by structural constraints than by a lack of interest. This study examines the determinants of Malawian youth agricultural engagement using four waves of nationally representative data from the Malawi Integrated Household Panel Survey for 2010, 2013, 2016 and 2019. Youth participation is classified into three categories based on their involvement -crop production, livestock production, or both. A multinomial logit model is used to analyse how individual characteristics, household conditions, and access to agricultural support systems shape these forms of engagement. The results show that youth agricultural participation is strongly associated with access to land, extension services, and farm implements. These factors have the largest marginal effects across all model specifications. Higher levels of education correspond with lower probabilities of engagement, while age and marital status show positive associations. Predicted probabilities indicate modest changes over time, with a gradual shift from diversified to more specialized participation. The findings contribute to rural studies debates by showing that youth engagement in agriculture is shaped by structural and institutional conditions rather than by disengagement. Policies that expand land access, strengthen extension services and improve access to basic agricultural tools may support more inclusive youth livelihoods.

### 1. Introduction

Across much of the Global South, agriculture remains central to rural livelihoods, employment, and food security despite ongoing economic diversification and the growth of nonfarm sectors. While its share of global employment has declined over time, many rural households in developing countries continue to depend on smallholder farming as a key source of income and resilience (De La O Campos et al., 2023; FAO, 2024; IFAD, 2024). In many low- and middle-income countries, rapid population growth and youthful demographics have intensified pressure on rural livelihood systems, as young people's economic prospects remain closely tied to opportunities within rural spaces and agrifood systems (Abay et al., 2021; NSO, 2019; Yeboah et al., 2020). These dynamics place youth at the centre of debates on agrarian transition,

livelihood reproduction, and the future of smallholder farming in the Global South (Girard, 2023; Sumberg et al., 2024).

A growing body of scholarship questions whether young people are disengaging from agriculture or whether their participation is shaped primarily by structural constraints. Some studies argue that youth increasingly perceive farming as physically demanding, low status, and insufficiently remunerative, which encourages aspirations for nonfarm work or migration (Asciutti et al., 2016; Berckmoes and White, 2016; Henning et al., 2022; LaRue et al., 2021). Other work challenges this narrative and shows that many young people remain interested in agriculture but face limited access to land, credit, extension services and productive assets, which constrains their ability to participate meaningfully in rural economies (Kabuli et al., 2024; Magagula and Tsvakirai, 2020). This distinction reflects a broader theoretical tension in rural

\* Corresponding author. The French Institute for Demography Studies (INED), European Doctoral School of Demography, Aubervilliers, Paris, France.

E-mail addresses: [sylvia.david-kachola@ined.fr](mailto:sylvia.david-kachola@ined.fr) (S.D. Kachola), [donmakoka@yahoo.co.uk](mailto:donmakoka@yahoo.co.uk) (D. Makoka), [lovenessmphiri@gmail.com](mailto:lovenessmphiri@gmail.com) (L.G. Phiri), [chombochristopher2@gmail.com](mailto:chombochristopher2@gmail.com) (C. Chombo).

<https://doi.org/10.1016/j.jrurstud.2026.104230>

Received 10 February 2026; Received in revised form 5 May 2026; Accepted 26 May 2026

Available online 8 June 2026

0743-0167/© 2026 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

studies over whether observed patterns represent a generational shift away from farming or a rational response to structural exclusion and precarious agrarian conditions (Sumberg et al., 2024; Yeboah et al., 2020).

These debates are especially relevant in regions where customary tenure systems, land fragmentation, and uneven institutional support through access to agricultural extension services and credit shape youth livelihood trajectories. In many parts of Sub Saharan Africa, young people face delayed or uncertain access to land, limited opportunities to accumulate productive assets and inconsistent support from agricultural institutions (Lindsjö et al., 2021; Zuka, 2019). Empirical studies from Malawi and other African countries show that youth often express interest in agricultural livelihoods but struggle to translate this interest into productive engagement because of structural constraints related to land, finance, technology and skills (Twumasi et al., 2019). Research on youth agripreneurship similarly highlights that weak support systems and limited institutional backing, rather than a lack of aspiration, underpin low levels of engagement in agricultural enterprises (Kabuli et al., 2024; Magagula and Tsvakirai, 2020; Mukwedeya and Mudhara, 2024).

Despite this growing literature, empirical evidence remains fragmented. Much existing research relies on local case studies, cross sectional surveys or programme specific samples, which limits the ability to generalize findings or assess trends over time (Amegnaglo et al., 2024; Henning et al., 2022; Twumasi et al., 2019). Few studies track how youth agricultural engagement evolves across multiple years or examine how individual characteristics interact with structural constraints to shape participation using nationally representative data (Girard, 2023; Sumberg et al., 2024). Without longitudinal and nationally representative evidence, it remains difficult to determine whether observed patterns reflect genuine disengagement, cyclical labour market adjustments or the accumulated effects of structural exclusion.

This study contributes to these debates by analysing nationally representative data from four waves of the Malawi Integrated Household Panel Survey (IHPS) for 2010, 2013, 2016 and 2019. Malawi provides the empirical setting, but the conceptual focus speaks to broader questions in rural studies about how structural constraints shape youth engagement in smallholder agriculture. By distinguishing between participation in crop production, livestock production, both or neither, the analysis offers a detailed assessment of youth agricultural engagement over a decade. The study incorporates key dimensions of structural access, including landholding size, extension services, credit and farm implements, to examine how institutional and resource based constraints shape youth participation. Rather than interpreting nonparticipation as evidence of disengagement, the study tests the idea that structural constraints are the primary factors limiting youth involvement. In doing so, it situates Malawi within wider debates on rural transformation, youth livelihoods and the reproduction of smallholder farming systems across Sub Saharan Africa (Sumberg et al., 2024; Yeboah et al., 2020).

## 2. Literature review

A growing body of literature identifies multiple and interrelated factors influencing youth engagement in agriculture, particularly in developing countries such as Malawi. These determinants are commonly grouped into economic, human capital, institutional and sociocultural dimensions. Across these domains, limited access to productive resources, especially land, credit and inputs, consistently emerges as one of the most significant constraints shaping youth participation. Empirical evidence across African contexts shows that resource access strongly determines youth engagement in agriculture. For example, studies by Giwu et al. (2024) in South Africa demonstrate that education, farming skills, social networks, and household income enhance youth participation, while limited access to land, finance, and credit, alongside

gender disparities, significantly restrict engagement. Similarly (Twumasi et al., 2019), show that access to land and credit, perceived input costs, and education strongly influence youth participation in Ghana, although high input prices and male gender reduce participation intensity. Comparative studies across Ghana, Nigeria, Kenya, and Benin further confirm that access to credit, extension services, and farm inputs significantly improves both participation and productivity outcomes (Amegnaglo et al., 2024; Ankrah Twumasi et al., 2020; Ouko et al., 2022).

Institutional and policy-related factors also play a central role. Adeyanju et al. (2021) find that youth participation in agricultural programmes in Nigeria is positively influenced by age, education, migration status, training perceptions, and mental health, while formal employment reduces participation. Similarly, Osabohien and Al-Faryan (2025) show that gender, education, land ownership, income, social protection, and value chain participation significantly determine youth engagement. These studies collectively highlight the importance of institutional support systems including extension services, training programmes, and cooperative structures in shaping youth decisions to engage in agriculture.

Human capital development, particularly education, is another key determinant of youth participation. Higher educational attainment enhances youths' ability to apply theoretical knowledge in practical farming contexts, solve production challenges, and adopt improved technologies (Boye et al., 2024; Haryati et al., 2024; Nemanzamba et al., 2025; Nnadi and Akwivu, 2008; Osabohien, 2024; Tshabalala et al., 2025). This, in turn, improves productivity and resource allocation efficiency within agricultural value chains (Chibuzo et al., 2025; Nyberg et al., 2025; Sunam et al., 2025). However, despite these advantages, evidence suggests that educated youth often prefer service-sector employment due to perceived income stability and the urban concentration of opportunities (Henning et al., 2022). This highlights a persistent structural tension between agricultural potential and labour market preferences.

Socio-cultural perceptions also strongly shape youth engagement in agriculture. Studies across Africa consistently show that agriculture is often perceived as labour-intensive, low-status, and financially unattractive, leading many young people to view it as a "last resort" livelihood (Asciutti et al., 2016; Berckmoes and White, 2016; Tsitsi et al., 2020). Evidence from Tanzania and other contexts reinforces perceptions of low profitability and high physical demand as key deterrents (Daudu et al., 2023; Magagula and Tsvakirai, 2020; Zulu et al., 2023). Nevertheless, contrasting findings indicate that in contexts with limited non-farm opportunities, agriculture remains an accessible and necessary livelihood option for rural youth (Matabwa and Umar, 2021). These mixed perceptions suggest that youth attitudes toward agriculture are highly context-dependent and shaped by broader labour market conditions.

