

Info Note

Exploring gender- and nutrition-sensitive climate-smart agriculture value chains for Nwoya District, Northern Uganda

Action research with multi-stakeholders

Patricia Bamanyaki and Perez Muchunguzi

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Key messages

- Recent statistics indicate a rise in food security among Uganda's population over the period 2014 to 2019.
- Gender- and nutrition-sensitive agriculture may improve food and nutrition insecurity by sustainably addressing underlying causes of malnutrition.
- The Climate Risk Profiling Methodology is useful in assisting district-level agricultural development practitioners in identifying and prioritizing gender-sensitive value chain enterprise options with the potential to improve household incomes, food and nutrition security.
- Four value chain enterprises that may be promoted based on economic importance, resilience to climate change, gender sensitivity and importance for food and nutrition security are cassava, poultry, goats and beans.
- Considerations for policy action to improve food and nutrition security in Nwoya District amidst climate change include: boosting local production of diverse nutrient-dense foods; enhancing sustainable agricultural productivity and incomes; social behavior change; communication focusing on nutrition; providing supportive institutions, infrastructure and services; and the use of gender transformative approaches to boost women's effective participation, agency and benefit from agricultural value chain enterprises.

Since 2014, global estimates have shown a gradual rise in the number of people affected by hunger annually, with 36 percent of the world's undernourished population (253 million people) located in Africa as at 2019 (FAO et al.

2020). Within Africa, the Eastern Africa sub-region has a high prevalence of undernourishment at 27.2 percent of the total population, compared to the Sub-Saharan Africa average at 22 percent and the Africa region's average at 19.1 percent as at 2019 (FAO et al. 2020). Before consideration of the impact of the COVID-19 pandemic, the prevalence of undernourishment among East Africa's population was projected to rise to 33.6 percent by 2030, implying that the Sustainable Development Goal 2 target of zero hunger by 2030 will not be achieved (FAO et al. 2020). In Uganda, similar trends are observed in the prevalence of moderate or severe food insecurity in the total population, which rose from 58 percent during the period 2014-2016 to 66 percent during the period 2017-2019 (FAO et al. 2020).

Among the explanatory factors advanced for the hunger situation in Eastern Africa include an increasing frequency of extreme weather events, changing environmental conditions, fast population growth and poor access to health care and education (FAO et al. 2020). Economic slowdowns, made worse by the COVID-19 pandemic, have also led to disruptions in food supply chains; increased prices of nutritious foods (especially for import-dependent countries); over-burdened health care systems; and the discontinuation or suspension of community-level nutrition-focused interventions (FAO et al. 2020).

During 2019, the International Institute of Tropical Agriculture (IITA) undertook action research with diverse stakeholders in Nwoya District, Northern Uganda, seeking to address food and nutrition insecurity among the population. The focus of the research was to identify and

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prioritize gender-sensitive agriculture value chain enterprises that can address productivity, income, food security and nutrition challenges faced by rural farming households amidst climate change. The research was undertaken under the Policy Action for Climate Change Adaptation (PACCA) project of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) in Uganda.

This Info Note describes the process and results of the research in Nwoya District and suggests implications to inform policy formulation and implementation.

Unravelling gender- and nutrition-sensitive climate-smart agriculture

Food and nutrition security is described as a state when “adequate food ([satisfying the attributes of] quality, quantity, safety, socio-cultural acceptability) is available and accessible for, and satisfactorily used and utilized by all individuals at all times to live a healthy and active life” (Weingärtner 2004). Following this description, the nutritional status of individuals and households is determined by various factors, notably:

- The physical existence (availability) of nutritious food, either from home production, food stocks, markets (local, regional, international), or food aid;
- Accessibility of resources that are enough to obtain appropriate foods for a nutritious diet, such as income, physical assets, labor and knowledge;
- Household decisions on the types of foods that are produced or purchased, prepared and consumed by household members, including intra-household food allocation (use);
- The biological ability of individuals to utilize the food consumed and convert it to energy. This is supported by other factors including the dietary intake, health status of the individual, the health environment (access to safe drinking water, adequate sanitation), access to health services and proper health-seeking behavior, care and feeding practices, among others (Weingärtner 2004).

