



Factors Influencing Youth Participation in Agricultural Practices: Evidence from Madingou, Republic of the Congo**Jossame Stécia Goma Massala**

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Received 12 november 2025, accepted 03 february 2026, available online 28 march 2026

DOI : <https://dx.doi.org/10.4314/rafea.v9i1.23>

ABSTRACT

Description of the subject. Despite the Republic of the Congo's agricultural potential, youth participation in the sector remains limited, while rural unemployment and food insecurity persist. Understanding the factors that shape youths' engagement in agriculture is therefore essential for revitalizing the sector and strengthening rural livelihoods.

Objective. This study investigates the determinants of youth participation in agricultural activities in Madingou, Bouenza Department in the Republic of the Congo, with particular emphasis on socioeconomic and institutional factors influencing engagement decisions.

Methods. A cross-sectional design was applied, with primary data collected through structured interviews from 112 youths aged 18-35. Youth participation in agriculture was specified as a binary outcome and analyzed using a logit regression model.

Results. The findings show that approximately 47 % of youths engage in agriculture, and participation in agricultural and youth development training significantly increases the likelihood of engagement in farming, underscoring the importance of skills acquisition and capacity building. In contrast, migration intentions exert a strong negative effect on participation, indicating that youths planning to move to urban areas are less likely to invest in agricultural livelihoods.

Conclusion. Enhancing youth participation in agriculture in Madingou requires prioritizing practical training programs and addressing the drivers of rural-urban migration to make agriculture a more attractive, viable, and sustainable livelihood option.

Keywords: Youth participation; agriculture; logit model; Madingou; Republic of the Congo

RÉSUMÉ**Facteurs influençant la participation des jeunes aux pratiques agricoles : le cas de Madingou, République du Congo**

Description du sujet. Malgré le potentiel agricole de la République du Congo, la participation des jeunes dans le secteur reste limitée, tandis que le chômage rural et l'insécurité alimentaire persistent. Comprendre les facteurs qui influencent l'engagement des jeunes en agriculture est essentiel pour revitaliser le secteur et renforcer les moyens de subsistance ruraux.

Objectif. Cette étude examine les déterminants de la participation des jeunes aux activités agricoles à Madingou, dans le département de la Bouenza, en République du Congo, en mettant l'accent sur les facteurs socioéconomiques et institutionnels influençant les décisions d'engagement.

Méthodes. Une étude transversale a été menée, avec des données primaires recueillies par des entretiens structurés auprès de 112 jeunes âgés de 18 à 35 ans. La participation des jeunes en agriculture a été considérée comme une variable binaire et analysée à l'aide d'un modèle de régression logistique.

Résultats. Les résultats indiquent qu'environ 47 % des jeunes participent à des activités agricoles. La participation aux formations agricoles et au développement des jeunes augmente significativement la probabilité d'engagement, soulignant l'importance de l'acquisition de compétences. En revanche, les intentions de migration exercent un effet négatif marqué, montrant que les jeunes prévoyant de migrer vers les zones urbaines investissent moins dans l'agriculture.

Conclusion. Renforcer la participation des jeunes à l'agriculture à Madingou nécessite de prioriser les programmes de formation pratique et de traiter les facteurs incitant à la migration rurale-urbaine, afin de rendre l'agriculture plus attractive, viable et durable comme option de subsistance.

Mots-clés : Participation des jeunes, agriculture, modèle logit, Madingou, République du Congo

1. INTRODUCTION

In recent years, the Republic of the Congo has experienced a significant economic downturn, primarily driven by declining commodity prices and an excessive dependence on oil production. During the height of oil revenues, the sector accounted for about 45 % of GDP, 75 % of government revenue, and 95 % of merchandise exports (World Bank, 2023). Such concentration has made the economy highly vulnerable to external shocks, constraining the country's ability to generate diversified and sustainable sources of growth. As a result, expanding productive non-oil sectors has become an urgent development priority. At the same time, the Republic of the Congo, like many African countries, has a predominantly youthful population. Youth represent one of the most dynamic segments of society, as their energy, creativity, and innovative potential position them as key drivers of economic transformation (WFP, 2024).

With an estimated population of about 6.5 million, more than 70 % are under 30 (FIDA, 2024). While this demographic structure offers the prospect of a demographic dividend, it also intensifies pressure on the labor market, where opportunities for stable and well-paid employment remain limited (Ndiaye *et al.*,

2021). Consequently, integrating young people into productive sectors of the economy has become a central development challenge. Within this context, agriculture represents a strategic avenue for employment creation and inclusive growth. Youth engagement in productive activities, particularly in agriculture, can revitalize rural economies by enhancing productivity, accelerating technological adoption, and modernizing traditional farming systems. Agriculture remains fundamental to food security and rural livelihoods in developing countries, employing a substantial share of the labor force.

