NUTRITION *in* CITY ECOSYSTEMS

March 2022

FARMERS' SURVEY

KENYA

Key insights into farming systems in **Bungoma**

The Nutrition in City Ecosystems (NICE) project works to improve nutrition and reduce poverty by increasing the supply of and demand for nutritious foods that are produced using agroecological practices in six secondary cities across Bangladesh, Kenya, and Rwanda. The NICE project works closely with local governments at city level and facilitates locally led actions to improve nutrition through agricultural, food, and health sector collaborations and public-private engagements, with strong emphasis on the role of women and youth entrepreneurs (see *Project Factsheet*).

Agroecological practices apply the concept of agroecology (utilization of ecological and social concept and principles in the design and management of sustainable agriculture and food systems) in agriculture. NICE specifically concentrates its efforts on five of the 10 main agroecology elements shaping sustainable food systems transformation: efficiency, recycling, diversity, resilience, and culture and food traditions.

Source: FAO

Nutritious foods are foods, that in the context where they are consumed and for the individuals that consume them, provide beneficial nutrients (e.g. vitamins, major and trace minerals, essential amino acids, essential fatty acids, dietary fibre) while being poor on potentially harmful elements (e.g. antinutrients, quantities of saturated fats and sugars etc.)

Source: GAIN

The six cities where NICE works are secondary cities, characterized by a relatively modest spatial scale and a physical proximity to rural areas, distinguishing them from primary or mega-cities. In these cities, food producers reside close to urban consumers, making shorter food supply chains with fewer intermediaries at least a possibility. The potential for direct producer-to-consumer connection offers practical opportunities for transforming food systems, notwithstanding it is quite common even for urban and peri-urban households to produce small amounts of food at the homestead in these contexts.

This short report gives the result of a farmers' survey held in March 2022 in Bungoma, Kenya. Bungoma is a secondary city within the Bungoma county in western Kenya. Agriculture is the main economic activity in Bungoma county with two growing seasons that follow the long rains and short rains periods. Maize covers 95% of the land under food crop production in Bungoma and 80% of the value of food crops produced annually in Bungoma county is from maize, still, the majority of farmers are reliant on rainfall for watering their crops.

150 rural and peri-urban farmers, representing a farming household, were interviewed in the Farmers' survey to complement more nutrition-focused data collected as a baseline for the NICE project among urban residents in the secondary city. Sampling was purposive to include farmers who are producing for the local market and to interview female farmers with a target of 50%.

Data from farmers and small holders were collected using an adapted version of a tool called Self-evaluation and Holistic Assessment of climate Resilience of farmers and Pastoralists (SHARP+) developed by the Food and Agriculture Organization (FAO). The SHARP+ tool collects a mix of quantitative and qualitative data on various aspects of farming households, such as fertilizer application, sales outlets, daily consumption, and more. All the questions in SHARP+ serve a dual purpose: Firstly, they help gauge the prevalence or distribution of specific practices among farmers, often presented as percentages. Secondly, they contribute to understanding farmers' resilience levels through a combined score derived from the thematic questions. Farmers' resilience levels are expressed in a set of 13 behavior-based resilience indicators scaling from 0-10. High scores indicate a high presence of the resilience indicators, suggesting a more resilient farming system.

Penguin Agricultural Consultants Limited with their specifically recruited enumerators familiar with the local agricultural context and local language and culture collected the data, supervised by the NICE team. Data collection was approved by the local authorities and all findings have been discussed with various district stakeholders in November 2022.

Household information

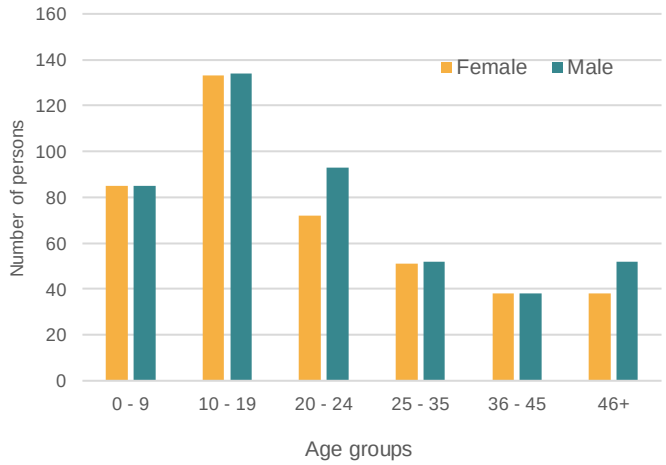

Figure 1: Age group distribution of the sampled household population in Bungoma

The farmers' survey in Bungoma covered 156 households. Of these, 52% were headed by males, 45% by females, and 3% were jointly headed by both.