Nutrition-sensitive agriculture is concerned with addressing the underlying causes of malnutrition (undernutrition, micronutrient deficiency, overweight) by ensuring the availability and accessibility of diverse nutritionally-dense food that is safe, culturally appropriate, affordable, and of adequate quantity and quality to meet the dietary requirements of populations sustainably (FAO 2017; FAO 2014). Nevertheless, factors such as changes in rainfall patterns, temperature fluctuations, extreme weather events and pests and diseases resulting from changing environment conditions impair food production and productivity (Global Panel 2015). Existing studies additionally reveal that the nutrient content of C3 grains

and legumes (largely food staples) is degraded at higher levels of carbon dioxide in the atmosphere (Myers et al. 2014). Consequently, it follows that (i) the technologies and practices that help to increase agricultural productivity and incomes, (ii) enhancing farmer’s adaptive capacity and resilience to climate variability and climate shocks; and (iii) reducing greenhouse gas emissions, are crucial for food and nutrition security.

While women in many farming households in the developing world play important roles as food producers, providers of household agricultural labor, care providers for family members and managers of natural resources, they have less access to resources and information, earn significantly lower wages for their labor and are less involved in strategic household decision-making compared to men (Weingärtner 2004; Bamanyaki and Aogon 2020). Women are also more affected by hunger and micro-nutrient deficiencies (especially iron during pregnancy) than men. According to FAO et al. (2020), evidence suggests that the gender gap in accessing food widened in 2019 compared to 2018. A gender- and nutrition-sensitive approach to climate-smart agriculture, therefore, recognizes the differences in needs, preferences, roles, responsibilities, decision-making authority, access to and control of resources between men and women, during the design, promotion and application of strategies, technologies and practices that focus on food and nutrition security in the face of climate change (Bryan et al. 2017; Nyasimi and Huyer 2017; Bamanyaki 2020).

Methodology

The research adapted the Climate Risk Profiling Methodology that was developed by the International Center for Tropical Agriculture (CIAT) to support agricultural development practitioners at county, district or regional level in delivering adaptation options that help farmers to cope with climate risk and vulnerability (CIAT n.d.). The methodology was adapted to emphasize aspects of gender, and food and nutrition security in accordance with the purposes of this research.

The adapted methodology involved two phases, namely, a situation analysis phase conducted between October 2018 and February 2019 and a three-day multi-stakeholder workshop that was held in Nwoya District in June 2019. The objectives of the situation analysis were to: (i) identify climate risks and map out nutrition needs, opportunities and constraints of men, women and youth along the farming systems pathway based on the impact of climate change on their livelihoods; and (ii) understand the initiatives and institutional infrastructure in place that government and non-government actors were employing to address food and nutrition insecurity in Nwoya District (Bamanyaki 2019).

Various methods were employed to collect data for the situation analysis phase of the research. A snowball approach was used to identify relevant actors (within and outside government) involved in climate risk management, food security and nutrition interventions in Nwoya district. Primary data sources included key informant interviews with 10 local government officials from the departments of agriculture, natural resource management, health, education and community development, as well as representatives from four non-government organizations with interventions in climate change, food security or nutrition in the district. Two separate focus group discussions were also held at district level that brought together the different government and non-government actors engaged in climate risk management and food security and nutrition respectively.

At the community level, focus group discussions were held with farmer representatives from two sub counties (Got Apwoyo and Alero), who were categorized into three groups, namely women (15 to 49 years); men (25 to 60 years) and youth (15 to 35 years). For each category of farmer representatives, two focus group discussions consisting of 8 to 12 respondents were conducted in each sub-county, making a total of 12 focus group discussions held in the district (see Bamanyaki 2019 for elaborate description of the methodology). The information obtained from primary sources included: perspectives on climate risk, climate-related vulnerabilities and the categories of persons most-affected; effects of climate change on agriculture, food and nutrition security in the district; local coping and adaptation strategies to climate risk; existing programs, strategies, plans and interventions related to climate change, food and nutrition security in the district; challenges or gaps in implementation of climate risk, food and nutrition security programs, strategies, plans and interventions; and suggestions to enhance climate change adaptation, food and nutrition security in the district.

