

Food systems transformation in China and Africa: experiences, lessons and future directions

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1 Introduction

The transformation of agrifood systems represents one of the most critical challenges of our time, particularly for regions supporting large populations while facing complex environmental, social and economic pressures. China and Africa, collectively home to over 2.9 billion people, exemplify both the urgency and the diversity of approaches needed to build resilient, sustainable and inclusive food systems. While both regions have achieved significant progress through various agricultural and food policy initiatives over recent decades, they now confront a new generation of complex, interconnected challenges. These include the double burden of malnutrition, encompassing micronutrient deficiency, overweight and obesity, alongside mounting pressures from natural resource depletion, climate variability and external shocks such as extreme weather events, plant and animal diseases, regional conflicts and trade disruptions.

Addressing these challenges requires enhanced cooperation and knowledge sharing, exemplified by emerging initiatives such as the China-Africa Food System Policy Network that facilitates mutual learning and coordinated responses. This special issue of *Frontiers of Agricultural Science and Engineering* brings together the latest research that examines the experiences, innovations and lessons learned from food systems transformation efforts from these two vital regions. Seven papers provide valuable insights into policy innovations, technological solutions and cooperation mechanisms driving this transformation.

2 Key contributions and findings

Environmental sustainability and climate action represent critical priorities for the agrifood systems of both China and Africa. Li et al. (doi: [10.15302/J-FASE-2025609](https://doi.org/10.15302/J-FASE-2025609)) analyze carbon emissions across China and Africa's agrifood systems, finding that these regions contribute 32% of global agricultural emissions through distinct pathways. China's emissions have evolved from production-focused to encompassing pre- and post-production stages, while Africa's remain predominantly production-based. This analysis offers crucial insights for developing differentiated climate mitigation strategies that account for varying development stages and agricultural structures.

Technology innovation and digital transformation offer promising pathways for addressing information asymmetries and promoting sustainable practices. Ning et al. (doi: [10.15302/J-FASE-2024590](https://doi.org/10.15302/J-FASE-2024590)) investigate the role of digital agricultural technology extension services in promoting sustainable farming practices, specifically focusing on organomineral fertilizer adoption among Chinese farmers. Using propensity score matching methodology with data from 1167 farmers, their research demonstrates that digital extension services increase the probability of organomineral fertilizer adoption by 7.2%–10.2% through two key mechanisms: enhancing the benefit perceptions of farmers and reducing transaction costs. The study reveals how digital platforms overcome temporal and spatial limitations of traditional extension models, enabling personalized technical guidance and improved information access. This research highlights the

transformative potential of digital technologies in addressing information asymmetries and promoting environmentally sustainable agricultural practices.

Nutrition and human development are examined through two distinct approaches in this special issue. Lufuke and Tian (doi: 10.15302/J-FASE-2025645) examines the complex relationships between agricultural production patterns and nutritional outcomes in Tanzania, uncovering a nutritional paradox in high-production bread basket regions. The study tests mechanisms including working times of mothers and household dietary patterns, finding that dietary diversity correlates positively with crop production in low-productivity areas but becomes insignificant in high-production regions. Shifting from agricultural production effects to nutrition program evaluation, Zhang et al. (doi: 10.15302/J-FASE-2025611) analyze China's Nutrition Improvement Program using longitudinal data from 345,255 observations across 222 schools (2016–2020). The program, providing daily meal subsidies to over 40 million rural students, significantly promoted height and weight development while reducing urban–rural gaps. Importantly, rural participants showed superior physical fitness performance that expanded over time, offering practical strategies for African school feeding programs through comprehensive evaluation metrics and standardized implementation guidelines.

Trade and market integration emerge as powerful drivers of food security enhancement. Ma et al. (doi: 10.15302/J-FASE-2025617) provide a rigorous quantitative analysis of China–Africa agricultural trade impacts on food security using multi-country general equilibrium modeling and empirical analysis. Their findings reveal significant welfare gains from enhanced agricultural trade liberalization, with African countries achieving welfare improvements of nearly 19% through increased real incomes and improved household access to food. The study demonstrates how structural complementarity between China's processed goods diversification and Africa's high-value exports creates sustainable food security pathways.

Systems approaches and policy frameworks are explored through comprehensive analyses of resource management and subsidy reform. Lei et al. (doi: 10.15302/J-FASE-2025646) provide a comprehensive systems framework for understanding how China and Africa are addressing resource, environmental and climate challenges through agrifood system transformation. Their analysis reveals that both regions face

critical challenges including land degradation, water scarcity and biodiversity loss, while experiencing intensified climate-related risks such as droughts, floods and extreme weather events. Their paper emphasizes the importance of enhanced cooperation through science and technology exchange, strengthened bilateral trade, and establishment of a China–Africa Food Policy Network to support mutual learning and inclusive development. The study advocates for a holistic approach that integrates efficiency, resilience and sustainability objectives across production, market and consumption components of food systems. Wu et al. (doi: 10.15302/J-FASE-2025624) examine agricultural subsidy policy evolution in China and Africa, revealing significant differences in policy orientation, that is, China's comprehensive, sustainability-focused approach contrasts with Africa's emphasis on immediate productivity gains and poverty reduction. Their comparative analysis identifies key reform pathways including transitioning from input subsidies to comprehensive support systems and aligning subsidy programs with broader transformation objectives.

These studies collectively highlight several critical themes. South–south cooperation emerges as essential, with China's agricultural modernization experiences offering valuable lessons while Africa's diverse agricultural systems provide insights for sustainable development. Technology and innovation appear central to transformation, from digital extension services to climate-smart practices, though context-specific adaptation remains crucial. Policy integration proves necessary, as single-sector interventions often produce limited outcomes compared to comprehensive approaches addressing multiple system components.

3 Conclusions

This special issue demonstrates that food systems transformation in China and Africa requires nuanced, context-specific approaches that learn from both successes and challenges. The research presented here provides valuable insights for policymakers, researchers and development practitioners working to build more resilient, sustainable and inclusive food systems. The experiences of China and Africa offer important lessons for other developing regions facing similar challenges. By continuing to foster collaboration, innovation, and knowledge exchange, these regions can lead the way in demonstrating how comprehensive food systems transformation can contribute to sustainable development, poverty reduction and improved human well-being.

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