Children (0-9), adolescents (10-19), and youth (20-35) were the predominant age brackets in the households, indicating a population leaning towards younger individuals. The average household size among the sampled households was 5.1 individuals with relatively even age-based gender distribution.

Farming practices

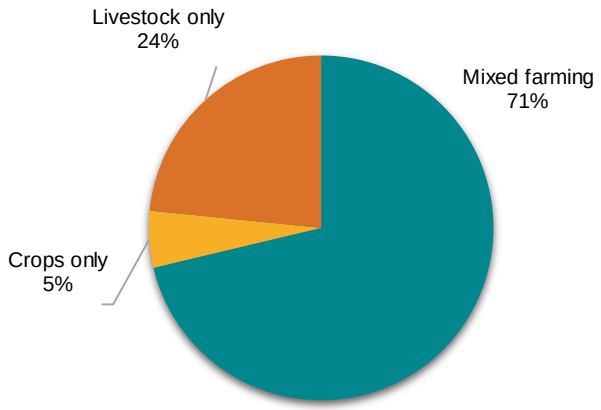

Figure 2: Different farming systems practiced in Bungoma

The farming system in Bungoma predominantly featured mixed farming practices, with 71% of respondents combining crop and livestock farming. Although 24% of the respondents engaged solely in livestock farming, crop production is relatively uncommon, practiced by only 5% of the respondents. 59% of the respondents also indicated to relay on non-farm income sources besides their revenue from agricultural activities. The fact that a third of the participants kept some form of farming records suggests a measure of proactive management within a segment of the farming community.

Crops and animals

The diversity of crops grown in Bungoma suggests a multi-faceted agricultural landscape. Maize (97%) and beans (90%), which are staple crops providing the primary sustenance for the local population, dominate the agricultural scene. Alongside these, a variety of crops, including seasonal ones that are planted and harvested within a single year, and perennial crops that live for multiple seasons and yield harvests over time, are also cultivated as shown in table 1.

Table 1: Household participation in production of crops

Staple crops	% of households engaged in production	Seasonal crops[a]	% of households engaged in production	Perennial crops[b]	% of households engaged in production
Maize	97%	**Tomato**	10%	**Banana**	78%
Beans	90%	**Arrowroot**	10%	**Avocado**	38%
Groundnut	64%	**Onion**	9%	**Mango**	32%
Amaranthus	55%	**Sorghum**	8%	**Sugarcane**	23%
Black nightshade	52%	**Cabbage**	5%	**Coffee**	9%
Spider plant	51%	**Finger millet**	4%	**Lemon**	4%
Cowpea	50%	**Sesame**	3%	**Orange**	1%
Sweet potato (White)	36%	**Carrot**	3%		
Cassava	30%	**Bambara**	2%		
Sweet potato (Orange)	26%				
Soybean	18%				
Pumpkin	13%				

[a] Seasonal crops are plants that are cultivated and harvested during specific times of the year.
[b] Perennial crops are plants that live for multiple years and produce crops year after year.

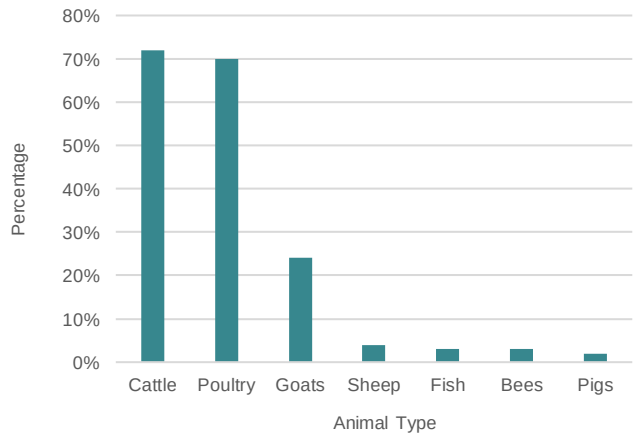

Figure 3: Household participation in production of animals

Among the households interviewed in Bungoma, livestock farming is predominantly focused on cattle and poultry, with a considerable majority of households (72% and 70% respectively) engaged in their rearing, followed by goat rearing (24%), while only few of the respondents engaged in sheep (4%), fish (3%) bees (3%) or pig (1%) farming.