Secondary data for the situation analysis was obtained from reviews of national and district-level documents (frameworks, policies, strategies, plans, guidelines, reports) relating to climate change, natural resource management, agriculture, food security and nutrition, as well as related academic and practitioner literature. In addition, a historical climate trend analysis was conducted for Nwoya District for the period 1980 to 2005 using the Climate Hazards Group InfraRed Precipitation with Station Data version 2.0 for Africa, followed by modelling of future climate scenarios for the period 1980 to 2005 (precipitation) and from 1980 to 2015 (temperature) (CIAT 2019).

The second phase of the methodology involved a three-day multi-stakeholder workshop, which brought together the actors who participated during the situation analysis

phase and relevant additional actors at district level. A total of 40 persons participated in the stakeholder workshop, which comprised of 12 district technocrats from relevant district departments; 12 representatives from non-government organizations/community-based organizations working on climate risk management, food security and nutrition; 13 farmers (8 male, 5 female); and 3 researchers from IITA.

In accordance with the climate risk profiling methodology, the objectives of the multi-stakeholder workshop were to:

- Validate the findings from the situation analysis;
- Present and discuss current and historic climate trends and projections of future possible climate scenarios for Nwoya District;
- Identify four key value chain enterprises that have adequate male, female and youth participation and are relevant for boosting household income, food and nutrition security;
- Identify climate risks and related vulnerabilities for men and women engaged in the selected four value chains;
- Brainstorm ongoing and potential adaptation and coping responses for the climate risks identified across each of the four value chains; and
- Identify institutions with interventions in climate change, food security and nutrition in Nwoya District and assess their resources and capacity to deliver adaptation options to farming households.

The workshop participants were divided into four groups consisting of 9 to 10 persons, with each group comprising of local government technocrats, non-government organization actors, male and female farmers. Each group was assigned one of the four value chain enterprises, which informed subsequent group work over the three-day period. The approach employed for the multi-stakeholder workshop involved guided group discussions, plenary presentations and validation of results for each of the four value chains.

Contextual overview of Nwoya District

Nwoya is a district in Acholi sub-region, Northern Uganda, occupying a total land area of 4,170.60 sq. kilometers. The topography of the district consists of a complex low landscape, with an altitude ranging between 1,000 and 1,200 meters above sea level (Republic of Uganda 2016). Nwoya District experiences a unimodal rainfall pattern. The wet season extends from April to October, with the highest peaks in May, August and October; while the dry season extends from November to March (Republic of Uganda 2016). The average annual rainfall for Nwoya District is 1,500 mm, while the average annual minimum and maximum temperatures are 18°C and 30°C,

respectively (Republic of Uganda 2016). According to the historic climate analysis conducted for the period 1981 to 2015, Nwoya District has experienced a declining trend in annual total precipitation and an increasing trend, albeit slight, in annual mean temperature. The extremes experienced during the period were moisture stress and heat stress, respectively (CIAT 2019). The historic analysis findings were affirmed by the various stakeholders interviewed during the situation analysis phase, who expressed high and increasing temperatures, increased weather unpredictability (delayed rains), prolonged dry seasons, heavy and short-term rains that are unevenly distributed and occurrences of hazards such as floods and hailstorms (Bamanyaki 2019).

According to the National Population and Housing Census of 2014, Nwoya District has a population of 133,506 (49 percent male, 51 percent female), with an annual growth rate of 9.9 percent (2002 to 2014) and average household size of 5 persons (Uganda Bureau of Statistics 2016). About 90 percent of the district population is rural, with crop production practiced as the main economic activity by 98 percent of the population (Republic of Uganda 2015). The major food crops grown, which also constitute non-traditional cash crops, are maize, finger millet, sorghum, sweet potatoes, cassava, groundnuts, sesame, beans, peas, and sunflower (Republic of Uganda 2015). Other cash crops grown are cotton, coffee and rice, while non-agricultural economic activities include charcoal trade, sand mining, stone quarrying and formal employment (Bamanyaki 2019). The animals reared on a largely small-scale basis include cows, goats, sheep, pigs and poultry (chicken, ducks, domestic guinea fowls and turkeys) (Bamanyaki 2019).

