

ETHIOPIA

Agrifood System Change and PARI Research on Innovations

INTRODUCTION

Government spending on agriculture in Ethiopia has consistently been declining, dropping from 26% in 2009 to 12% in 2023. On the other hand, the country has been experiencing fluctuations in value added growth rate from the agriculture sector (refer to Figure 1 for details). The disparity displayed in the trajectory of these two indicators suggests that there are other external factors, such as market conditions and weather, influencing the agriculture value added growth rate. This calls for a holistic approach to improve the performance of the agriculture sector. While the innovative pathways to sustainable food systems transformation (see Table 1) in Ethiopia reflect this comprehensive approach, effective implementation is key. Going beyond planning to actionable execution coupled with continuous learning and adaptation will enhance the resilience of Ethiopia’s agriculture sector and ensure sustainable

growth. It is also important to revisit these and other current initiatives to draw lessons, as provided in this brief based on studies done under PARI, to guide future strategies.

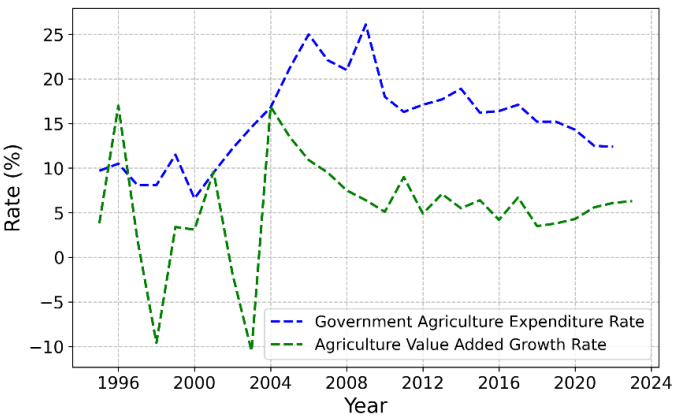


Figure 1: Trend of government agriculture expenditure and value added growth rate in Ethiopia¹

Table 1. Summary of innovative pathways to sustainable food systems transformation for Ethiopia²

Category	Key Innovations	Implementation objectives/Strategies
Institution and policy frameworks	Land reform	- Introduce leasing rights and collateral use to facilitate land consolidation, reduce environmental degradation, and enhance technology adoption. - Promote integrated landscape and watershed management with climate-smart approaches to improve resource efficiency and sustainability.
	Agricultural finance	Establish rural development banks and financial literacy programs to provide credit and insurance for smallholder farmers, enhancing farm capitalization and investment.
	Index-based insurance	Scale up index-based crop and livestock insurance and leverage satellite data for risk assessment to enhance resilience.

¹ Source: Authors’ illustration using data from <https://www.resakss.org/node/3>, accessed on 26 May 2025

²Source: Authors’ compilation from https://www.unfoodsystemshub.org/docs/unfoodsystemslibraries/national-pathways/ethiopia/2021-09-09-en-draft-ethiopian-food-system-technical-synthesis-report-09012021.pdf?sfvrsn=d6739050_1, accessed on 11 March 2025



Technological innovations	Climate-smart technologies	Promote rural electrification and climate-smart livestock value chains to enhance sustainability.
	Mechanisation	Establish training and mechanization service centers for tractors, harvesters, and irrigation equipment with supported from private sector
	Agricultural input support	Enhance supply chains for high-quality inputs (e.g., improved seeds, fertilizers, veterinary medicines) to reduce post-harvest losses and increase yields.
	Digitalization	- Use satellite-based data to model crop production and inform targeted interventions including risk-insurance payouts. - Fine-scale weather forecasting to provide farmers and policymakers with accurate data on crop dynamics and risks.

PARI CONTRIBUTIONS

The PARI research in Ethiopia relates to priorities as indicated by PARI Partners, and took note of initiatives of the Green Innovation Centers.