Fertilizers and pest management

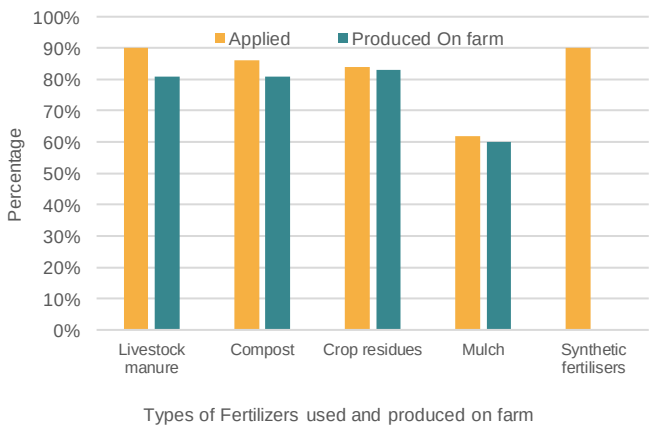

Figure 4: Organic and synthetic fertilizer use in Bungoma

The sampled households adopted a variety of approaches to soil fertility management, combining the use of on-farm produced organic inputs with external synthetic inputs. The high adoption rates of livestock manure (90%), compost (86%), and crop residues (84%) indicate a commitment to recycling organic materials within the farming system. Many farmers produce almost all the organic fertilizers on-farm highlighting a strong inclination towards self-sufficiency.

A vast majority of crops were adversely affected by pests, especially the fall armyworms (83%), in the 12 months before this survey. Farmers applied many different pest management practices. Synthetic pesticides are the

dominant countermeasure (90%) of farmers, but there were also other strategies applied encompassing both traditional and novel methods. Overall, while the majority of farmers using synthetic pesticides read the guidelines before application, 35% of respondents indicated not to use protective gear while handling pesticides which may raise health and safety concerns.

Table 2: Pests and pest management practices

Farmers ...	%
... significantly affected by pests in the last 3 years	83
... significantly affected by pests attacking crops specifically	82
... applying pest management irrespective of whether they are affected by pest	81
Which pests affected them the most	%
Army worm	36
Aphid	13
Cutworm	13

Seeds varieties and sources

The majority of households in Bungoma obtain seeds from shops or markets (97%) or through self-production (58%), reflecting a combination of market-driven and traditional seed procurement practices. The prevalence of multiple seed sources among households suggests a level of diversification in seed acquisition, which can contribute to crop resilience and adaptation to changing conditions.

Table 3: Sources of seeds for seasonal and perennial crops in Bungoma.

Variety of seed sources	% of households	Number of seed sources for each household	% of households
Shop or market	97%	**Households with 1 source**	46%
Own production	58%	**Households with 2 sources**	58%
Family/friend/neighbour	19%	**Households with 3 or more sources**	33%
Plant nursery	15%		
Cooperative	10%		
Government	4%		
NGO	4%		

Looking at the inclination of farmers toward traditional local varieties versus new varieties, it is seen that in Bungoma farmers prefer local, traditional breeds over new breeds in livestock farming while this difference in preference cannot be seen for crop farming where preference do not differ.