The Nwoya District Development Plan of 2015/16 to 2019/20 highlights the key development challenges of the district as: general poor health of the population resulting from inadequate nutrition; limited access to safe water (only 25.1 percent of the population); limited access to health services (51.5 percent of the population reside five kilometers or more from the nearest public health facility); and poor hygiene and sanitation (22 percent of the population do not have latrines) (Republic of Uganda 2015; Republic of Uganda 2017). Other development challenges of the district include the lack of national electricity grid, which affects value addition and industrialization; natural hazards (flooding, prolonged dry spells); problem animals and high incidences of pests and diseases (Republic of Uganda 2015). Gender disparity is also highlighted as a challenge to development, with females less advantaged in terms of access to education, productive resources and benefits, employment opportunities, decision-making and participation in development activities compared to men (Republic of Uganda 2015).

Prioritizing value chain enterprises for gender- and nutrition-sensitive climate-smart agriculture in Nwoya

According to the findings obtained from expert interviews and focus group discussions with farmers during the situation analysis phase, the most important agricultural value chain enterprises for food and nutrition security mentioned were beans, cassava, finger millet and groundnuts, while rice and cassava were mentioned as the most important value chains for income (Bamanyaki 2019). Other value chain enterprises that were identified as important for food and nutrition security included sorghum, sesame, green leafy vegetables (cow pea leaves), okra, cabbages and fruits (Bamanyaki 2019). A comprehensive list, which also included value chain enterprises listed in the District Development Plan, was provided to the workshop participants. IITA facilitators guided workshop participants in the identification and prioritization of four value chain enterprises that are 'climate-smart, gender and nutrition-sensitive' in accordance with the following criteria:

- *Economic importance*—vast size of the population is engaged in the enterprise value chain and the value chain enterprise contributes considerably to household income and district revenue;
- *Resilience to climate change*—ability of the value chain enterprise to withstand climate shocks considering current climate trends and future projections;
- *Importance for food and nutrition security*—relevance of the value chain enterprise as an important source of micronutrients (especially Vitamin A, zinc, iron);
- *Gender-sensitive*—the enterprise has considerable participation of women, men and youth (male and female) at different stages of the value chain.

Utilizing the four criteria developed of 'climate-smart, gender and nutrition-sensitive' value chain enterprises, IITA facilitators guided workshop participants in a ranking and prioritization exercise of value chain enterprises that are important for boosting incomes and food and nutrition security. For three out of the five criteria (i.e. *economic importance*, *productivity*, and *resilience to climate change*) the ranks ranged from 1 to 3, with 1 representing low, 2 representing medium/moderate and 3 representing high, respectively. The ranks of the remaining two criteria (i.e. *importance for food and nutrition security* and *gender-sensitive*) ranged from 0 to 1, with 0 representing 'no' and 1 representing 'yes', respectively. It should be noted that the assigning of ranks was subjective and based on the opinions of the workshop participants.

Table 1 shows the ranks that were assigned to the respective value chain enterprises by the plenary of workshop participants.

Table 1. Ranking of value chain enterprises according to climate-smart, gender and nutrition-sensitive criteria.

Value chain enterprise	Economic importance (percentage of population engaged; Low (1) = 0-29; Medium (2) = 30-60; High (3) = 61-100)	Resilience to climate change		Importance as a source of micronutrients	Gender sensitivity (women and youth participation)	Total score
		Current	Future			
Maize	3	2	1	0	1	7
Beans	2	1	1	1	1	6
Cassava	3	3	3	0	1	10
Millet	1	3	3	1	0	8
Egg plants	2	2	2	1	1	8
Local chicken	3	3	3	1	1	11
Sweet potato	3	2	2	1	1	9
Groundnuts	2	1	1	0	1	5
Sesame	2	3	2	0	1	8
Sorghum	1	3	3	1	1	9
Cow peas	3	3	3	1	1	11
Pigeon peas	1	3	2	0	1	7
Goats	3	3	3	1	1	11
Okra	1	3	3	1	1	9
Rice	3	1	1	0	1	6

As can be seen from Table 1, the value chain enterprises of high economic importance for households in Nwoya (practiced by over 60 percent of the population) were maize, cassava, poultry (local chicken), sweet potatoes, cow peas, pigeon peas, goats and rice. The table also shows that all the enterprises, except for millet, have considerable participation of women and youth at different stages of the value chains. The enterprises that were ranked as important sources of micronutrients, according to workshop participants, were beans, millet, egg plants, local chicken, sweet potatoes, sorghum, cow peas, goats and okra. Across the four criteria, the four value chain enterprises with the highest scores were goats, local chicken, cow peas and cassava respectively.