In the Republic of the Congo, the sector is supported by abundant natural resources, favorable climatic conditions, dense hydrographic networks, and nearly 10 million hectares of potentially cultivable land, of which less than 3 % is currently exploited (Biodev, 2023). Regardless of this potential, agricultural performance remains weak. Approximately 40 % of the active population is engaged in agriculture, mainly on subsistence family farms, yet the sector contributes only about 9 % of national GDP (PND, 2022). This imbalance reflects structural constraints, including low productivity, limited mechanization, and insufficient use of improved inputs and

technologies. Moreover, youth participation in agriculture has been declining across many developing countries, raising concerns about the sustainability of food systems and rural employment (Adeyanju *et al.*, 2021). As agriculture is increasingly perceived as unprofitable and unattractive, the sector risks losing a vital source of innovation and labor.

Despite its agricultural vocation, the Republic of the Congo remains highly dependent on imported food, with nearly 70 % of domestic food needs met through imports (World Bank, 2023). This dependence exposes domestic markets to global price volatility and supply disruptions, while putting pressure on public finances and household welfare. Strengthening national agriculture through greater youth engagement is therefore not only an employment strategy but also a critical pathway to food security, economic diversification, and resilience. Demographic and spatial dynamics further complicate this challenge. More than half of the Congolese population resides in Brazzaville, while Pointe-Noire accounts for about 25 %, leaving smaller rural towns with limited human capital. Rapid urbanization, driven mainly by internal migration from rural areas, concentrates economic opportunities in cities and draws young, economically active individuals away from the agricultural labor force (WFP, 2024). Across sub-Saharan Africa, more than 65 % of internal migrants are aged 15-34, the demographic group that traditionally forms the backbone of rural agricultural labor (FAO, 2019). This sustained out-migration reduces labor availability on family farms, accelerates the aging of the agricultural population, and constrains innovation and productivity growth in rural communities.

The Bouenza Department, often described as the agricultural breadbasket of the Republic of the Congo, illustrates these challenges. It plays a central role in the national food supply, particularly for staple crops such as cassava (*Manihot esculenta* Crantz), maize (*Zea mays*) and groundnuts (*Arachis hypogaea*) (PND, 2022). However, persistent youth migration undermines the region's capacity to fully

exploit its productive potential. A shrinking, aging, and poorly equipped farming population limits the sustainability of food production, especially within a largely extensive and non-mechanized agricultural system. Traditional practices, including slash-and-burn cultivation, combined with weak mechanization and limited technology adoption, keep productivity low (Landa *et al.*, 2019). The interaction between youth out-migration, insufficient rural investment, and technological constraints further reinforces urban dependence on imported food. Beyond productivity concerns, current agricultural practices also raise environmental challenges. Unsustainable land use and agricultural expansion into forest areas threaten biodiversity and ecological stability in the Congo Basin (Biodev, 2023).

Promoting youth engagement in modern, climate-smart, and sustainable agriculture, therefore, represents not only an employment and economic opportunity but also a strategy for conserving natural resources while improving rural livelihoods. Regardless of the strategic importance of agriculture, many young Congolese perceive farming as labor-intensive, risky, and insufficiently profitable compared with non-farm livelihood options. Consequently, agriculture is often viewed as unattractive, particularly among educated and ambitious youth. Yet their participation is essential for revitalizing a sector characterized by an aging workforce and low productivity. Engaging youth in agriculture can address unemployment, stabilize food systems, reduce import dependence, and promote inclusive economic growth.

Against this backdrop, understanding the determinants that influence youth engagement in agriculture is crucial for designing effective policies and interventions. Accordingly, this study seeks to identify the factors shaping youth participation in agricultural practices in the Republic of the Congo by examining individual characteristics, socioeconomic conditions, and structural constraints that influence young people's decisions to engage in the sector.

2. MATERIEL AND METHODS

2.1. Theoretical Perspectives on Youth Participation in Agriculture

Youth participation in agriculture is increasingly understood as a strategic livelihood choice shaped by expected returns, institutional constraints, and perceived opportunities rather than as a default occupational outcome. From a labor allocation perspective, young people weigh the potential benefits of agricultural employment against alternative non-farm options, considering income prospects, risk exposure, and long-term career trajectories (Harris *et al.*, 1970; Losch, 2016). In contexts where farming is associated with low profitability, high uncertainty, and limited social mobility, youth tend to redirect labor toward urban or service-sector opportunities, reflecting calculated decisions rather than mere preference.