Agroecological practices

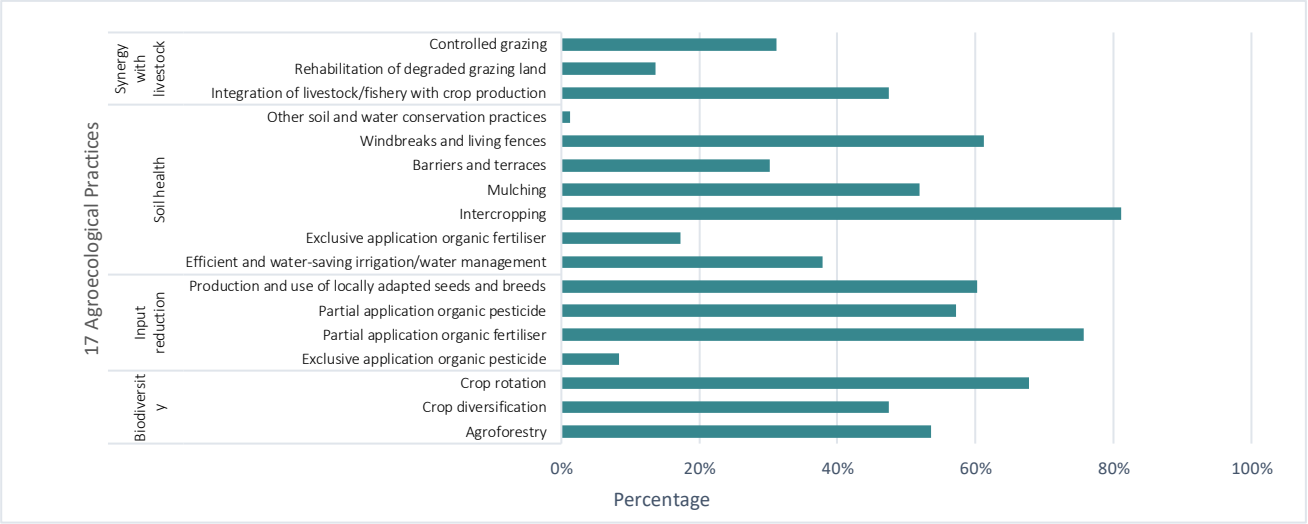

Figure 5: Agroecological practices applied by the respondents. Agroecological practices specifically asked for are in line with definitions used in other projects, e.g. promoted by Swissaid

In Bungoma, our data indicate a mixed level of adoption of agroecological practices in surveyed households. Intercropping, partial application of organic fertilizers and crop rotation are adopted in more than two thirds of the surveyed households, suggesting that these practices may serve as entry points for broader agroecological adoption within the community. Integration of livestock/fishery with crop production, windbreaks and living fences, mulching, production and use of locally adapted seeds and breeds, partial application of organic pesticides crop diversification and agroforestry are also moderately adopted. However, there are practices with lower adoption rates, such as exclusive application of organic pesticides, exclusive application of organic fertilizers, barriers and terraces, and rehabilitation of degraded grazing land. Other soil and water conservation practices have very low adoption rates.

Market access

Selling locations and prices

In Bungoma, the majority of interviewed households prefer selling their agricultural produce directly to neighbours or through local markets within a 1 km radius, which suggests the importance they place on convenience and accessibility.

Local and community-based commerce seems to be very important for the agricultural economy in Bungoma.