Gender and socio-demographic characteristics further influence youth participation. Evidence consistently shows that young men have greater access to land, credit, and productive resources, while young women face structural constraints linked to social norms, domestic responsibilities, and limited asset ownership (Girei et al., 2016; Harb et al., 2024; Kote et al., 2024). These inequalities are reinforced by intersecting factors such as education, location, and household structure, which jointly shape access to agricultural opportunities (Kamuzora, 2025; Osabohien, 2024). Household income, marital status, age, and dependency ratios also significantly affect youth engagement decisions. For example, Ng'Atigwa et al. (2022) find that farm income positively influences youth-headed households' participation in Tanzania, while Bello (2025) identifies education, household size, and parental occupation as significant determinants in Nigeria.

Additional evidence shows that age, farming experience, income, and social networks enhance youth willingness to engage in agriculture (Etim and Udoh, 2018), while gender, education, training participation, and marital status shape participation decisions (Fawole and Ozkan,

2019). These findings collectively reinforce the importance of socio-economic and demographic heterogeneity in understanding youth engagement.

Extension services and land access remain critical structural determinants. Evidence from Chibuzo et al. (2025), Nyang'au and Maobe (2025), and Nyberg et al. (2025) shows that inadequate extension services, limited access to land and credit, high input costs, and low profitability perceptions discourage youth participation. Conversely, access to training, finance, inputs, and social support enhances agribusiness engagement across Africa (Boye et al., 2024). Land tenure security also significantly increases youth participation, as shown by Msangi et al. (2024), where titled land ownership increases time allocated to farming. Similar patterns are observed across Nepal, South Africa, and other African contexts (Nemanzamba et al., 2025; Sunam et al., 2025).

Despite the breadth of existing literature, evidence from Malawi remains limited and geographically fragmented. Most studies rely on district-level surveys, qualitative approaches, or programme-specific samples, limiting generalisability and understanding of national-level dynamics (Kabuli et al., 2024; Tsitsi et al., 2020). Moreover, there is limited empirical work that simultaneously examines crop and livestock participation or tracks youth engagement over time using multi-wave panel data. Existing studies also tend to focus narrowly on specific value chains or entrepreneurial outcomes rather than broader measures of agricultural participation, while nationally representative analyses rarely disaggregate by type or intensity of engagement.

Against this backdrop, this study addresses these gaps by utilising harmonized, nationally representative data from four waves of the IHPS to examine the determinants of youth agricultural engagement in Malawi over a ten-year period. By distinguishing between crop, livestock, and diversified participation, the study provides a more nuanced and comprehensive understanding of youth involvement in agriculture within evolving institutional, socio-economic, and spatial contexts.

### 3. Methodology

#### 3.1. Data

This study draws on four waves of the Malawi Integrated Household Panel Survey collected in 2010, 2013, 2016, and 2019. While the survey follows households over time, the composition of the youth sample changes across waves as individuals age into or out of the youth category, migrate, or are lost to follow-up. Consequently, the analysis treats the data as repeated cross-sections rather than a balanced panel. This approach preserves sample representativeness and allows for meaningful comparison of youth agricultural participation patterns across survey years (Verbeek, 2008; Verbeek and Vella, 2005). The sample sizes were 3256 in 2010; 4483 in 2013; 4909 in 2016; and 7292 in 2019.

All analyses account for the complex survey design of the Malawi IHPS by applying sampling weights, primary sampling units, and stratification variables. Sampling weights adjust for unequal probabilities of selection and nonresponse, while clustering and stratification corrections improve the accuracy of standard errors and population estimates. These procedures follow the survey design guidelines provided in the documentation for each IHS wave and are consistent with the overall framework outlined in the most recent survey documentation (NSO, 2020, 2017, 2014, 2012).

#### 3.2. Outcome variable: youth agricultural engagement

Youth agricultural engagement is measured using a mutually exclusive categorical variable that combines information on crop production and livestock ownership. Both components are linked directly to each youth, based on the plots they worked on and the livestock they personally owned. Youth are classified into three categories. The first captures participation in both crop and livestock production. The second captures participation in only one activity, either crop or livestock. The

third captures youth who do not participate in any agricultural activity.

$$AgriCategory_{it} = \begin{cases} 1 & \text{both crop and livestock production} \\ 2 & \text{only one activity (crop or livestock)} \\ 3 & \text{no agricultural participation} \end{cases}$$

The third category serves as the reference outcome in the multinomial logit model.

#### 3.3. Covariates

The selection of explanatory variables was informed by prior literature on youth participation in agriculture and rural livelihood decisions (Giwu et al., 2024; Mukwedeya and Mudhara, 2024; Nemanzamba et al., 2025; Nnadi and Akwiwu, 2008; Tsitsi et al., 2020; Twumasi et al., 2019). Variables were taken from the individual level and household level modules of the survey. Youth were identified through the household roster, and all individuals aged eighteen to thirty five were included. Individual level variables include age, sex, marital status, education, access to credit, livestock ownership, access to extension services, crop production and landholding size. Household level variables include household size, place of residence and access to farm implements. Landholding size reflects the cultivated area assigned to each youth and was winsorized at the first and ninety ninth percentiles to limit extreme values (Dixon, 1960). The model includes indicators for survey year with 2010 as the reference category. Sex is coded with females as the reference group, and marital status with married youth as the reference category. Education is grouped into none, primary school leaving certificate, secondary and tertiary. Household level and access related variables are coded as simple yes or no indicators. Table 1 summarises all variables.

**Table 1**  
Description of variables used in the analysis.

Variable	Description	Measurement (Final Coding)
Age	Age of the youth	Continuous (years)
Sex	Biological sex of the youth	1 = Male; 2 = Female
Marital status	Current marital status	1 = Married; 2 = Separated/Divorced/Widowed; 3 = Never married
Education level	Highest level of formal education attained	1 = None; 2 = Primary; 3 = Secondary; 4 = Tertiary
Household size	Number of individuals living in the household	Continuous
Residence	Urban or rural location	1 = Urban; 2 = Rural
Access to credit	Youth-specific access to credit or loans	0 = No; 1 = Yes
Access to livestock	Youth-specific access to livestock ownership or management	0 = No; 1 = Yes
Access to extension services	Youth-specific indicator of receiving agricultural advice or information	0 = No; 1 = Yes
Access to farm implements	Access to implements refers to ownership of essential agricultural tools such as hoes, axes, sprayers, treadle pumps or ox drawn ploughs	0 = No; 1 = Yes
Crop production	Whether the youth is linked to any crop grown on plots they worked on	0 = No; 1 = Yes
Landholding size	Total cultivated land area assigned to each youth	Continuous (acres)
Survey year	IHPS survey wave	2010, 2013, 2016, 2019
Agricultural engagement category	Youth participation in crop and livestock production	1 = Both crop & livestock; 2 = Either crop or livestock; 3 = Neither

### 3.4. Multinomial logit model

Following previous studies (Akrong and Kotu, 2022; Ray et al., 2022; Samaraweera et al., 2022), this paper likewise examines youth engagement in agriculture using a multinomial logit model. Specifically, the model estimates the probability of participation across three categories: crop production, livestock production, or no agricultural activity, such that the likelihood of each outcome, conditional on individual characteristics, is expressed as:

$$P(Y_{it} = j | X_{it}) = \frac{\exp(X_{it}\beta_j)}{1 + \sum_{k=1}^2 \exp(X_{it}\beta_k)}, j = 1, 2$$

The log-odds of selecting a particular activity relative to no agricultural activity is:

$$\ln \frac{P(Y_{it} = j)}{P(Y_{it} = \text{No Agri})} = X_{it}\beta_j$$

This framework captures the influence of characteristics such as education, sex, and survey year on youth participation in different agricultural activities.

#### 3.4.1. Interactions and robustness

Interactions between survey year and individual characteristics capture changes in agricultural participation over time. Marginal effects are used to show how predicted probabilities vary for education, sex and access to extension services across survey years. Robustness is assessed using a binary logistic regression in which agricultural engagement is defined as participation in either crop or livestock production. Survey weights ensure national representativeness, and standard errors are clustered at the individual level. The robustness results are consistent with the multinomial model and confirm the stability of the main findings.

### 3.5. Gender considerations

This study uses self-reported sex of respondents as collected in the survey data. While the analysis examines differences between male and female youth, the data do not allow for a more nuanced examination of gender identities or intra-household power dynamics. Findings related to gender should therefore be interpreted within these data limitations.

## 4. Results

### 4.1. Trends in Youth Access to credit and extension services (2010–2019)

Youth access to credit and extension services in Malawi showed noticeable fluctuations between 2010 and 2019 rather than steady improvement as shown in Fig. 1. Credit access among males increased from 9.5 percent in 2010 to 13.3 percent in 2013, then declined slightly to 12.1 percent by 2019, while female access rose from 1.3 percent to 6.5 percent over the same early period before falling to 5.5 percent in 2019. Extension access followed a similar rise-and-fall pattern: male access increased from 30.1 percent in 2010 to 38.5 percent in 2013 before dropping to 24.8 percent in 2019, and female access rose sharply from 15.1 percent to 42.1 percent between 2010 and 2013, then declined to 35.7 percent by 2019. This fluctuation may reflect broader institutional challenges within Malawi’s agricultural advisory system, including underfunding of public extension services, heavy budget prioritization toward input subsidies, staffing shortages, transport constraints, and reliance on short-term donor programs that create inconsistent service delivery over time (Ragasa, 2018; Ragasa et al., 2024).