Human capital theory further explains participation through the role of skills, education, and experience. Investment in education and training enhances productivity and decision-making capabilities but simultaneously raises opportunity costs by providing access to non-agricultural employment (Becker, 1993). Consequently, education does not automatically increase or reduce agricultural participation. In technologically stagnant systems, higher schooling may encourage youth to exit farming, whereas in commercialized and innovation-

oriented agricultural systems, education can attract skilled youth into agribusiness and entrepreneurial ventures (Sumberg *et al.*, 2012; FAO, 2017). Institutional economics emphasizes that access to productive resources and supportive policies is critical for youth engagement. Insecure land tenure, limited financial inclusion, and incomplete market access reduce expected payoffs from farming, discouraging investment in productive activities (Kosec *et al.*, 2017). Youth participation, therefore, reflects not only personal preferences but also structural and institutional factors that govern access to land, capital, and markets.

Psychosocial perspectives highlight the importance of aspiration, identity, and perceived social status. Youth participation is shaped by how young people imagine their future trajectories and social roles. When agriculture is viewed as backward, physically demanding, or socially undervalued, youth gravitate toward urban, non-farm identities. In contrast, when farming is associated with entrepreneurship, innovation, and professional recognition, participation becomes more appealing (Sumberg *et al.*, 2012; Wittman *et al.*, 2021). In this sense, engagement in agriculture is simultaneously an economic, institutional, and psychosocial process (Figure 1).

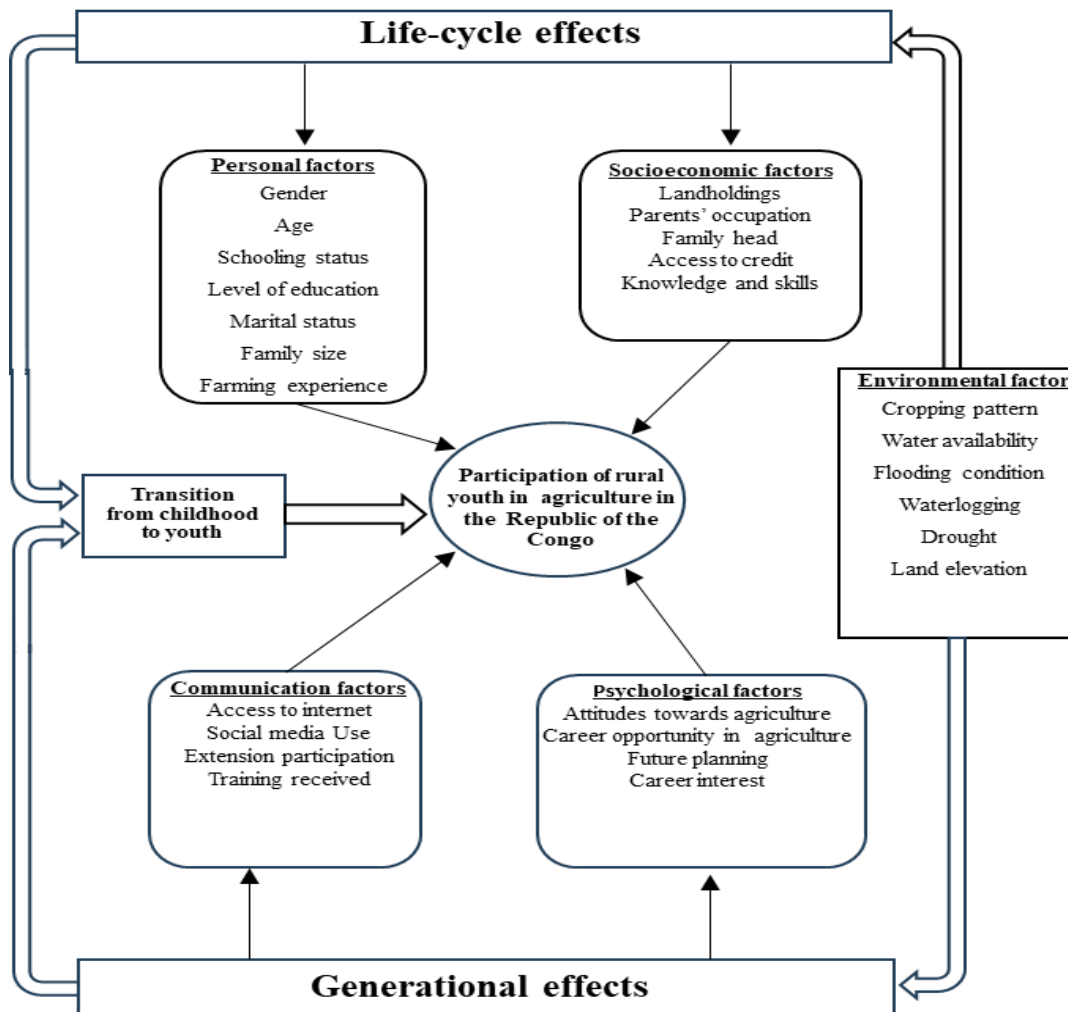


Figure 1. Conceptual framework of determinants and perceptions influencing youth participation in agriculture