Innovations in value chains

Agricultural productivity in Ethiopia faces numerous challenges, including climate factors (e.g., rainfall variability, droughts), institutional barriers (e.g., land tenure insecurity) and limited access to inputs, information and credit (Bahir Dar University et al., 2017). State ownership of land restricts farmers' land rights, reducing efficiency and investment. Low adoption of fertilizers, improved seeds and pesticides, combined with weak research and extension services and inadequate storage and transport infrastructure, further hinders productivity. In the livestock sector, droughts and floods are key constraints, exacerbated by weak institutional arrangements and limited access to technology. Similarly, Ethiopia's honey sector, despite its potential, is underutilized, with low adoption of modern production technologies (Tegegne and Legese Feye, 2020).

Rainfall variability and crop diseases significantly impact wheat and faba bean production in Ethiopia, yet adoption of drought- and pest-resistant seeds and fertilizers remains very low (Feiruz et al., 2019; Goshu et al., 2019). Only a small share of producers use chemical fertilizers and improved seeds, despite their potential to boost yields. Farmers are more likely to adopt fertilizers than improved seeds, with larger farmers being more inclined to use improved seeds. This is partly due to the limited availability of high-

yielding, disease-resistant cultivars. To improve productivity, better access to inputs, greater farmer awareness and research on high-yielding, disease-resistant and climate-adapted crop varieties are urgently needed.

Digitally enabled innovations, such as information and insurance services, have supported Ethiopian farmers in improving productivity (Bahir Dar University et al., 2017; Tegegne and Legese Feye, 2020). A popular agricultural hotline launched in 2014 provides farmers with advice on cultivation practices. Additionally, since 2008, the Nyala Insurance Company has offered two types of crop insurance for rain-fed and drought-prone areas. In the livestock sector, index-based insurance protects pastoralists against forage scarcity using remotely sensed vegetation indices. When forage availability falls below a threshold, pastoralists receive compensation to buy inputs and avoid selling assets. To further boost technology adoption and information dissemination, providing on-farm extension services and encouraging community gatherings is essential (Ahmed and Getahun, 2019).

Ethiopian livestock farmers have benefited from improved management practices and greater access to inputs (Tegegne and Legese Feye, 2020). Key innovations include advancements in feed production and marketing, as well as the adoption of integrated



feedlot operations. To combat soil erosion, efforts have focused on soil management techniques, such as planting legumes as ground cover and implementing water harvesting systems. Additionally, the rehabilitation of degraded lands and the cultivation of diverse perennial crops, such as coffee and fruit trees, hold significant potential to boost honey productivity.

In Ethiopia's honey sector, improved access to extension services can increase productivity by enhancing the supply of high-quality frame hives and provide entrepreneurial training (Tegegne and Legese Feye, 2020). Despite being one of Ethiopia's driest regions, Tigray leads in honey production due to strong regional government support for extension services, improving technical skills and knowledge in beekeeping. The Young Entrepreneurs in Silk and Honey project has also boosted apiary centers and modern hive adoption in the region. Beekeeping is a traditional livelihood for many rural households, playing a cultural and religious role while offering opportunities for youth employment. However, the sector remains supplementary to other agricultural activities, with low adoption of modern technologies. Regular technical supervision, improved financing and investments in apiculture could increase adoption rates and deliver ecosystem benefits like enhanced pollination.

Farmer innovations

Ethiopian farmers can be a valuable source of locally adapted innovations. Support is needed to validate these innovations, assist entrepreneurs in commercialization and empower women innovators (Tambo, 2018). A review of submissions to a farmer innovation contest organized by PARI shows that two thirds of participating farmers developed original innovations, while the rest adapted existing technologies to better suit local conditions. Motivated by curiosity and cost reduction, the majority focused on technical innovations, particularly in livestock production (34%), farm tools (26%) and crop management (13%). These innovations were typically low-cost (USD 20 or less) and used locally available materials, making them highly cost-effective. Farmers reported that their innovations increased knowledge, improved yields and reduced labour demands. While about 60% were aware of others adopting their innovations, more support is needed to validate and commercialize promising ideas. Women were underrepresented, contributing only 10% of

innovations, highlighting the need for targeted efforts to encourage and showcase women innovators.