### 4.2. Land Size Distribution among Youth Farmers by sex

Youth landholding patterns show that both male and female farmers cultivated relatively small plots, with mean plot sizes remaining low

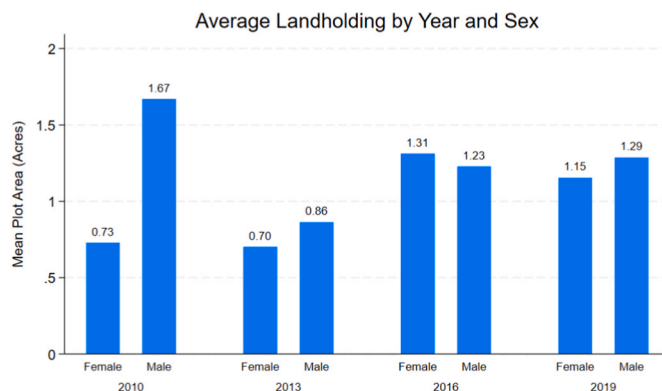


Fig. 2. Land size distribution among youth farmers by sex.

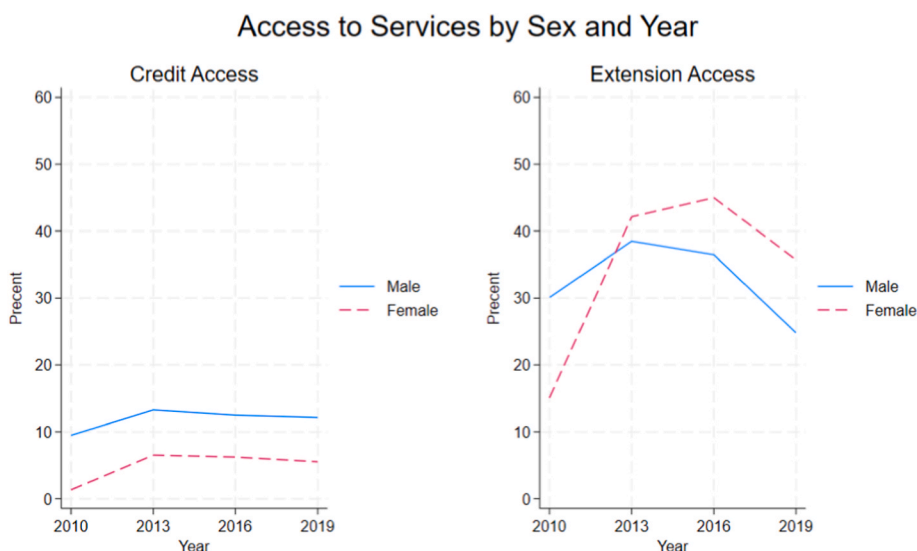


Fig. 1. Trends in youth access to credit and extension services (2010–2019).

across all survey years as shown in Fig. 2. Among males, the average cultivated area declined from 1.67 ha in 2010 to 0.86 ha in 2013, then rose modestly to 1.29 ha by 2019. Female youth cultivated even smaller plots in 2010 at 0.73 ha, with a slight decline in 2013 followed by an increase to 1.31 ha in 2016 and 1.15 ha in 2019.

4.2.1. Patterns of youth agricultural engagement across years, sex, education, and service access

Table 2 shows that youth agricultural engagement differs across years, sex, education, and access to services. The share of youth engaged in both crop and livestock activities fell from 15.5 percent in 2010 to 11.4 percent in 2019, while those engaged in either activity increased from 42.9 percent to 48.1 percent. Males were more likely to engage in both activities at 24.0 percent compared with 5.7 percent among females, who had 56.9 percent in the either category. Engagement declined with higher education, dropping from 14.9 percent among youth with no schooling to 2.7 percent among those with tertiary education, who had 80.6 percent in the neither category. Access to services was strongly linked to participation, as 41.3 percent of youth with credit access and 22.5 percent of those with extension access engaged in both activities, compared with 11.1 percent and 8.8 percent among those without access. All associations are statistically significant at  $p < 0.001$ .

4.3. Determinants of youth agricultural engagement

Descriptive patterns show a gradual decline in diversified agricultural engagement, from 15.5 percent in 2010 to 11.4 percent in 2019. The multinomial regression confirms this trend (as shown in Table 3). Relative to 2010, the probability of participating in both crop and livestock production decreased by 1.8 percentage points in 2013 and by 3.6 percentage points in 2019. The effect for 2016 was small and not statistically significant. Participation in either crop or livestock production remained relatively stable once covariates were controlled, despite an increase from 42.9 percent to 48.1 percent in the descriptive statistics.

Age is positively associated with agricultural engagement. Each additional year increases the probability of diversified participation by 0.5 percentage points and increases the probability of participating in either activity by 0.8 percentage points. Gender differences are pronounced. Twenty four percent of male youth engage in both crop and livestock production compared to 5.7 percent of female youth. The regression results show that being male reduces the probability of diversified engagement by 19.0 percentage points but increases the probability of participating in either activity by 22.4 percentage points.

Marital status is strongly linked to agricultural involvement. Separated or widowed youth are 9.2 percentage points more likely to participate in both activities, while never married youth are 13.8 percentage points less likely to do so. For participation in either crop or livestock production, separated or widowed youth are 10.7 percentage points less likely, and never married youth are 21.9 percentage points less likely than married youth. This may reflect differences in household labour availability and livelihood responsibilities. In Malawi, small-holder agriculture remains labour-intensive, and married households often have greater access to family labour and productive assets, whereas never-married youth may face labour constraints and may also delay full engagement in farming while pursuing education or nonfarm opportunities.

Education shows a clear negative gradient. Youth with tertiary education have a diversified engagement rate of only 2.7 percent compared to 14.9 percent among those with no education. The regression results indicate that tertiary education reduces the probability of diversified engagement by 7.2 percentage points and reduces the probability of partial engagement by 13.7 percentage points. Secondary education also reduces participation, although the effects are smaller.

Household and contextual factors also matter. Household size slightly reduces agricultural engagement, particularly partial participation, where the marginal effect is a reduction of 2.8 percentage points. Rural residence strongly increases the probability of diversified engagement by 19.0 percentage points, although its effect on partial engagement is small and not statistically significant.

Access to agricultural resources and services is among the strongest set of predictors. Access to credit increases the probability of diversified engagement by 8.9 percentage points. Access to farm implements increases this probability by 31.9 percentage points, which is the largest marginal effect in the model. Access to extension services increases the probability of diversified engagement by 5.6 percentage points and increases the probability of partial engagement by 9.3 percentage points. These findings highlight the central role of agricultural support systems in shaping youth participation.

The robustness check using a logit model shows results that closely match the main multinomial findings (as shown in Appendix). Youth were slightly less likely to participate in agriculture in 2013 and 2016 compared to 2010, while the effect for 2019 was small. Age and being male increased the likelihood of participation, while being married and having higher education reduced it. Larger households were also less likely to engage. In contrast, urban residence and access to credit, farm implements, and extension services strongly increased the probability of agricultural participation. These consistent patterns confirm that the

Table 2  
Survey weighted distribution of youth agricultural engagement (%).

Predictor	Category	Both Crop & Livestock (%)	Either Crop or Livestock (%)	Neither (%)	Design-Based F(df)	p-value
Year	2010	15.5	42.9	41.6	F(5.24, 35,798.77)	0.0158
	2013	14.8	42.3	42.9		
	2016	14.3	42.8	42.9		
	2019	11.4	48.1	40.5		
	Total	13.5	44.7	41.8		
Sex	Male	24.0	28.1	47.9	F(1.85, 12,631.17)	0.0000
	Female	5.7	56.9	37.3		
	Total	13.5	44.7	41.8		
Education	None	14.9	50.1	35.0	F(4.84, 31,532.14)	0.0000
	PSLC	13.9	40.2	46.0		
	Secondary	11.3	32.8	55.9		
	Tertiary	2.7	16.7	80.6		
Credit Access	Total	13.8	44.5	41.7	F(1.59, 10,827.77)	0.0000
	No	11.1	44.8	44.1		
	Yes	41.3	42.7	16.0		
Extension Access	Total	13.5	44.7	41.8	F(1.69, 11,548.51)	0.0000
	No	8.8	37.5	53.7		
	Yes	22.5	58.5	19.0		
	Total	13.5	44.7	41.8		

Note: (Column percentages; rows sum to 100% within each subgroup).