2.2. Socioeconomic and Household Determinants of Participation

Demographic and household factors also influence youth participation, though their effects vary depending on context. Gender roles shape access to labor, land, and markets, with men typically engaging in land preparation and commercialization and women focusing on post-harvest processing and household-linked activities (World Bank *et al.*, 2009; Sumberg *et al.*, 2012; Balasha *et al.*, 2022). However, evidence suggests that when structural barriers such as limited land access, financial constraints, and inadequate training are addressed, gender disparities in participation diminish, highlighting the importance of institutional support over inherent preferences (IFAD, 2019).

Age affects engagement through experience accumulation and evolving risk tolerance. Younger youth often lack technical competence and confidence, while older youth can develop stronger attachments to farming through learning-by-doing (Yami *et al.*, 2019). However, age effects are moderated by the availability of alternative employment, which may pull youth away from agriculture, despite accumulated experience (Fox *et al.*, 2016). Education presents a complex influence. While it enhances cognitive capacity, openness to innovation, and entrepreneurial potential (FAO, 2017), it also increases the attractiveness of non-farm employment opportunities, potentially reducing

engagement in low-return agriculture (Sumberg *et al.*, 2012). The net effect depends on whether local agricultural systems provide pathways for skills utilization and income generation. Household characteristics further shape participation decisions. Larger households may increase competition for land and encourage diversification into off-farm activities, while marital status affects labor allocation, risk preferences, and income responsibilities (Nnadi *et al.*, 2008; Tadele *et al.*, 2012). Married youth may seek stability and consistent income, which could either strengthen agricultural engagement or redirect efforts toward alternative livelihood strategies.

Access to productive assets remains central. Secure land tenure increases investment incentives, while insecure rights reduce the likelihood of adopting productivity-enhancing technologies (Kosec *et al.*, 2017). Similarly, access to finance supports input acquisition, mechanization, and participation in value chains, but credit alone is insufficient without complementary support mechanisms such as training, market linkages, and organizational integration (Njeru, 2017; IFAD, 2019). Youth participation emerges from the interplay of household characteristics, assets, and the broader institutional context rather than from any single factor in isolation.

2.3. Information, Training and Opportunity Perceptions

Beyond demographics and asset endowments, access to information, skills, and perceived opportunity plays a critical role in youth participation. Training and extension services reduce technical uncertainty, improve managerial competence, and increase expected profitability (FAO, 2014). Exposure to agribusiness practices, value-chain management, and entrepreneurial approaches transforms agriculture from a subsistence activity into a commercially viable enterprise, enhancing youth motivation to engage (IFAD, 2019). Training also functions as a signaling mechanism, shaping youth perceptions of agriculture as a professional and socially legitimate

career (Som *et al.*, 2019). Youth who acquire such skills are more likely to align farming with modern aspirations, innovation, and income-generating opportunities. In this sense, capacity building influences not only technical ability but also identity formation, confidence, and future orientation.

Digital technologies, including mobile applications and online market platforms, have the potential to enhance participation by improving access to market information, reducing transaction costs, and facilitating network building (FAO, 2017). However, digital access alone does not guarantee engagement. Its effectiveness depends on complementary infrastructure, institutional support, and market integration. Without such integration, information and communication technology (ICT) adoption may remain superficial and fail to translate into sustained agricultural commitment. Perceived risk further moderates participation decisions. Agriculture is characterized by climate variability, price volatility, and production uncertainty. Youth, with limited financial buffers and risk management capacity, may exhibit high risk aversion and discount long-term agricultural investments (IPCC, 2023). Mitigation of these risks through training, diversification, and institutional support is therefore essential for encouraging participation.

2.4. Migration Aspirations and Labor Allocation

Migration functions as a key mechanism influencing youth participation by shaping labor allocation and opportunity perception. The Harris-Todaro framework posits that individuals migrate when expected urban income, adjusted for employment probability, exceeds rural returns (Harris *et al.*, 1970). For youth, migration represents a strategic investment in income potential, social mobility, and long-term career objectives rather than simply physical relocation. High migration intentions reduce agricultural engagement by reallocating labor and attention away from local farming, leading to lower investment in land, inputs, and long-term productivity-enhancing strategies (Chamberlin *et al.*, 2020). Migration thus operates both as a practical

response to economic opportunity differentials and as a psychological reorientation toward non-farm identities (Fox *et al.*, 2016). The strength of migration pressures depends on local opportunity structures, such as limited market access, low innovation, and weak social recognition of agriculture, which amplify migration, whereas well-integrated, entrepreneurial farming systems can reduce out-migration incentives.

