RESEARCH BRIEF

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Topic: Urban Food and Nutrition Security Resilience through Urban Agriculture: A Circular Economy Approach

Based on the EfD Discussion Paper by the authors.

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Research questions

1. How do small, low-cost climate-smart gardens affect food and nutrition security in dense urban settlements?
2. What is the impact of using recycled fertilizer (frass) alongside low-cost climate-smart gardens on household welfare and food production?
3. How do the outcomes of low-cost climate-smart gardening differ between male- and female-headed households?

Key Messages

1. Urban agriculture boosts food security and household resilience.
Families with climate-smart gardens were up to 35% less likely to face hunger, produced five to six times more food, and spent up to 35% less on food purchases, strengthening dietary diversity and income stability.

2. Women benefit most from climate-smart gardening.
Women-headed households saw the largest improvements in food and nutrition security, highlighting urban farming's potential to empower women and promote more inclusive, resilient communities.

3. Circular urban agriculture advances multiple sustainable development goals.
By using recycled fertilizer (frass), these initiatives reduce organic waste and sanitation challenges while contributing to Zero Hunger (SDG 2) through improved food access, Gender Equality (SDG 5) by empowering women, Sustainable Cities (SDG 11) by fostering resilient urban communities, and Responsible Consumption and Production (SDG 12) through recycling and waste reduction.

Background and Methodology

Kenya's urban population is expanding rapidly, and with it, food insecurity. According to the Kenya Integrated Household Budget Survey (Kenya National Bureau of Statistics, 2018), low-income households in urban areas spend about KES 5,705 (US$38) per month on food. In Kibera—home to between 600,000 and 1 million people within just 2.1 km²—our 2023 baseline survey found that 74.5% of households were food insecure, with families spending an average of KES 14,083 per month (about 73% of their income) on food.

Urban residents in informal settlements such as Kibera typically occupy single-room dwellings, have irregular sources of income, and purchase food that is often expensive and varies in quality. Poor sanitation and limited waste management worsen the problem. These conditions call for affordable, space-saving, and sustainable food solutions. Urban agriculture—especially when linked to circular economy practices like waste recycling—offers a practical solution.

The study was conducted in Kibera, Nairobi, between May and November 2023, involving a sample of 789 households distributed across 150 clusters. It employed a clustered randomized controlled trial design with three groups: Group 1, which received a climate-smart garden only; Group 2, which received both a climate-smart garden and frass (recycled) fertilizer; and a control group, which received neither intervention. Baseline and endline household surveys were carried out to track changes in food and nutrition security, dietary diversity, household spending, and food production over the study period.

Results

Urban agriculture significantly improved household food and nutrition security, diet diversity, and income:

- Families with gardens were **up to 35% less likely to face hunger**.
- **Food production increased five- to sixfold**, giving families a steady source of vegetables.
- **Women-headed households** benefitted the most — gaining stronger food and nutrition security and household resilience.
- Households spent **11–35% less on purchased food**, freeing income for other needs.
- The use of **recycled fertilizer** reduced organic waste, easing sanitation problems common in informal settlements.

Policy Recommendations

Integrate urban agriculture into national and county food and nutrition security policies. Recognize small-space gardens as formal interventions.

Finance expansion. Support vulnerable households—especially women—with subsidies, credit, or starter kits (approx. USD 25 per garden with a ten-year lifespan).

Promote waste-to-fertilizer enterprises. Partner with private sector

players to turn organic waste into safe, affordable fertilizer.

Train and equip communities. Offer practical skills for managing climate smart gardens and using recycled fertilizers effectively.

Prioritize women. Mainstream gender in all urban agriculture programs.

Track progress. Use data to measure improvements in food and nutrition security, diet, income, and well-being over time.

The Environment for Development initiative is a capacity-building program in environmental economics focused on international research collaboration, policy advice, and academic training. It consists of centres in Central America, Chile, China, Colombia, Ethiopia, Ghana, India, Kenya, Nigeria, South Africa, Sweden (University of Gothenburg), Tanzania, Vietnam, Uganda, and the US (Resources for the Future). Financial support is provided by the Swedish International Development Cooperation Agency (Sida).