**Table 3**  
Determinants of youth agricultural engagement (multinomial logit & marginal effects).

Variable	Both crop & livestock		Either crop/livestock	
	Coef (SE)	dy/dx (SE)	Coef (SE)	dy/dx (SE)
<b>Year (ref = 2010)</b>				
2013	-0.357 (0.181)**	-0.018 (0.017)	-0.228 (0.101)**	-0.020 (0.021)
2016	-0.182 (0.178)	-0.009 (0.017)	-0.127 (0.100)	-0.012 (0.021)
2019	-0.410 (0.178)**	-0.036 (0.017)**	0.003 (0.087)	0.026 (0.019)
<b>Age (years)</b>	0.117 (0.015)***	0.005 (0.001)***	0.081 (0.008)***	0.008 (0.002)***
<b>Male (ref = female)</b>	-1.745 (0.151)***	-0.190 (0.011)***	0.634 (0.081)***	0.224 (0.013)***
<b>Marital status (ref = married)</b>				
Separated/widowed	0.597 (0.203)**	0.092 (0.025)***	-0.320 (0.124)**	-0.107 (0.025)***
Never married	-3.820 (0.377)***	-0.138 (0.009)***	-1.680 (0.128)***	-0.219 (0.024)***
<b>Education (ref = none)</b>				
PSLC	0.075 (0.178)	0.017 (0.016)	-0.163 (0.103)	-0.035 (0.019)
Secondary	-0.346 (0.164)**	-0.015 (0.013)	-0.239 (0.097)**	-0.024 (0.018)
Tertiary	-1.772 (0.539)***	-0.072 (0.027)**	-1.170 (0.226)***	-0.137 (0.039)***
<b>Household size</b>	-0.097 (0.035)**	0.003 (0.003)	-0.182 (0.022)***	-0.028 (0.004)***
<b>Urban (ref = rural)</b>	2.997 (0.260)***	0.190 (0.023)***	1.147 (0.098)***	0.029 (0.023)
<b>Credit access</b>	1.524 (0.187)***	0.089 (0.016)***	0.696 (0.128)***	0.035 (0.023)
<b>Implements access</b>	5.062 (0.806)***	0.319 (0.071)***	1.955 (0.190)***	0.051 (0.059)
<b>Extension access</b>	1.314 (0.130)***	0.056 (0.010)***	0.941 (0.075)***	0.093 (0.014)***
Observations	18,501			
Population size	40,372,509			
Base outcome	Neither crop nor livestock			
Design df	6516			
F(30, 6487)	60.43			
Prob > F	0.0000			
Number of strata	6			
Number of PSUs	6522			

Note: \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.10. Survey-weighted estimates (svy: logit).

main results are stable.

4.4. Predicted Probabilities of Youth Agricultural Engagement by year

Youth engagement changed only slightly over time. The probability of taking part in both crop and livestock production fell from about 16 percent in 2010 to 12 percent in 2019 (Fig. 3). Participation in either crop or livestock stayed the most common form of engagement, ranging from about 42 to 47 percent across the years and reaching its highest

level in 2019. Nonparticipation remained fairly stable, staying between 40 and 44 percent. Overall, these results show that youth gradually moved away from doing both activities together and shifted more toward single activity farming.

4.5. Predicted Probabilities of Youth Agricultural Engagement by Year and Sex

Male and female youth show different patterns of agricultural

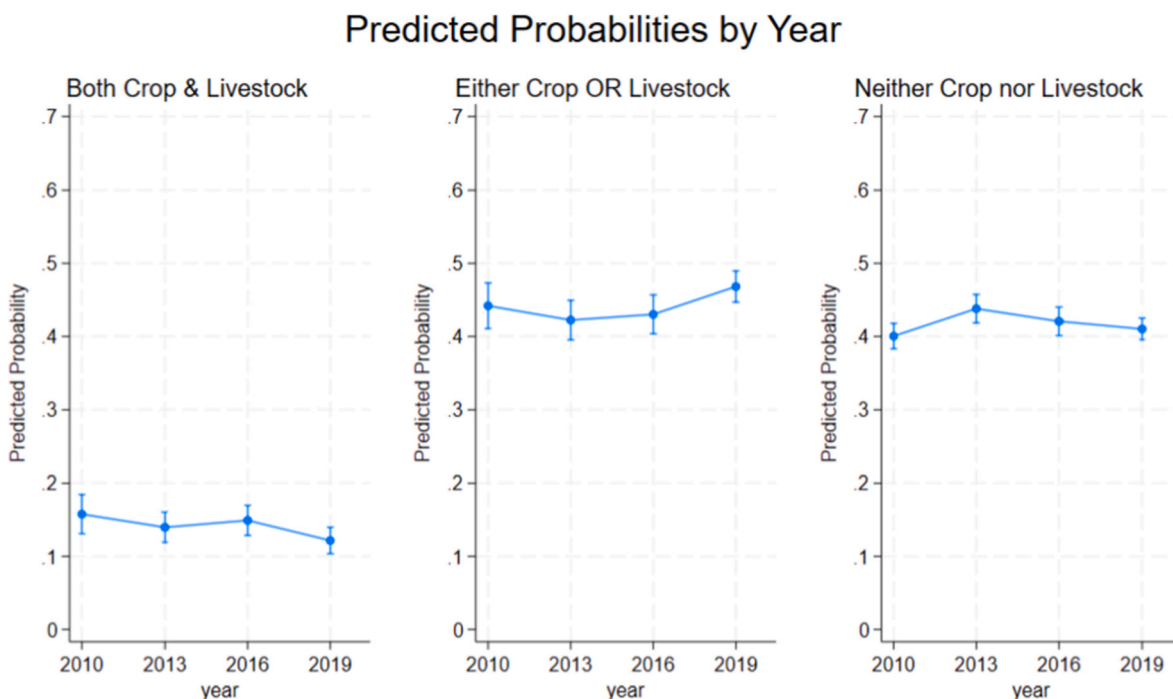


Fig. 3. Predicted probabilities of youth agricultural engagement by year (2010–2019).

engagement over time as illustrated in Fig. 4. For participation in both crop and livestock production, male youth consistently have higher predicted probabilities, ranging from about 29.8 percent in 2010 to 24.9 percent in 2019, while female youth remain much lower, ranging from about 6.9 percent in 2010 to 4.0 percent in 2019. For participation in either crop or livestock production, female youth show the highest probabilities across all years, increasing from about 54.3 percent in 2010 to 58.0 percent in 2019, while male youth range between 27 and 32 percent. Nonparticipation remains relatively stable for both groups, with male youth ranging from about 40.9 to 44.7 percent and female youth ranging from about 38.9 to 42.3 percent.

4.6. Predicted Probabilities of Youth Agricultural Engagement by Year and Education Level

Youth with no education, primary education, and secondary education show broadly similar and stable patterns of agricultural engagement over time (Fig. 5). Their predicted probabilities of participating in both crop and livestock production remain between about 12 and 18 percent across all survey waves. In contrast, youth with tertiary education consistently have the lowest probabilities of diversified engagement, ranging from about 7.9 percent in 2010 to 5.7 percent in 2019. For participation in either crop or livestock production, youth with no education, primary or secondary education maintain relatively high probabilities, generally between 40 and 48 percent, while tertiary-educated youth remain much lower, between about 30 and 34 percent. Nonparticipation is highest among tertiary-educated youth, remaining above 59 percent in all years, while the other education groups remain between about 38 and 47 percent.

4.7. Predicted Probabilities of Youth Agricultural Engagement by Year and Access to extension services

Youth with access to extension services consistently show higher probabilities of agricultural engagement than those without access (Fig. 6). For participation in both crop and livestock production, youth with extension access have predicted probabilities between about 19 and 21 percent from 2010 to 2016, compared to about 9 to 13 percent

among those without access. By 2019, the probability for youth with extension access declines to about 12 percent but still remains slightly higher than the 11.7 percent observed among those without access. For participation in either crop or livestock production, youth with extension access maintain higher probabilities across all years, ranging from about 46 to 56 percent, while those without access remain between about 41 and 43 percent.

5. Discussion

The results of this study show that youth agricultural engagement is shaped primarily by structural and institutional conditions rather than by declining interest in farming. Across all model specifications, landholding size, access to extension services, and access to farm implements emerge as the strongest predictors of participation in both crop and livestock production. This pattern reinforces a wide body of African evidence demonstrating that youth engagement is fundamentally constrained by the resources and opportunities available to them rather than by attitudinal disengagement (Bezu and Holden, 2014; Proctor and Lucchesi, 2012; Sumberg et al., 2024; White, 2012). The magnitude of the landholding in particular underscores the importance of land access as a structural condition that shapes the ability of young people to participate meaningfully in agriculture. Similar findings have been documented across Ethiopia, Kenya, Malawi and Zambia, where land scarcity and delayed intergenerational transfer remain major barriers for rural youth (Yeboah et al., 2020).