2.5. Research Gap and Hypothesis Development

Despite extensive research on youth participation, several gaps remain, particularly in the context of Central African agricultural hubs such as Madingou, Republic of the Congo. Most studies emphasize demographic and asset-based factors, with less attention to the integrated role of training, opportunity perceptions, and migration intentions in shaping youth engagement. Additionally, existing literature often generalizes findings across sub-Saharan Africa, without accounting for the specific socioeconomic, institutional, and ecological conditions that define agricultural participation in smaller, rural towns.

Building on the theoretical and empirical evidence, this study conceptualizes youth participation as a multidimensional outcome determined by skill acquisition, household endowments, institutional access, and forward-looking livelihood expectations rather than by demographic background alone. Access to agricultural or youth development training enhances technical competence, entrepreneurial capacity, and professional confidence, thereby increasing perceived returns from agriculture and motivating sustained participation (FAO, 2017; IFAD, 2019; Som *et al.*, 2019). Conversely, strong migration aspirations reduce engagement by reallocating labor and psychological investment toward urban employment, reflecting both opportunity costs and aspirational choices (Harris *et al.*, 1970; Tadele *et al.*, 2012; Ricker-Gilbert *et al.*,

2014; Fox *et al.*, 2016). Household and asset conditions also shape participation feasibility. Secure access to land and adequate farm size increase the likelihood of youth adopting productive technologies and investing in commercial farming, while insecure tenure and small plots limit engagement (Kosec *et al.*, 2017). Marital status and household responsibilities influence risk tolerance, labor allocation, and income priorities, further modifying participation outcomes (Nnadi *et al.*, 2008; Tadele *et al.*, 2012). These factors operate interactively with training and opportunity perceptions, forming a comprehensive framework for understanding youth engagement in agriculture.

2.6. Study area

The study was conducted in Madingou, the administrative capital of the Bouenza Department in the Republic of the Congo. Located in the Niari Valley, approximately 245 km from Brazzaville and about 270 km from Pointe-Noire, Madingou serves as a strategic agricultural hub that supplies both local and surrounding urban markets. Its geographic position and market connectivity make it a central node in the country's food system. The area is characterized by savanna vegetation, fertile soils, and a humid tropical climate, with average annual rainfall ranging from 1,000 to 1,600 mm. These agro-ecological conditions are favorable for cultivating major staple and cash crops, including cassava, maize, groundnuts, plantains, and a variety of vegetables, which are primarily produced under rain-fed farming systems. As a result, agriculture remains a dominant livelihood activity in the Bouenza Department. Youth involvement faces multiple constraints, including limited access to land, insufficient training opportunities, restricted financial resources, and pressures from rural-urban migration. These factors make Madingou an appropriate context for examining the determinants of youth participation in agriculture and the interactions among several factors.