Employment

Young Ethiopian entrepreneurs are increasingly engaging in the food and agricultural sector, which can be more financially rewarding than other industries, but they are constrained by limited access to finance, land shortages and poor raw material supply (Nigus et al., 2022). A survey of 199 young agri-entrepreneurs in Amhara, Oromia and Sidama states revealed that youth focus primarily on livestock and crop production, food processing and, to a lesser extent, food retail. There is no significant difference in high school completion rates between those in agribusiness and those who are not. However, successful agripreneurs often have formal education, training, or farm work experience, as well as access to wealth, assets, family connections and social networks. Many agribusinesses are start-ups rather than inherited ventures, often supported by NGOs, international organizations, or government programs. For example, beneficiaries of the "Youth Revolving Fund" have successfully launched businesses using these funds (Getahun and Fetene, 2020b). To enhance youth success in agribusiness, it is crucial to provide training in accounting and recordkeeping, facilitate bank account setup, reduce bureaucratic barriers and increase funding for start-ups.

Ethiopia has implemented several national policies to increase employment opportunities for young people, particularly in rural areas. While unemployment rates have declined, the impact of these initiatives is difficult to assess due to a lack of data (Getahun and Fetene, 2020b). Since 2000, at least four major policy interventions have targeted youth unemployment, providing funds, land, market information and training. For example, the National Rural Youth Development Package (2006) allocated land for agroforestry to young people. However, limited data on job creation, fund utilization and implementation challenges have hindered the evaluation and monitoring of these programs. Additionally, many policies lack clear objectives and measurable targets. For instance, the National Youth Policy (2004) does not specify actionable goals, making it difficult to assess its outcomes. Establishing robust monitoring and follow-up mechanisms would improve outreach and enable better evaluation of program effectiveness. Addressing these gaps would help refine future policies to further reduce youth unemployment.



Attracting young Ethiopians to agriculture and expanding off-farm activities in rural areas could help reduce out-migration. A study on rural youth employment aspirations found that most young people prefer non-agricultural jobs and aspire to high socioeconomic status occupations (Mussa, 2020). Youth interested in further schooling are less likely to migrate, though evidence on their aspirations in agriculture is limited. Policies should align youth aspirations with rural opportunities to make farming more appealing. Key measures include improving access to technology, developing rural infrastructure and supporting the growth of non-farm sectors.

Ethiopia's agro-processing sector creates jobs, particularly for skilled women and youth, but greater investment in raw materials and infrastructure is needed (Getahun and Fetene, 2020a). Food production industries generate more jobs than beverage industries, though the sector overall offers fewer jobs per unit of capital compared to chemicals and metals. Most food and beverage manufacturers are small (43%), with medium and large enterprises comprising 27% and 31%, respectively (Baumüller et al., 2023b). These firms are predominantly privately and domestically owned, with half focused on grain milling and others spanning diverse sub-sectors. Key challenges include unreliable electricity, reliance on imported inputs and limited access to foreign currency. To unlock the sector's potential for economic growth and job creation, efforts should focus on substituting imported inputs with local raw materials and improving electricity infrastructure to reduce blackouts and ensure reliable power supply.

Mechanization and automation in Ethiopia's agroporcessing sector have not yet caused significant job losses, but targeted training programs are needed to close technical skill gaps and help employees adapt to new technologies (Baumüller et al., 2023b). A survey of manufacturers shows that all firms use machinery for processing and packaging, with 20% employing computer-controlled automation. Most machines are imported from Asia and Europe. Reported benefits include improved product quality, greater efficiency, reduced costs and lower food waste. While 96% of firms believe their staff are qualified to operate these systems, gaps in technical and computer skills remain. Automation has not led to widespread layoffs—only 9% of firms reduced staff after their last major investment, while 27% reported job gains. Many workers in automated firms have been

reassigned to new tasks as needed. To help employees adjust to advancing technologies, technical training programs are essential. Additionally, social safety nets should be implemented to address potential job losses in the future.