Extension access also shows a strong association with diversified agricultural participation. Youth who received extension services had substantially higher predicted probabilities of engaging in both crop and livestock production. This aligns with evidence from Malawi, Ghana, Nigeria and Benin showing that extension services improve youth participation, enhance productivity and reduce uncertainty in agricultural decision-making (Davis et al., 2012; Ragasa and Mazunda, 2018). In contexts where extension coverage remains limited, the strength of this association highlights the importance of technical support in enabling youth to participate in agriculture. Access to farm implements shows a similar pattern. Youth in households with basic agricultural tools are more likely to participate in multiple agricultural activities,

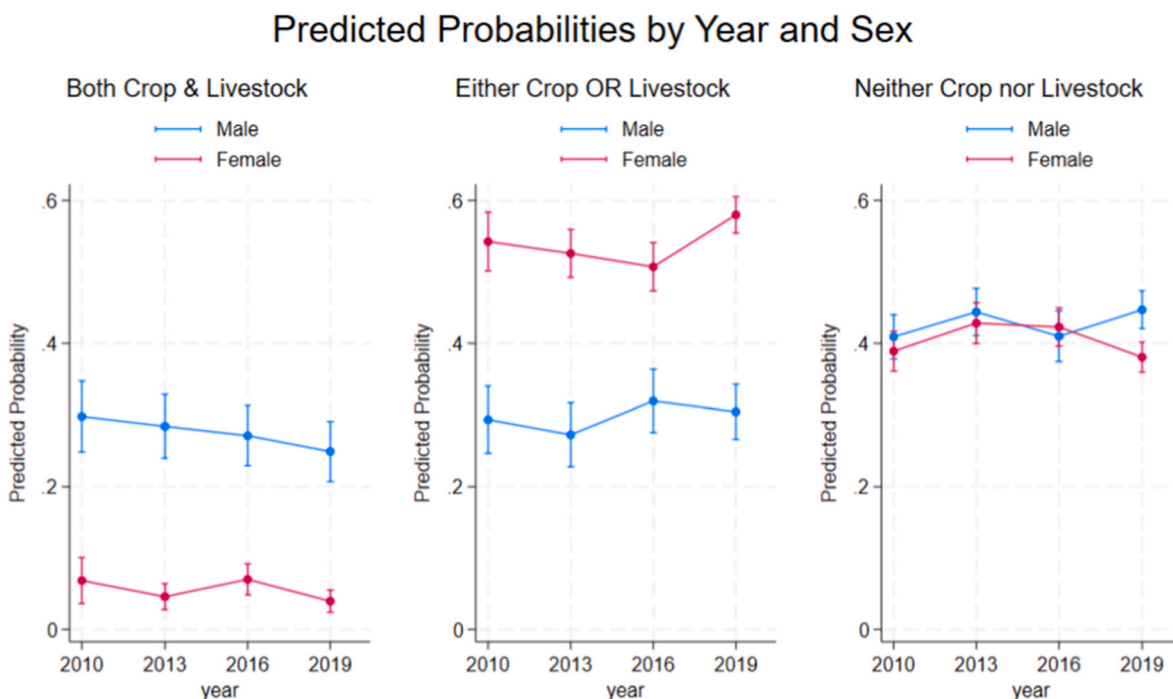


Fig. 4. Predicted probabilities of youth agricultural engagement by year and sex.

### Predicted Probabilities by Year and Education Level

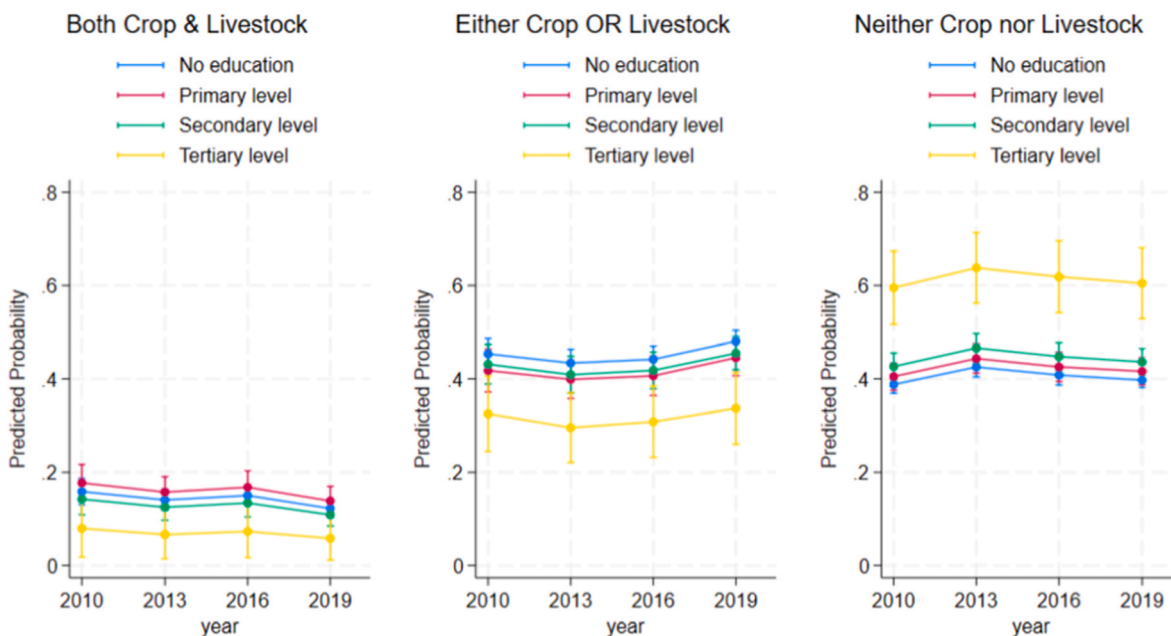


Fig. 5. Predicted probabilities of youth agricultural engagement by year and education level.

### Predicted Probabilities by Year and Extension Access

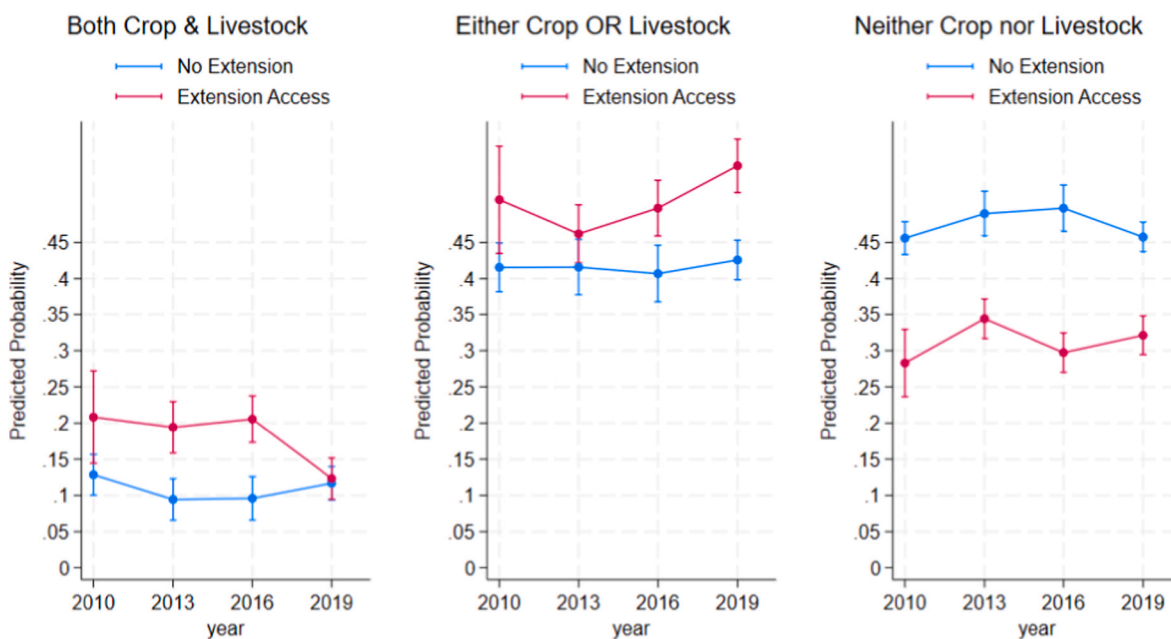


Fig. 6. Predicted Probabilities of Youth Agricultural Engagement by Year and Access to extension services.

consistent with research showing that labour-saving technologies reduce the physical burden of farming and increase youth willingness to engage (Daum and Birner, 2020; Diao et al., 2020; Sims and Kienzle, 2017).

Credit access shows a smaller but positive association with diversified participation. This reflects broader evidence that financial constraints limit youth entry into agriculture and agribusiness, even when interest is high. Many rural youth lack collateralizable assets altogether, as land and productive resources are often controlled by older household

members, while structural weaknesses in financial markets further exclude them from formal credit systems (Kumeh and Omulo, 2019; Simba et al., 2024; Yeboah et al., 2019).