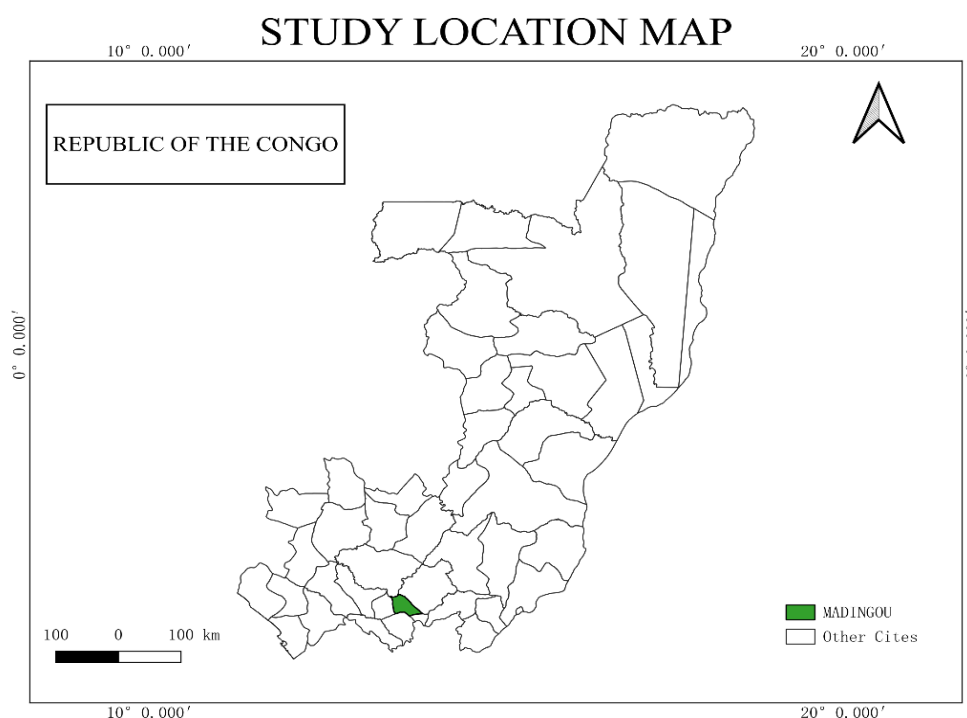


Figure 2. Study area

2.7. Methods

This study employed a cross-sectional research design to capture both measurable patterns and contextual insights into youth participation in agriculture. Primary data were collected through structured interviews with youths aged 18-35 in Madingou, covering demographic characteristics, socioeconomic status, agricultural activities, and perceptions of farming as a livelihood option. Secondary data were obtained from departmental agricultural records, official statistics websites, and previous studies on youth and agriculture in the Republic of the Congo.

2.8. Analytical Approach

Data analysis followed two complementary stages. First, descriptive statistics were used to summarize the socio-economic profile of respondents and their perceptions of agricultural engagement. This step provided an overview of youth characteristics and participation patterns in the study area. Second, a logit regression model was employed to identify the determinants of youth participation in agriculture. The model was estimated using STATA (version 17) and is expressed as:

$$\text{logit}[(p)] = \log \left[\frac{p^{(x)}}{1 - p^{(x)}} \right] = \beta_0 + \beta_i X_i$$

Where p is the probability of youth participation in agriculture, β_0 is the constant, β_i are the coefficients of the explanatory variables X_i . Model robustness was evaluated through diagnostic tests for normality, heteroskedasticity, and multicollinearity, with robust standard errors applied where appropriate. Goodness-of-fit was assessed using standard procedures.

3. RESULTS

3.1 Descriptive Statistics

Table 1 summarizes the main characteristics of the 112 youths surveyed in Madingou. The descriptive evidence provides an overview of the socioeconomic environment in which young people make decisions about agricultural engagement. Overall, 47.3 % of respondents report active participation in agricultural activities, indicating that agriculture remains an important livelihood option for youth, though it does not dominate employment choices. This moderate participation rate suggests that farming competes with alternative aspirations, particularly non-farm and urban-oriented opportunities. In terms of gender composition, females account for 45.5 % of the sample and males for 54.5 %. This relatively balanced distribution reflects the presence of both young men and women in rural livelihood systems. The average age of respondents is 25 years, with values ranging from 20 to 32 years. This concentration around early adulthood corresponds to a stage where youths begin making more permanent livelihood and investment decisions, including whether to remain in agriculture or seek alternative employment. Educational attainment averages 10.5 years of schooling, corresponding roughly to upper secondary level. This indicates that many youths possess basic formal education, yet rural labor markets offer limited opportunities to absorb these skills outside agriculture. As a result, education does not automatically translate into exit from farming but rather coexists with constrained employment choices. Household size averages five members, reflecting typical rural family structures in which livelihood responsibilities and labor sharing influence participation in productive activities. Access to productive resources remains limited. The mean farm size is 1.63 hectares, and only 42.9 % of respondents report secure access to land suitable for farming. This highlights a structural constraint for youth engagement, as land availability determines both

production potential and incentives for long-term investment. Farming experience averages 5.5 years, indicating moderate exposure to agricultural activities. In addition, 72.3 % of respondents have parents involved in agriculture, suggesting substantial intergenerational transmission of agricultural knowledge, even if this does not necessarily guarantee sustained youth engagement. Institutional exposure appears weak. Only 27.7 % of youths report participation in agricultural or youth development training programs. This low coverage reflects limited opportunities for skills upgrading and professionalization of youth farming. Access to financial services is even more restricted, with only 8.9 % of respondents reporting access to credit. Such limited financial inclusion constrains the adoption of improved inputs and entrepreneurial expansion. Technological and informational access is moderate: 55.4 % of youths report having internet access, which may facilitate information flows, although infrastructure and skills remain uneven. Household economic indicators reveal modest living standards, with an average annual income of about 688 thousand FCFA and expenditure of about 608 thousand FCFA. These figures indicate tight household budgets that may both push youths into income-generating activities and restrict their capacity to invest in agriculture. Finally, migration intentions are pronounced. About 63.4 % of respondents express plans to migrate to urban areas in search of better opportunities. This descriptive pattern already signals potential tension between local agricultural engagement and aspirations for mobility. Together, the descriptive statistics portray a context characterized by moderate agricultural participation, constrained access to land and finance, limited institutional support, and strong migration orientation among youth (Table 1).