Climate change adaptation

Efforts at the local and national levels have helped to address impacts of land degradation and climate change in Ethiopia, but significant challenges persist (Admassie and Abebaw, 2021). Land degradation is a critical issue, particularly in the mountainous highlands, where rainfall variability and droughts undermine agricultural productivity. Farmers traditionally diversify crops and livelihoods to cope with agricultural shocks, but adoption of climate-smart technologies—such as agroforestry, rainwater harvesting and drought-tolerant crops—remains low. The government has introduced programs like the Agricultural Growth Program, Productive Safety Nets Program, Sustainable Land Management Program and Climate Resilient Green Economy Strategy to support agriculture. Despite these efforts, agriculture remains heavily rain-fed and invasive species are spreading, particularly in the lowlands where much of the livestock production occurs.

Women empowerment

Women in Ethiopia continue to bear the majority of unpaid work. Investments in services and infrastructure, such as electricity, markets, roads and agricultural technologies, could help reduce their time burdens (Getahun and Mekonnen, 2024). On average, women work 10 hours per day compared to 8.6 hours for men, with the gap more pronounced in large, low income and less-educated households where women face greater time poverty. Household labour is highly gendered, with unpaid tasks largely falling to women and children, while men focus on paid work. As a result, women's dual role in paid and unpaid work leaves them with just 0.73 hours of leisure per day, compared to 1.48 hours for men. Improving access to electricity and agricultural technologies can help reduce women's unpaid workloads and increase leisure time for all household members.

Nutrition

Market integration in Ethiopia has a greater impact on household dietary diversity than production diversity alone (Getahun and Fetene, 2021). A study of panel data from 7,110 rural households found that



improved market access positively affects both household and individual diets. Many households focus on cultivating high-value crops to boost income and access a wider range of foods through markets. Risk-averse farmers, larger farm owners and those participating in community meetings are more likely to diversify crops. Cereal production and livestock farming dominate, while dairy, fruits and vegetables remain less common. Similarly, starchy foods, vegetables and pulses are widely consumed, whereas fruits, meat and eggs are less prevalent. This indicates that policies focused solely on production diversity may not significantly improve nutrition. Instead, these efforts should be paired with strategies to enhance market access, particularly for poorer households. Supporting the adoption of agricultural technologies can further boost productivity and contribute to better nutrition and food security. More research is needed on how production diversity impacts the nutrition of children and lactating women.

KEY TAKE AWAYS FROM PARI RESEARCH IN ETHIOPIA

Agricultural challenges: Ethiopia's productivity is constrained by rainfall variability, land tenure insecurity, limited input access, weak extension services and poor infrastructure. Low adoption of fertilizers and improved seeds also persists, despite their potential to boost yields.

Farmer innovation: Ethiopian farmers create cost-effective and locally adapted innovations. However, these solutions need rigorous validation, strategic commercialization and targeted support to empower women innovators.

Mechanization in agroprocessing: Continuous training is needed to support companies and workers in effectively adopting and utilizing machinery for processing.

Youth in agriculture: Young agripreneurs face barriers like limited credit and land. Training and funding programs are crucial for their success.

Women's burden: Women's time poverty from unpaid domestic work requires solutions like better infrastructure, electricity and agricultural technologies.

Market access for nutrition: Market integration impacts dietary diversity more than production diversity. Policies should enhance market access and food variety for rural households.

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All studies are available at www.r4ai.org.

PARI implementing partners: ZEF/University of Bonn, University of Hohenheim, the Forum for Agricultural Research in Africa (FARA) and its national partners, the African Growth and Development Policy Modeling Consortium (AGRODEP) facilitated by AKADEMIYA2063, and research collaborators in India.

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