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Developing Africa's next generation of scientists for sustainable food systems transformation

Significance:

We reflect on the FSNet-Africa model of strengthening research capacity for food systems transformation in Africa. By equipping early-career researchers with skills to undertake engaged, transdisciplinary research and fostering collaborations with stakeholders, the model has led to context-relevant innovations and strengthened policy linkages. Outcomes include improved researcher competencies, international partnerships, and tangible tools for food system resilience. The FSNet-Africa approach demonstrates how locally grounded, stakeholder-informed research can drive sustainable change, offering a replicable model for building the next generation of African scientists committed to equitable and inclusive food systems development.

Introduction

South Africa's food system presents a significant paradox. Despite having a sufficient food supply, the country faces considerable challenges, such as widespread under- and overnutrition, environmental degradation, deep socio-economic inequalities, and a slow pace of transformation toward inclusivity.[1] Local food systems are increasingly recognised as a vital solution to challenges, such as those faced in the South African food system.[2]

Local food systems contribute to improved nutrition and food security through promoting the cultivation and consumption of diverse, locally grown, culturally acceptable and nutrient-rich foods[3]; create economic opportunities (particularly for smallholder farmers, informal traders, and marginalised groups such as women and the youth)[4] by creating employment opportunities; and empower communities to have control over their food production and distribution. Furthermore, local food systems can contribute to environmental sustainability by encouraging agroecological farming practices[5] and shortening food supply chains and decreasing the need for long-distance transportation.[6] Importantly, local food systems help mitigate the effects of food insecurity during global supply chain disruptions and localise control over food sovereignty.[7]

Engaged research can play a pivotal role in identifying local food systems solutions and innovations that address context-specific challenges, ensuring that interventions are tailored to the realities of local communities. Defined as a collaborative approach in which researchers and stakeholders – such as communities, policymakers, and practitioners – work together throughout the research process, engaged research is rooted in real-world problems and aligned with the needs and values of those most affected. This co-production of knowledge not only enhances the relevance and practical applicability of research, but also fosters trust, transparency and accountability, increasing the likelihood that research outcomes will inform and improve policy and practice.[8]

There is increasing pressure for publicly funded research to demonstrate that it is contributing to the type of impact and change that engaged research can deliver. Yet, there is limited training provided at the postgraduate level in Africa to develop the skills required to achieve impact, for example, through influencing policy or practice.[9] A new cadre of researchers with different and more diverse skills who can collaborate across disciplines and outside of academia is needed. In this Commentary, we reflect on the model adopted by the Food Systems Research Network for Africa (FSNet-Africa) to develop early-career researchers' skills for delivering engaged research, as documented by Mkandawire et al.[10] While this Commentary is situated within the context of South Africa's food system challenges, the FSNet-Africa model itself is continental in scope. Implemented across six African countries, the initiative provides a platform for drawing broader lessons on strengthening research capacity and food systems transformation across diverse African contexts.

The FSNet-Africa model aligns with several strategic policy and practice frameworks that shape food systems and research capacity development in South Africa and beyond. Globally, it contributes to the objectives of the Sustainable Development Goals, particularly Goals 1 (Zero Poverty), 2 (Zero Hunger) and 13 (Climate Action), and is consistent with the focus of the 2021 United Nations Food Systems Summit on sustainable food systems transformation. At the continental level, FSNet-Africa supports the African Union's Agenda 2063 and complements the Comprehensive Africa Agriculture Development Programme (CAADP) by enhancing agricultural research and innovation capacity. Nationally, the initiative is aligned with South Africa's National Development Plan (NDP) 2030, which emphasises inclusive economic growth and food security, as well as the Department of Science, Technology and Innovation's Decadal Plan for Science, Technology and Innovation, which prioritises transdisciplinary research, science–policy engagement, and the development of a next-generation research cohort. FSNet-Africa contributes to these strategic agendas by equipping early-career researchers with the skills and networks required to engage meaningfully with policy processes and co-create solutions with non-academic stakeholders.