Education shows a more complex pattern. Secondary and tertiary education are associated with lower probabilities of agricultural participation, consistent with studies showing that higher education often corresponds with aspirations for non-farm employment or urban migration (Tadele and Gella, 2012). However, the predicted probabilities indicate that the negative association between tertiary education

and agricultural engagement weakens over time. This may reflect the limited availability of formal employment opportunities for educated youth, a trend widely observed across African labour markets (Anyidoho et al., 2012; Cieslik et al., 2022). In such contexts, agriculture remains a fallback or complementary livelihood, even for educated young people.

Household characteristics also play a meaningful role. Larger households show higher predicted probabilities of diversified participation, likely reflecting greater labour availability and shared responsibilities within the household. Marital status shows a small positive association with agricultural engagement, echoing findings from Nigeria and Ethiopia that married youth tend to assume more stable livelihood roles, including farming (Bezu and Holden, 2008; Girei et al., 2016). This may also be attributed to increased household labour availability and access to shared productive resources within married or larger households. These associations highlight the importance of household-level dynamics in shaping youth livelihoods.

Although agriculture in Malawi is predominantly a rural activity, evidence shows that urban and peri-urban areas also support agricultural engagement among youth through diversified livelihood strategies, including small-scale crop production and livestock keeping in backyard gardens and small plots (Mkandawire et al., 2023; Mkwambisi et al., 2011). This engagement is partly driven by the contribution of urban agriculture to food security, income generation, and employment among low-income households (FAO, 2012; Mkwambisi et al., 2011). Urban areas also provide relatively better access to markets, input suppliers, and information networks, while peri-urban zones often enable land access through rental and borrowing arrangements, further facilitating agricultural participation among youth (Mkandawire et al., 2023; World Bank, 2019).

Taken together, the findings indicate that youth agricultural engagement is shaped by structural and institutional conditions rather than by a simple decline in interest in farming. The strong associations observed for landholding size, extension access and access to implements highlight the importance of resource availability and support systems in shaping youth participation. These results contribute to broader debates in rural studies by showing that youth engagement in agriculture is best understood as a function of the opportunities and constraints embedded within rural livelihood systems. The findings support the argument that youth are not disengaging from agriculture because they reject it, but because structural barriers limit their ability to participate in meaningful and productive ways (Sumberg et al., 2024).

## 6. Conclusion

This study provides a detailed assessment of youth agricultural engagement using harmonized data from four waves of the Malawi Integrated Household Panel Survey. The results show that youth participation in agriculture is closely associated with access to land, extension services and farm implements, while higher levels of education correspond with lower probabilities of engagement. Predicted probabilities indicate a modest increase in overall youth involvement between 2010 and 2019, accompanied by a shift from diversified to more specialized participation in later years. These patterns align with broader evidence from Sub Saharan Africa which shows that youth agricultural engagement is shaped by structural and institutional conditions rather than by declining interest in farming.

Although the analysis does not establish causal relationships, the consistency of the associations across model specifications highlights the importance of resource access and support systems in shaping youth participation. By identifying the conditions under which youth are more likely to engage in agriculture, the study contributes to ongoing discussions on youth's livelihoods and rural transformation. The findings underscore the relevance of policies that address land access, extension support, access to implements, and financial inclusion. Strengthening these areas may support more inclusive and sustainable livelihood opportunities for young people.

## 7. Limitations

Although this study provides robust evidence on the determinants of youth's agricultural engagement, several limitations should be acknowledged. While the Malawi Integrated Household Panel Survey offers rich data, some variables relevant to youth livelihoods are not consistently measured across the waves. This limits the ability to capture all dimensions of agricultural decision making. The analysis relies on self-reported measures of crop and livestock participation, which may be subject to reporting bias. While the multinomial model identifies associations between determinants and agricultural engagement, it does not establish causal relationships. Unobserved factors including motivation, risk preferences or social networks may influence both resource access and participation outcomes. Despite these limitations, the study offers valuable insights into the structural and institutional factors that shape youth agricultural engagement and provides a strong foundation for policy interventions aimed at strengthening youth livelihoods and promoting sustainable agricultural development.

## Declaration of generative AI and AI-assisted technologies

The authors used generative AI tools to assist with language editing and clarity during the preparation of this manuscript. The authors reviewed and edited all content and took full responsibility for the accuracy and integrity of the work.

## Funding Statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## CRedit authorship contribution statement

**Sylvia David Kachola:** Conceptualization, Formal analysis, Methodology, Writing – original draft. **Donald Makoka:** Conceptualization, Data curation, Methodology, Supervision, Writing – review & editing. **Loveness Gloria Phiri:** Writing – original draft, Writing – review & editing. **Christopher Chombo:** Data curation, Writing – review & editing.

## Declaration of competing interests

The author declares no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

## Appendix

## Appendix 1. Robustness Check: Determinants of Any Youth Agricultural Engagement (Logit Model)

Variable	Coef (SE)	dy/dx (SE)
Year 2013	-0.253 (0.091)***	-0.038 (0.014)***
Year 2016	-0.169 (0.089)*	-0.025 (0.013)*
Year 2019	-0.070 (0.079)	-0.010 (0.012)
Age	0.097 (0.008)***	0.015 (0.001)***
Sex (Male = 1)	0.330 (0.073)***	0.050 (0.011)***
Married	-0.850 (0.051)***	-0.128 (0.007)***
PSLC	-0.146 (0.097)	-0.022 (0.015)
Secondary	-0.282 (0.091)***	-0.044 (0.014)***
Tertiary	-1.317 (0.226)***	-0.218 (0.039)***
Household size	-0.173 (0.020)***	-0.026 (0.003)***
Residence (Urban = 1)	1.350 (0.098)***	0.203 (0.014)***
Credit access	1.061 (0.112)***	0.160 (0.017)***
Implements access	2.160 (0.195)***	0.325 (0.029)***
Extension access	1.023 (0.070)***	0.154 (0.010)***
Observations	18,501	
Population size	40,372,509	
Base outcome	Neither crop nor livestock	
Design df	6516	
F(14, 6503)	100.65	
Prob > F	0.0000	
Number of strata	6	

Note: \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.10. Survey-weighted estimates (svy: logit).

## Data availability

Research Link Provided.