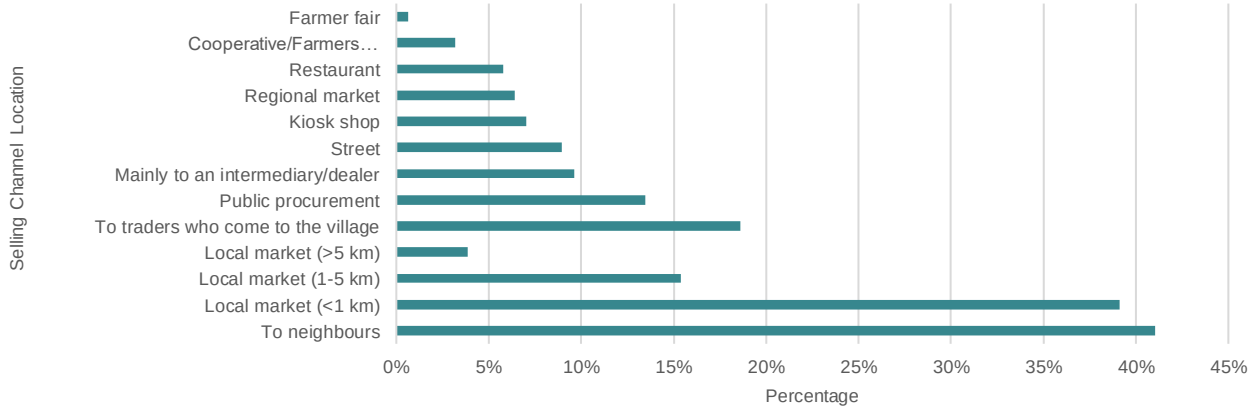

Figure 6: Selling locations of farming output in Bungoma

Post-harvest practices

Post-harvest activities vary depending on the crop and its intended use. For maize, immediate consumption, cleaning, and sorting are the post-harvest practices adopted most often, while for groundnut refrigerated storage and packaging are more common. Many sampled households in Bungoma transport their own animal products for selling. Other post-harvest practices such as packaging and refrigeration were practiced much less and many post-harvest practices are underutilized, highlighting opportunities for improvement. Notably, none of the respondents holds sustainability certifications due to skepticism, limited availability, or perceived complexity.

Women & youth empowerment

Women participation in farming practices

When asked about their participation in agricultural decision-taking, female respondents affirmed the broad prevalence of joint decision-taking in farming activities; particularly when it comes to decisions regarding subsistence crops (where 87% affirmed joint decision-taking) and post-harvest processing (where 92% affirmed joint decision-taking) but also regarding inputs (varieties, seeds, 84% joint decision-taking). Joint decision-taking is much less common when it comes to livestock farming (only 51% joint decision-taking re large stock animal production and cash crops, 66%).

Food consumption

The dietary pattern of the surveyed households reveals a strong inclination towards plant-based foods, with bread being a significant component for 96% of the respondents. Vegetables also play a critical role in the daily diet, featured in the meals of 97% of households. Additionally, a noteworthy 87% of households exhibit a fondness for coffee or tea. The moderate to low consumption of animal proteins such as meat and fish, evident in 39% and 35% of households respectively, may be indicative of economic constraints, cultural practices, or health-conscious choices.

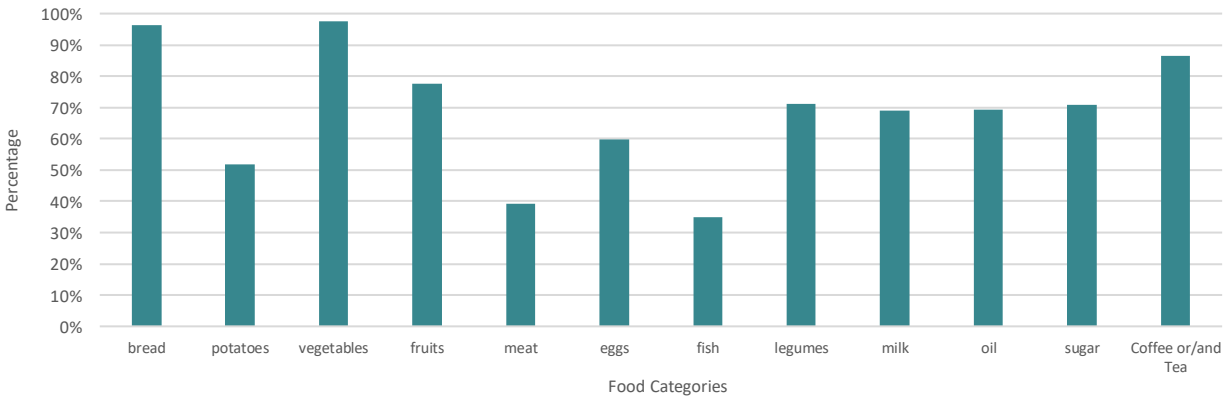

Figure 7: Respondents' household food consumption patterns in the 24 hours prior to the survey

It is important to note that this analysis provides a snapshot of food consumption patterns at the time of the survey without delving into underlying factors such as seasonality of produce or personal dietary habits or requirements.

Farmers' resilience

Figure 8 illustrates scoring on each of the 13 behavior-based resilience indicators evaluated with the SHARP+ tool and provides a detailed assessment of Bungoma's food system resilience.