The FSNet-Africa model

The FSNet-Africa project aimed, inter alia, to develop skills for engaged research through its two-year experiential research-capacity-building programme targeted at early-career researchers. The research undertaken in the project by the early-career researchers (the Fellows) was intended to be relevant to African food systems and focused on tangible outcomes and impact. FSNet-Africa further aimed to enhance the networks of researchers: between disciplines, across career phases, across Africa, between Africa and the world, and between academia and society.

Twenty early-career researchers (who were within 10 years of completing their PhDs) from 10 universities in six African countries (Ghana, Kenya, Malawi, South Africa, Tanzania and South Africa) participated in the programme. They worked with a network of 60 researchers in these countries and the United Kingdom.

The FSNet-Africa model is distinguished by three interrelated features: an experiential learning approach, a multi-mentorship structure, and the embedding of ongoing stakeholder engagement. Together, these features support the development of skills for engaged research. They offer potential for replication in other capacity-strengthening initiatives (scaling out), for integration into institutional frameworks (scaling up), and for fostering shifts in research culture and values (scaling deep).

The FSNet-Africa experiential research-capacity-building fellowship provided funding for Fellows to conduct research during the fellowship, with capacity-strengthening interventions undertaken while the research project implementation was ongoing. Structuring the programme in this way facilitated learning through practice.

The capacity-strengthening interventions were aimed at embedding five key skills essential for conducting engaged research: project management, responsible research, research methodology, research impact assessment and communication. There were seven primary interventions during which Fellows' capacities were strengthened, including a structured orientation, two summer schools, a write shop, science communications training and a stakeholder engagement dialogue. Additional training was provided online as needed. The content of the different training events was aligned with the phases of the research project cycle – conceptualisation, implementation and dissemination. Through this alignment, the project delivered just-in-time training. Figure 1 demonstrates the alignment of the research process and the capacity-strengthening activities.

FSNet-Africa's approach to capacity strengthening was intentionally designed around the principles of experiential learning, where researchers build competencies through direct application in real-world contexts. This approach enabled Fellows to immediately apply knowledge acquired through training activities (e.g. science communication or stakeholder engagement) within their ongoing research projects, reinforcing skill acquisition through practice. Capacity development extended beyond technical research skills to include soft skills such as leadership in transdisciplinary teams, communication with non-academic audiences, and navigating institutional structures. This holistic skill set is critical for researchers working at the intersection of science, policy and practice.

Each Fellow was supported by at least one mentor from one of the African academic partner institutions and one from the University of Leeds (United Kingdom). The two mentors were chosen in combination to provide different disciplinary insights into the interdisciplinary team. Each Fellow was also supported by a University of Pretoria researcher (referred to as a UP host) whose primary role was to expand the Fellows' networks within the institution. This structure facilitated the development of international and intra-Africa networks and enabled networking across career phases.