Table 1. Description of the variables used in the model estimation and their summary statistics

Variable	Description	Mean	Std. Dev.
participation	Participation in agriculture (1 = yes, 0 = no)	0.473	0.502
gender	Gender (1 = female, 0 = male)	0.455	0.500
age	Age of respondent (years)	25.22	3.46
education	Years of schooling	10.54	3.05
family_size	Household size	5.00	1.46
marital_status	Married (1 = yes, 0 = no)	0.491	0.502
farm_size	Farm size (hectares)	1.628	0.788
access_land	Access to land (1 = yes, 0 = no)	0.429	0.497
experience	Farming experience (years)	5.66	3.49
parents_agri	Parents involved in agriculture (1 = yes, 0 = no)	0.723	0.449
training	Agricultural/youth training (1 = yes, 0 = no)	0.277	0.449
income	Household income (thousand FCFA/year)	688.37	239.31
expenditure	Household expenditure (thousand FCFA/year)	608.52	237.54
migrate	Plan to migrate (1 = yes, 0 = no)	0.634	0.484
internet	Access to internet (1 = yes, 0 = no)	0.554	0.499
credit	Access to credit (1 = yes, 0 = no)	0.089	0.286

3.2. Empirical Findings

Table 2 presents the results of the logistic regression model estimating the determinants of youth participation in agriculture in Madingou. Youth participation is specified as a binary outcome, and the model includes demographic, household, institutional, and resource-related variables. To facilitate interpretation, coefficient estimates are complemented with average marginal effects.

The overall performance of the model is satisfactory. The pseudo R^2 is 0.198, indicating that nearly 20 % of the variation in participation is explained by the included variables. The likelihood ratio chi-square statistic (30.66) is significant at the 1 % level ($p = 0.0098$), rejecting the null hypothesis that all explanatory variables jointly equal zero. The model correctly predicts 69.6 % of observations. Furthermore, the Hosmer–Lemeshow goodness-of-fit test ($\chi^2 = 8.33$, $p = 0.4017$) confirms that the predicted probabilities do not significantly differ from observed outcomes, supporting the adequacy of the specification.

Among all variables, training emerges as the strongest positive determinant of participation. The coefficient is positive and statistically significant at the 5 % level. The marginal effect indicates that youths who participated in agricultural or youth development training are, on average, 22.5 percentage points more likely to engage in agriculture than those without training. This sizable effect shows that institutional exposure substantially shifts participation probabilities rather than merely marginally affecting behavior. Migration intentions constitute the most powerful negative determinant. The migrate variable is significant at the 1 % level and associated with a marginal effect of -31.1 percentage points. This implies that youths planning to migrate to urban areas are substantially less likely to engage in agricultural activities locally. This result reflects how expectations about future location influence present labor allocation and investment decisions.

Other variables show weaker, statistically insignificant effects. Gender has a positive marginal effect, indicating slightly higher participation among females once other factors are controlled for, but the effect is not statistically significant. Age shows a small positive influence, suggesting gradual attachment to agriculture with age, although the effect remains modest. Education exhibits a negative coefficient, implying that additional schooling may orient youth toward non-farm aspirations, but the effect is very small and insignificant. Household and asset variables show economically meaningful but statistically weak effects. Farm size and land access both increase the probability of participation by about 9-10 percentage points, indicating the role of productive assets, although their independent influence is overshadowed by training and migration orientation. Farming experience increases participation by about 2.1 percentage points per year, reflecting learning effects, while parental involvement in agriculture increases participation by about 7.4 percentage points through intergenerational exposure. Financial and informational variables display limited explanatory power. Income slightly reduces participation, while expenditure slightly increases it, suggesting competing income effects and necessity motives.

Access to the internet and credit both show positive marginal effects, but neither reaches statistical significance. These findings indicate that, in this context, access to resources alone does not automatically translate into agricultural engagement without complementary institutional and behavioral incentives. In general, the empirical results show that youth participation in agriculture in Madingou is primarily shaped by institutional capacity-building and future mobility expectations rather than by demographic background or asset endowments alone (Table 2).