<https://microdata.worldbank.org/e08738>

## References

- Abay, K.A., Asnake, W., Ayalew, H., Chamberlin, J., Sumberg, J., 2021. Landscapes of opportunity: patterns of young people's engagement with the rural economy in Sub-Saharan Africa. *J. Dev. Stud.* 57, 594–613. <https://doi.org/10.1080/00220388.2020.1808195>.
- Adeyanju, D., Mburu, J., Mignouna, D., 2021. Youth agricultural entrepreneurship: assessing the impact of agricultural training programmes on performance. *Sustainability* 13, 1697. <https://doi.org/10.3390/su13041697>.
- Akrong, R., Kotu, B.H., 2022. Economic analysis of youth participation in agripreneurship in Benin. *Heliyon* 8. <https://doi.org/10.1016/j.heliyon.2022.e08738>.
- Amegnaglo, C.J., Akpa, A.F., Adjimonti, G.O., Yessoufou, A.W., 2024. Do credit constraints affect non-farm entrepreneurship entry decisions of rural agricultural households in Benin? *Heliyon* 10. <https://doi.org/10.1016/j.heliyon.2024.e40900>.
- Ankrah Twumasi, M., Jiang, Y., Owusu Acheampong, M., 2020. Capital and credit constraints in the engagement of youth in Ghanaian agriculture. *Agric. Finance Rev.* 80, 22–37. <https://doi.org/10.1108/AFR-11-2018-0100>.
- Anyidoho, N.A., Leavy, J., Asenso-Okyere, K., 2012. Perceptions and aspirations. *IDS Bull.* 43, 20–32. <https://doi.org/10.1111/j.1759-5436.2012.00376.x>.
- Asciutti, E., Pont, A., Sumberg, J., 2016. Young People and Agriculture in Africa: a Review of Research Evidence and EU Documentation. Institute of Development Studies. <https://www.ids.ac.uk/publications/young-people-and-agriculture-in-africa-a-review-of-research-evidence-and-eu-documentation/>.
- Bello, L.O., 2025. Exploring the nexus between non-agricultural employment and rural youth welfare in Nigeria. *Discover Sustainability* 6, 114. <https://doi.org/10.1007/s43621-025-00897-4>.
- Berckmoes, L., White, B., 2016. Youth, farming and precarity in rural Burundi. In: Huijsmans, R. (Ed.), *Generationing Development*. Palgrave Macmillan, pp. 171–190. [https://doi.org/10.1057/978-1-137-55623-3\\_13](https://doi.org/10.1057/978-1-137-55623-3_13).
- Bezu, S., Holden, S., 2008. Can food-for-work encourage agricultural production? *Food Policy* 33, 541–549. <https://doi.org/10.1016/j.foodpol.2008.06.004>.
- Bezu, S., Holden, S., 2014. Are rural youth in Ethiopia abandoning agriculture? *World Dev.* 64, 259–272. <https://doi.org/10.1016/j.worlddev.2014.06.013>.
- Boye, M., Ghafoor, A., Wudil, A.H., Usman, M., Prus, P., Fehér, A., Sass, R., 2024. Youth engagement in agribusiness: perception, constraints, and skill training interventions in Africa: a systematic review. *Sustainability* 16, 1096. <https://doi.org/10.3390/su16031096>.
- Chibuzo, I., Ankrah, D.A., Ojomugbokenyode, E., Ibrahim, M., Susan, I., Ndidiamaka, E., David, O.A., 2025. Determinants of youth participation in rice cultivation in South-Eastern Nigeria. *J. Agric. Ext.* 29, 37–46. <https://doi.org/10.4314/jae.v29i1.5>.
- Cieslik, K., Barford, A., Vira, B., 2022. Young people not in employment, education or training (NEET) in Sub-Saharan Africa: sustainable development target 8.6 missed and reset. *J. Youth Stud.* 25, 1126–1147. <https://doi.org/10.1080/13676261.2021.1939287>.
- Daudu, A.K., Abdoulaye, T., Bamba, Z., Shuaib, S.B., Awotide, B.A., 2023. Does youth participation in the farming program impact farm productivity and household welfare? Evidence from Nigeria. *Heliyon* 9. <https://doi.org/10.1016/j.heliyon.2023.e15313>.
- Daum, T., Birner, R., 2020. Agricultural mechanization in Africa: myths, realities and an emerging research agenda. *Global Food Secur.* 26, 100393. <https://doi.org/10.1016/j.gfs.2020.100393>.
- Davis, K., Nkonya, E., Kato, E., Mekonnen, D.A., Odendo, M., Miiro, R., Nkuba, J., 2012. Impact of farmer field schools on agricultural productivity and poverty in East Africa. *World Dev.* 40, 402–413. <https://doi.org/10.1016/j.worlddev.2011.05.019>.
- De La O Campos, A.P., Admasu, Y., Covarrubias, K.A., Davis, B., Diaz, A.M., 2023. Economic transformation and diversification towards off-farm income in rural and urban areas: a global update with a focus on Sub-Saharan Africa. *FAO Agric. Dev. Econ. Work. Pap.* <https://doi.org/10.4060/cc4796en>.
- Diao, X., Takeshima, H., Zhang, X., 2020. An Evolving Paradigm of Agricultural Mechanization Development. IFPRI. <https://ebrary.ifpri.org/utils/getfile/collectio/p15738coll2/id/133762/filename/133973.pdf>.
- Dixon, W.J., 1960. Simplified estimation from censored normal samples. *Ann. Math. Stat.* 31, 385–391. <https://doi.org/10.1214/aoms/1177705900>.
- Etim, N.-A.A., Udoh, E.J., 2018. Willingness of youths to participate in agricultural activities: implication for poverty reduction. *Am. J. Soc. Sci.* 6, 1–5. <https://api.semanticscholar.org/CorpusID:170026756>.
- FAO, 2012. *Growing Greener Cities in Africa: First Status Report on Urban and Peri-Urban Horticulture in Africa*. FAO. <https://www.fao.org/4/i3002e/i3002e.pdf>.
- FAO, 2024. *FAO Statistical Yearbook 2024: Nearing a Decade to 2030*. FAO. <https://openknowledge.fao.org/handle/20.500.14283/cd2971en>.
- Fawole, W.O., Ozkan, B., 2019. Examining the willingness of youths to participate in agriculture to halt the rising rate of unemployment in South Western Nigeria. *J. Econ. Stud.* 46, 578–590. <https://doi.org/10.1108/JES-05-2017-0137>.
- Girard, P., 2023. From family to markets: institutional determinants of rural youth transitions in Senegal and Zambia. *J. Rural Stud.* 101, 103094. <https://doi.org/10.1016/j.jrurstud.2023.103040>.
- Girei, A.A., Saingbe, N.D., Ohen, S.B., Gimba, E.A., 2016. Youth involvement in agricultural production in obi local government area, Nasarawa state, Nigeria. *Int. J. Environ., Agric. Biotechnol.* 1. <https://doi.org/10.22161/ijeab.1.4.54>.
- Giwu, O., Mdoda, L., Ntlanga, S.S., Loku, O., 2024. Evaluating factors influencing youth participation in agricultural enterprises: implications for food security and agribusiness. *South. Afr. J. Entrepren. Small Bu. Manag.* 16, 903. <https://doi.org/10.4102/sajesbm.v16i1.903>.
- Harb, S.A., Tarawneh, R., Hantash, K.L.A.A., Altarawneh, M., Al-Najjar, K., 2024. Empowering rural youth through sustainable innovation, entrepreneurship and peer learning in agriculture. *J. Hunan Univ. Nat. Sci.* 61, 1–8. <https://doi.org/10.5281/zenodo.14058869>.
- Haryati, N., Lasitya, D.S., Nurirrozak, M.Z., Herdianti, D.F., Fibriantingtyas, A., Hidayat, A.R.R.T., 2024. Demographics and course choices: impact on youth farming intention in Indonesia. *Int. J. Adolesc. Youth* 29. <https://doi.org/10.1080/02673843.2024.2358088>.