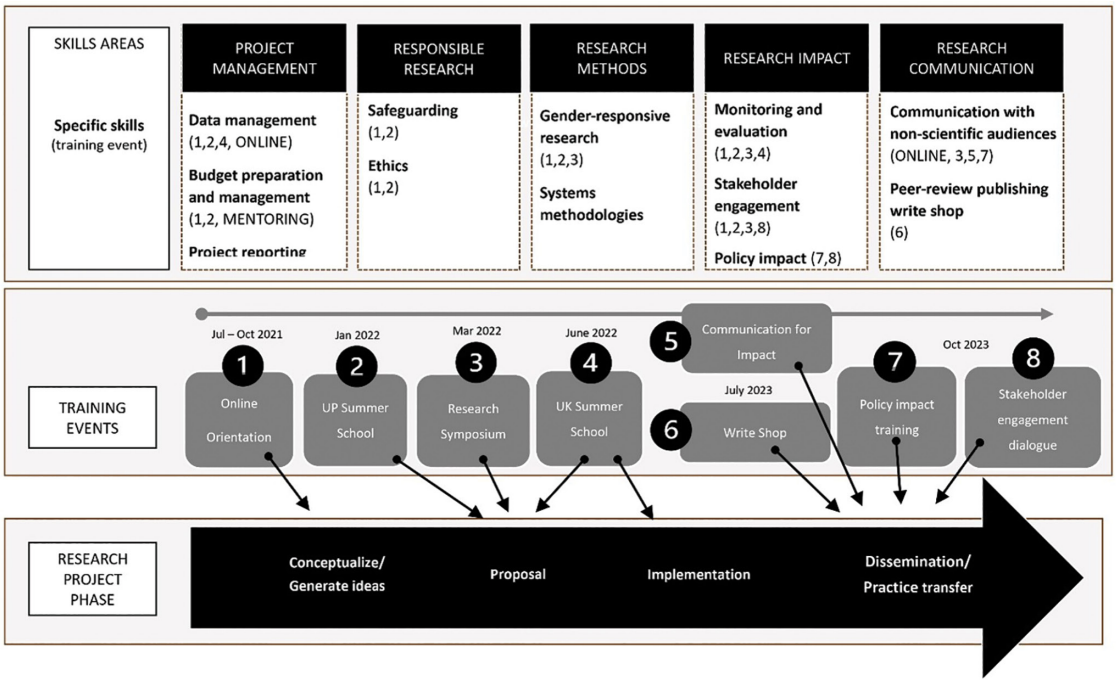
A critical feature of the fellowship was the stakeholders' role in the research process. From orientation, when Fellows were conceptualising their research ideas, they were tasked to collaborate with food systems stakeholders to define the research they would undertake. Stakeholders remained embedded in the research process, with several collaborating with Fellows to undertake the research, and with Fellows returning to stakeholders with the outcomes of their research. FANRPAN was primarily responsible for facilitating these engagements as a boundary-spanning organisation.

FSNet-Africa is aligned with a broader ecosystem of initiatives that aim to build food systems capacity across Africa, including the African Union's Science, Technology and Innovation Strategy for Africa (STISA-2024) and the African Centres of Excellence (ACE). In doing so, the programme not only contributes to individual and institutional capacity but also supports a systems-level approach to strengthening Africa's research and innovation landscape in agriculture and food security.

Outcomes and emerging impact

Professional development

Ongoing monitoring and evaluation were undertaken within the FSNet-Africa project to provide insight into the value of the fellowship to the Fellows. Self-reported skills assessments were undertaken at baseline, midway through the fellowship, and at the end of the fellowship. Results of the comparison of skill levels prior to and after the fellowship show that 80% of Fellows improved their capacity to conduct gender-responsive research, 75% improved their capacity to engage stakeholders in research and monitor research impact, and 60% improved their ability to engage with policy audiences.[10]



Source: ©2024 Mkandawire et al.[10] (reproduced under a CC BY 4.0 licence).

Figure 1: Illustration of Fellows research project implementation with capacity-building interventions.

Many Fellows continue to work with mentors and stakeholders, including through the development of joint funding proposals. Several Fellows received promotions within their institutions, signalling the value of their contributions. One Fellow, from the University of Dar es Salaam (Tanzania), was named one of the Top Agri-Food Pioneers by the World Food Prize Foundation. This accolade celebrated her significant contributions to sustainable agriculture and youth empowerment in Africa. She attributes this achievement to her participation in FSNet-Africa.[11] While many Fellows achieved important milestones, this example illustrates how the model supported visible, sector-recognised leadership.

Local solutions to promote food systems transformation

The FSNet-Africa approach of co-creating research with stakeholders resulted in enhanced partnerships with non-academic stakeholders. Fellows exchanged knowledge and expertise with stakeholders, including farmers, policymakers, civil society organisations, and the private sector.