Table 2. Results of logistic regression model

Variable	Coefficient	Std. Error	Marginal Effect	Std. Error	P-value
gender (female = 1)	0.333	0.480	0.063	0.090	0.487
age (years)	0.063	0.205	0.012	0.038	0.759
education (years)	-0.002	0.077	-0.0004	0.015	0.978
family_size	0.210	0.157	0.039	0.029	0.183
marital_status (married = 1)	-0.860	0.496	-0.162	0.089	0.083
farm_size (hectares)	0.519	0.322	0.098	0.058	0.107
access_land (yes = 1)	0.481	0.490	0.091	0.091	0.327
experience (years)	0.113	0.204	0.021	0.038	0.581
parents_agri (yes = 1)	0.393	0.514	0.074	0.096	0.444
training (yes = 1)	1.193	0.522	0.225	0.090	0.022**
income (thousand FCFA/year)	-0.004	0.010	-0.0008	0.002	0.669
expenditure (thousand FCFA/year)	0.005	0.010	0.0009	0.002	0.619
migrate (yes = 1)	-1.653	0.532	-0.311	0.084	0.002**
internet (yes = 1)	0.019	0.470	0.004	0.088	0.967
credit (yes = 1)	0.835	0.791	0.157	0.146	0.291
_cons	-3.932	4.513	—	—	0.384

** Significant at 5%, * Significant at 10%.

4. DISCUSSION

The purpose of this section is to interpret the empirical findings and relate them to existing theoretical and empirical literature. The results demonstrate that youth participation in agriculture in Madingou is driven less by who youths are and more by what opportunities and expectations they face. In

particular, training and migration intentions dominate the participation decision, while traditional factors such as gender, education, land access, and credit play secondary roles once these core mechanisms are accounted for. The strong positive effect of training highlights the central role of capacity building in

shaping youth engagement. Training programs do more than transfer technical knowledge; they influence how youth perceive agriculture as an economic activity. Exposure to improved practices, agribusiness skills, and value-chain opportunities increases confidence and expected returns, making farming a viable professional choice rather than a fallback option.

This finding is consistent with evidence from other African contexts showing that training enhances productivity, innovation, and entrepreneurial orientation among rural youth (Adeyanju *et al.*, 2021). In Madingou, the low proportion of trained youths observed in the descriptive statistics suggests a large untapped potential for improving participation through institutional investment. Migration intentions exert an even stronger influence, reflecting the opportunity cost of remaining in rural agriculture. Youths who expect to migrate are unlikely to invest time and labor in local farming. This supports theoretical arguments that youth participation is forward-looking and shaped by aspirations as much as by present constraints (Fox *et al.*, 2016). Urban areas are perceived as offering higher income, social mobility, and prestige, which weakens attachment to agriculture. The magnitude of the migration effect suggests that improving agricultural engagement requires not only farm-level interventions but also broader rural development strategies that make staying economically rational. The absence of a significant gender effect is noteworthy. In many rural settings, agriculture is highly gendered, yet in Madingou, both young men and women appear to face similar participation incentives once training and migration expectations are considered. This implies that observed gender gaps elsewhere may reflect institutional barriers rather than inherent preferences. Policies that expand access to training and markets may therefore benefit both male and female youth equally.

Education's weak and negative effect reflects a common tension in rural development. While education increases human capital, it may also raise

aspirations beyond agriculture if farming is perceived as low-return. Without profitable agricultural pathways, schooling alone does not anchor youth in farming. In the same way, land, experience, and parental background support participation but cannot substitute for institutional and market incentives. Financial access and internet availability, although theoretically important, do not independently shape participation in the model. This suggests that isolated provision of credit or connectivity is insufficient unless combined with training, profitability, and market integration. Youth engagement is therefore a systemic outcome rather than the result of single interventions. Taken together, the findings show that youth participation in agriculture in Madingou depends on the interaction between skills acquisition, perceived opportunity, and long-term aspirations. Agriculture competes with migration, and training shifts this competition in favor of local engagement.

5. CONCLUSION

This study shows that youth engagement is not primarily driven by demographic characteristics but by institutional exposure and future expectations. In particular, agricultural and youth development training significantly increases participation, while migration intentions strongly reduce it. These findings imply that agriculture becomes attractive to youth when it is associated with skills, innovation, and income prospects rather than subsistence labor. Expanding practical, market-oriented training programs should therefore be a policy priority. Such programs should integrate agribusiness management, value-chain development, and modern production techniques, and be embedded within schools, vocational centers, and community initiatives. At the same time, the strong negative influence of migration intentions highlights the importance of improving the rural opportunity structure. Policies should aim to increase the profitability of farming, improve market access, strengthen infrastructure, and support complementary rural enterprises that make local livelihoods competitive with urban alternatives. Although land, experience, and household

characteristics contribute to participation, they are insufficient on their own. Interventions must combine asset access with institutional and economic incentives. Equally, credit and digital access need to be linked with training and market integration to become effective. On the whole, strengthening youth participation in agriculture in Madingou requires moving beyond demographic targeting toward building a rural environment in which agriculture is professionally rewarding and economically viable. Future research should extend the analysis to other regions, explore the role of climate-smart and digital agriculture, and evaluate the impact of specific youth agribusiness programs to support long-term agricultural transformation.

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