- Henning, J.I.F., Matthews, N., August, M., Madende, P., 2022. Youth participation in agriculture, accounting for entrepreneurial dimensions. *South. Afr. J. Entrepren. Small Bus. Manag.* 14, a461. <https://doi.org/10.4102/sajesbm.v14i1.461>.
- IFAD, 2024. Annual report 2024. <https://www.ifad.org/en/annual-report-2024>.
- Kabuli, A., Enockwa Baa, O., Davis, K., 2024. A Landscape Analysis of Youth Engagement in Agripreneurship in Malawi. IWMI/CGIAR. <https://cgspace.cgiar.org/items/fc819772-7778-40fc-a7d0-6c7cfc96bada>.
- Kamuzora, A.N., 2025. Exploring youth perceptions in choosing employment in the agricultural production sector in Morogoro municipality, Tanzania. *Discov. Agriculture* 3, 47. <https://doi.org/10.1007/s44279-025-00182-y>.
- Kote, P., Jabeen, A., Tn, S., Prabhavathi, S.J., Ramasamy, M., Dhanalakshmi, K., Chitra, K., Malathi, G., 2024. A scoping review on youth participation in agriculture: sustainable development, food security, and economic growth. *J. Sci. Res. Rep.* 30, 947–958. <https://doi.org/10.9734/jsrr/2024/v30i52012>.
- Kumeh, E.M., Omulo, G., 2019. Youth's access to agricultural land in Sub-Saharan Africa: a missing link in the global land grabbing discourse. *Land Use Policy* 89, 104210. <https://doi.org/10.1016/j.landusepol.2019.104210>.
- LaRue, K., Daum, T., Mausch, K., Harris, D., 2021. Who wants to farm? Answers depend on how you ask. *Eur. J. Dev. Res.* 33, 885–909. <https://doi.org/10.1057/s41287-020-00352-2>.
- Lindsjö, K., Mulwafu, W., Djurfeldt, A.A., Joshua, M.K., 2021. Generational dynamics of agricultural intensification in Malawi: challenges for the youth and elderly smallholder farmers. *Int. J. Agric. Sustain.* 19, 423–436. <https://doi.org/10.1080/14735903.2020.1721237>.
- Magagula, B., Tsvakirai, C.Z., 2020. Youth perceptions of agriculture: influence of cognitive processes on participation in agripreneurship. *Dev. Pract.* 30, 234–243. <https://doi.org/10.1080/09614524.2019.1670138>.
- Matabwa, M., Umar, L., 2021. Effects of youth unemployment in Malawi. *Int. J. Res.* 8, 75–83. [https://www.academia.edu/49160738/Effects\\_of\\_Youth\\_Unemployment\\_in\\_Malawi](https://www.academia.edu/49160738/Effects_of_Youth_Unemployment_in_Malawi).
- Mkandawire, D., Gbgebelegbe, S., Nsenga, J.V., Yami, M., Kenamu, E., 2023. Analysing urban and peri-urban youth employment in agribusiness in Malawi. *PLoS One* 18, e0290877. <https://doi.org/10.1371/journal.pone.0290877>.
- Mkwambisi, D.D., Fraser, E.D.G., Dougill, A.J., 2011. Urban agriculture and poverty reduction: evaluating how food production in cities contributes to food security, employment and income in Malawi. *J. Int. Dev.* 23, 181–203. <https://doi.org/10.1002/jid.1657>.
- Msangji, H.A., Waized, B., Ndyetabula, D.W., Manyong, V.M., 2024. Promoting youth engagement in agriculture through land tiling programs: evidence from Tanzania. *Heliyon* 10. <https://doi.org/10.1016/j.heliyon.2024.e29074>.
- Mukwede, B., Mudhara, M., 2024. Factors affecting rural youth participation in the smallholder farming sector. *J. Agric. Food Sys. Community Dev.* 13, 259–275. <https://doi.org/10.5304/jafscd.2024.134.014>.
- Nemanzemba, E.N., Maziya, M., Mathaulula, M.A., 2025. Factors influencing youth participation in agriculture in thulamela local municipality, Limpopo province, South Africa. *J. Agribus. Rural Dev.* 2, 187–196. <https://doi.org/10.17306/J.JARD.2025.00012r1>.
- Ng'Atigwa, A.A., Hepelwa, A., Manyong, V., Feleke, S., 2022. Analysis of technical efficiency among youth involved in crop production in Njombe region, Tanzania. *Cogent Econ. Finance* 10, 2103923. <https://doi.org/10.1080/23322039.2022.2103923>.
- Nnadi, F.N., Akwiwu, C.D., 2008. Determinants of youths' participation in rural agriculture in Imo state, Nigeria. *J. Appl. Sci.* 8, 328–333. <https://doi.org/10.3923/jas.2008.328.333>.
- NSO, 2012. Integrated Household Panel Survey 2010–2011: Household socio-economic Characteristics Report. National Statistical Office, Malawi, Zomba, Malawi. <https://microdata.worldbank.org/catalog/1003/pdf-documentation>.
- NSO, 2014. Malawi Integrated Household Panel Survey 2013: Basic Information Document. National Statistical Office, Malawi, Zomba, Malawi. <https://microdata.worldbank.org/index.php/catalog/2248>.
- National Statistical Office (NSO), 2017. Fourth Integrated Household Survey 2016–2017 [Basic Information Document]. World Bank. <https://doi.org/10.48529/G2P9-9R19>. Development Data Group.
- NSO, 2019. Malawi Population and Housing Census Main Report. National Statistical Office, Zomba, Malawi.
- National Statistical Office (NSO), 2020. Fifth Integrated Household Survey 2019–2020 [Basic Information Document]. World Bank, Development Data Group. <https://doi.org/10.48529/MPYK-DS48>.
- Nyang'au, M.K., Maobe, S.N., 2025. Influence of youth participation in decision making on implementation of agricultural extension programmes. *Nigerian J. Rural Ext. Dev.* 17. <https://journals.ui.edu.ng/index.php/njred/article/view/1404>.
- Nyberg, Y., Mackay, H., Wilson, M., Samkunde, M., Wetterlind, J., 2025. Supporting access and implementation of agricultural extension services for female smallholder Farmers—a systematic review. *Int. J. Agric. Sustain.* 23, 2505387. <https://doi.org/10.1080/14735903.2025.2505387>.
- Osabohien, R., 2024. ICT adoption and youth employment in Nigeria's agricultural sector. *African J. Econ. Manag. Stud.* 15, 177–194. <https://doi.org/10.1108/AJEMS-03-2022-0111>.
- Osabohien, R., Al-Faryan, M.A.S., 2025. Youth in agriculture and food security in Nigeria. *Int. J. Soc. Econ.* 52, 501–514. <https://doi.org/10.1108/IJSE-04-2021-0197>.
- Ouko, K.O., Ogola, J.R.O., Ng'on'ga, C.A., Wairimu, J.R., 2022. Youth involvement in agripreneurship as nexus for poverty reduction and rural employment in Kenya. *Cogent Soc. Sci.* 8, 2078527. <https://doi.org/10.1080/23311886.2022.2078527>.
- Proctor, F., Lucchesi, V., 2012. Small-Scale Farming and Youth in an Era of Rapid Rural Change. IFAD and FAO. <https://www.iiied.org/sites/default/files/pdfs/migrate/14617IIED.pdf>.
- Ragasa, C., 2018. Supply of and Demand for Agricultural Extension Services in Malawi: a Synthesis (Project Note). International Food Policy Research Institute, Washington, DC.
- Ragasa, C., Alvarez-Mingote, C., McNamara, P., 2024. Bottom-up approaches and decentralized extension structures for improving access to and quality of extension services and technology adoption: multi-Level analysis from Malawi. *Eur. J. Dev. Res.* 36, 1093–1146. <https://doi.org/10.1057/s41287-024-00627-y>.
- Ragasa, C., Mazunda, J., 2018. The impact of agricultural extension services in Malawi. *World Dev.* 105, 25–47. <https://doi.org/10.1016/j.worlddev.2017.12.004>.
- Ray, P., Panigrahi, R.S., Shasani, S., 2022. Determinants of skill levels of farm youth with regard to agripreneurship: a multinomial regression approach. *Indian J. Extension Educ.* 58, 58–62. <https://doi.org/10.48165/IJEE.2022.58113>.
- Samaraweera, W., Dharmadasa, R., Kumara, P.H.T., Bandara, A., 2022. Are young rural women abandoning agriculture in Sri Lanka. *Sri Lanka statistical review. Dep. Census Stat. Sri Lanka* 1, 1–19. <https://www.statistics.gov.lk/Publication/SSR/DCSSSRVoll1Issue1Article5>.
- Simba, A., Tajeddin, M., Dana, L.-P., Ribeiro Soriano, D.E., 2024. Deconstructing involuntary financial exclusion: a focus on African SMEs. *Small Bus. Econ.* 62, 285–305. <https://doi.org/10.1007/s11187-023-00767-1>.
- Sims, B., Kienzle, J., 2017. Sustainable agricultural mechanization for smallholders. *Agriculture* 7, 50. <https://doi.org/10.3390/agriculture7060050>.
- Sumberg, J., Holland-Szyp, C., Yeboah, T., Oosterom, M., Crossouard, B., Chamberlin, J., 2024. Young people, livelihood building and the transformation of African agriculture: a reality check. *Global Food Secur.* 41, 100712. <https://doi.org/10.1016/j.gfs.2024.100759>.
- Sunam, R., Sugden, F., Kharel, A., Sunuwar, T.R., Ito, T., 2025. Unpacking youth engagement in agriculture: land, labour mobility and youth livelihoods in rural Nepal. *J. Agrar. Change* 25, e12611. <https://doi.org/10.1111/joac.12611>.
- Tadele, G., Gella, A.A., 2012. A last resort and often not an option at all. *IDS Bull.* 43, 33–43. <https://doi.org/10.1111/j.1759-5436.2012.00377.x>.
- Tshabalala, S., Lungu, W., Baloyi, C., 2025. Climate change education: preparing African youth for future challenges. *Sustainability* 17, 4267. <https://doi.org/10.3390/su17104267>.
- Tsitsi, A.D., Ombati, J.M., Maina, S.W., 2020. Influence of selected factors on participation of rural youth in agriculture in Balaka district, Malawi. *J. Agric. Ext. Manag.* 21, 19. <https://epubs.icar.org.in/index.php/JAEM/article/view/159520>.
- Twumasi, M.A., Jiang, Y., Acheampong, M.O., 2019. Determinants of agriculture participation among tertiary institution youths in Ghana. *J. Agric. Ext. Rural Dev.* 11, 56–66. <https://doi.org/10.5897/JAERD2018.1011>.
- Verbeek, M., 2008. Pseudo panels and repeated cross-sections. In: Mátyás, L., Sevestre, P. (Eds.), *The Econometrics of Panel Data: Fundamentals and Recent Developments in Theory and Practice*. Springer, pp. 369–383. <https://doi.org/10.2139/ssrn.869445>.
- Verbeek, M., Vella, F., 2005. Estimating dynamic models from repeated cross-sections. *J. Econom.* 127, 83–102. <https://doi.org/10.2139/ssrn.585561>.
- White, B., 2012. Agriculture and the generation problem. *IDS Bull.* 43, 9–19. <https://doi.org/10.1111/j.1759-5436.2012.00375.x>.
- World Bank, 2019. Africa's Cities: Opening Doors to the World. World Bank Group. <https://doi.org/10.1596/978-1-4648-1044-2>.
- Yeboah, F.K., Jayne, T.S., Muyanga, M., Chamberlin, J., 2019. Youth access to land, migration and employment opportunities: evidence from Sub-Saharan Africa (no. IFAD research series no. 53). *Int. Fund Agric. Dev.* <https://doi.org/10.2139/ssrn.3523765>.
- Yeboah, T., Chigumira, E., John, I., Anyidoho, N.A., Manyong, V., Flynn, J., Sumberg, J., 2020. Hard work and hazard: young people and agricultural commercialisation in Africa. *J. Rural Stud.* 76, 142–151. <https://doi.org/10.1016/j.jrurstud.2020.04.027>.
- Zuka, S.P., 2019. Customary land titling and inter-generational wealth transfer in Malawi. *Land Use Policy* 81, 680–688. <https://doi.org/10.1016/j.landusepol.2018.11.039>.
- Zulu, L.C., Djenontin, I.N.S., Kamoto, J.F., Kampanje-Phiri, J.M., Fischer, G., 2023. Do youth contextualizations influence the inclusion of young people in sustainable agriculture intensification? Insights from Ghana and Malawi. *Environ. Dev. Sustain.* 25, 13909–13935. <https://doi.org/10.1007/s10668-022-02632-9>.