Impact-ready outputs from FSNet-Africa include a range of products to improve the nutrient quality of food[12], including a recipe book, an infant porridge and a biscuit, all made from indigenous crops and ingredients that are readily available to the community. One Fellow explored the potential for *Moringa oleifera* to be used as a sustainable broiler feed additive to reduce the use of antibiotics in chicken farming.[13] Other outputs, yet to be finalised and published, include a mobile application for farmers to measure fertiliser application to improve soil health and reduce water pollution, and the use of fruit-peel waste to create more nutritious silage-based food for ruminant goats.

Harnessing partnerships for impact

International partnerships can play an important role in building capacity for engaged science. These collaborations facilitate knowledge exchange, provide access to resources, and enhance policy advocacy. In doing so, international collaborations bridge local needs with global expertise.

FSNet-Africa has demonstrated the value of international collaboration in developing research capacity. The University of Pretoria acted as project hub, with nine African universities as the spokes and two UK partner universities. FSNet-Africa contributed to the nomination and shortlisting of the University of Leeds/University of Pretoria strategic partnership as a finalist for The Times Higher Education Awards Partnership of the Year 2024. This nomination highlighted the impactful partnership between the two institutions, particularly through the FSNet-Africa initiative, which addresses critical challenges in food security and climate-smart agriculture.

Partnerships are also critical for strengthening the science–policy interface, which requires more than building capacity within academic institutions. Policy actors and boundary-spanning organisations also play a vital role in enabling the uptake of research into policy and practice. Within FSNet-Africa, this interface was supported by the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN), which served as a key boundary organisation facilitating collaboration between researchers and policy stakeholders across Africa. Such intermediary mechanisms help bridge institutional and disciplinary divides, create platforms for engagement, and support knowledge brokerage. Future capacity-building initiatives should explore how formal partnerships with national and regional policy bodies, advisory platforms, and evidence observatories can be institutionalised to deepen policy responsiveness and strengthen science-informed decision-making.

Challenges and lessons learnt

The FSNet-Africa model is a model that can enhance collaboration across disciplines and between academia and broader stakeholders to develop the next generation of researchers who are equipped to tackle complex challenges such as food systems transformation. The FSNet-Africa model was presented during a side event at the World Food Prize Borlaug Dialogue and has been taken up as a case study in the UN Food and Agriculture Organization's guidance on strengthening national science–policy interfaces for agrifood systems.[14] With the growing demand for collaboration and partnerships, such models need to be institutionalised to disrupt the silo mentality and advance collective action.

However, institutionalising such models requires systemic change. Universities and funders must adapt structures and incentives to support transdisciplinary work, reward stakeholder engagement, and prioritise real-world outcomes. At the same time, ongoing investment in research infrastructure, policy linkages, and inclusive partnerships, both local and international, is vital to sustain momentum and scale successes.

Conclusion

The FSNet-Africa model demonstrates a promising pathway for building the next generation of African researchers equipped to lead food systems transformation through engaged, transdisciplinary science. Its experiential learning design, multi-mentorship approach, and emphasis on stakeholder co-creation have not only strengthened individual capacities but also fostered enduring networks across disciplines, sectors and borders. The initiative's early outcomes (ranging from improved research skills and career advancement to context-relevant innovations) highlight the model's potential to generate meaningful, locally anchored impact. While FSNet-Africa was designed to generate research impact, its enduring contribution to the deliberate development of a cohort of African researchers equipped to lead future science–society engagements should not be overlooked.

Future research could explore the integration of additional capacity-building strategies within engaged research models like FSNet-Africa. In particular, examining the impact of job shadowing and incubation models could yield insights into how to deepen experiential learning. Furthermore, investigating the development of communication and leadership skills for researchers working in multidisciplinary and transdisciplinary teams would help to strengthen collaborative research for impact.

As global interest in transforming food systems grows, the FSNet-Africa experience provides valuable insights into how capacity-building, collaborative science, and local ownership can work in tandem to advance sustainability and equity in African food systems.

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Declarations

We have no competing interests to declare. We have no AI or LLM use to declare. Both authors read and approved the final manuscript.

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