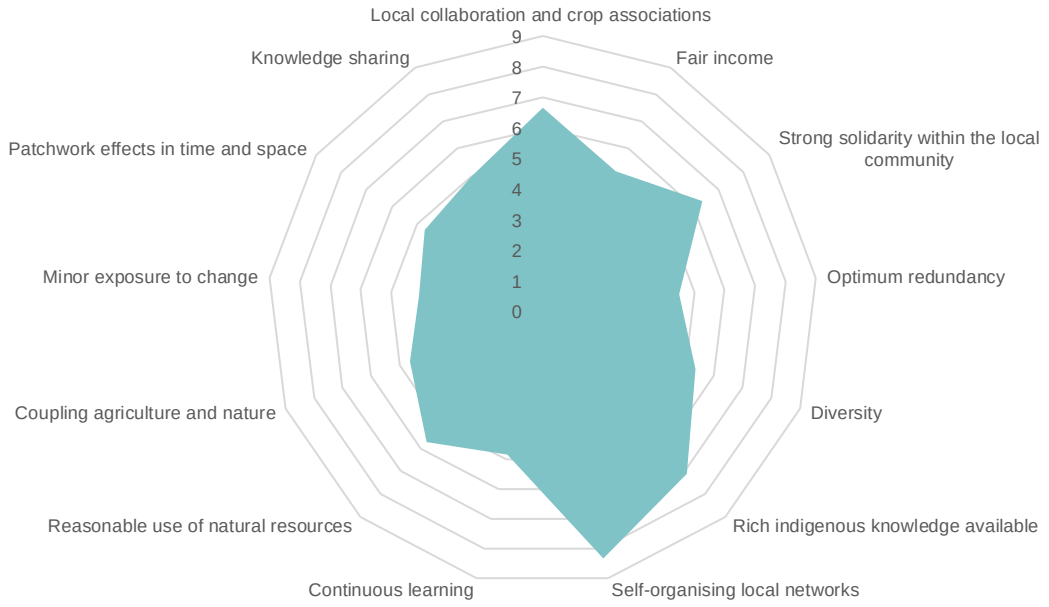

Figure 8: Representation of scoring on the 13 agroecosystem indicators of Cabell & Oelofse (2012)

The standout strength of the surveyed farmers and small holders in Bungoma is their 'self-organizing local networks'-power, receiving a score of 8.3/10 indicating strong collective actions and cooperative structures such as farmer's group and co-operatives. The strong grassroots connectivity provides a fertile ground for the dissemination and adoption of agricultural innovations and effective knowledge sharing. This is also accompanied by high scores for 'local collaboration and crop associations', 'strong solidarity within the local community' and 'rich indigenous knowledge available', affirming the community's commitment to preserving and incorporating traditional knowledge into farming, which have historically been central to resilience and adaptability.

A score of 4.1/10 on 'minor exposure to change' signals a moderate vulnerability of Bungoma's farmers community that needs attention as it underscores the importance of targeted interventions aimed at enhancing the adaptability of farmers, such as the adoption of Good Agricultural Practices (GAP), to improve resilience to disruptions. Moreover, 'coupling agriculture and nature' (4.6/10), particularly regarding the presence of beneficial insects, requires substantial improvement. By enhancing these aspects, the farming community can contribute to ecological sustainability and long-term resilience.

Economically, the 'fair income' indicator at (5.1/10) presents a nuanced situation. While it indicates that farmers can sustain their livelihoods, there are potential challenges in ensuring consistent incomes. Efforts to stabilize earnings, reduce external dependencies, strengthen market connections, manage price fluctuations, and diversify income sources can steer farmers toward heightened economic resilience. Strategies like diversifying income sources and having backup resources are paramount for enduring resilience amidst unpredictability.

The strengths, notably the community unity and traditional knowledge, can be pivotal in reshaping farming practices aligned with ecological principles, paving the way for a more resilient and prosperous farming future. Employing the deep-rooted interconnectedness and respect for traditional practices, interventions can be strategically developed to enhance ecological sustainability and introduce diverse farming methodologies.

Authorship: Tshering Lhamo, Agri-Food Sustainability Consultant with guidance from ETH Zurich and Sophie van den Berg Consulting

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Further information is available on the **NICE webpage:** *nice-nutrition.ch*