Although beans had a lower total score than cowpeas and some other enterprises, a debate amongst workshop participants resulted in its selection as a strategic enterprise for boosting incomes, food and nutrition security. It was further argued that cow pea cultivation was widespread amongst households as a food crop. The low rankings on resilience to climate change for beans were rationalized by using improved (stress-tolerant) seed varieties from certified dealers and the use of indigenous knowledge to distinguish appropriate soils for cultivation to minimize losses due to flooding.

Beans are rich in nutrients, including protein, folate, iron, potassium and magnesium and contain little or no total fat, trans-fats, sodium and cholesterol (Garden-Robinson and McNeal 2019). The folate in beans is essential to

produce red blood cells in the human body and the development of an embryo's nervous system in the early stages of pregnancy, making them especially important for expectant mothers (Garden-Robinson and McNeal 2019). The fiber and protein content in beans also contribute to short-term feelings of satiety, which may control overweight and obesity (Garden-Robinson and McNeal 2019). Beans are easily marketable in Nwoya District and are affordable for low income households.

Cassava is a drought-tolerant crop, making it an important enterprise for household food security in Nwoya District. Cassava roots are rich in carbohydrates and Vitamin C and contain traces of iron and zinc, among other minerals (Montagnac et al. 2009). Cassava leaves are rich in protein, iron, zinc, manganese, calcium and Vitamins B1, B2 and C (Montagnac et al. 2009). Cassava is also an important enterprise for income generation, owing to the variety of uses of cassava products, including animal feed, flour for confectioneries and starch for industrial processing, among others.

Goat products include meat and milk, which are rich sources of nutrients for human health. Goat milk has high levels of essential amino acids, fatty acids and minerals, including calcium, potassium, iron and zinc. (Lima et al. 2017). Goat milk also has a lower allergenicity compared to cow milk, making it a healthy choice for infants, convalescing people and adults alike (Lima et al. 2017). Goat meat is an important source of protein and iron and its low-fat content compared to beef and mutton makes it a healthier option for lowering cholesterol and controlling obesity. Goats also adapt better to hotter and drier conditions compared to cows (Silanikove 2000) and are an important enterprise for household income generation.

Poultry products include eggs and meat, which are important sources of high-quality protein, fats (monosaturated and polyunsaturated) and B-group vitamins (Marangoni et al. 2015). The local variety of chicken adapts well to hot and dry conditions and provides income to households especially during periods of drought. Chicken meat is a good source of minerals such as calcium, iron, phosphorus and zinc, as well as Vitamins A, D, C, B6, B12 and folic acid, all of which are essential for the health of pregnant women, infants and other household members (Marangoni et al. 2015). Notwithstanding, focus group discussions with female farmer representatives in Nwoya revealed that it was culturally a taboo for women to eat chicken, goat meat and squirrels.

Recent research conducted in Northern Uganda on the participation of women and men in crop enterprise value chains indicates that women and girls are responsible for secondary land preparation, planting, weeding, harvesting, post-harvest handling (drying, winnowing, sorting, packing, storage) and marketing of surplus food

crops (Bamanyaki et al. 2020). On the other hand, men are responsible for primary land preparation, seed acquisition, planting and weeding of cash crops, pest and disease management, and harvesting and marketing of cash crops (Bamanyaki et al. 2020). Concerning livestock enterprise value chains, men and boys are predominantly responsible for building kraals, animal acquisition, grazing, parasite control and marketing (Bamanyaki et al. 2020). Some women also participate in grazing (mainly tethering) and marketing of poultry and small ruminants like goats and sheep (Bamanyaki et al. 2020).

Implications for policy

Revisiting our definition of food and nutrition security and the potential for gender- and nutrition-sensitive climate-smart agriculture to address the underlying causes of malnutrition, it becomes prudent for policies, strategies and actions aimed at addressing food and nutrition insecurity in Nwoya District to consider the following:

- *Boosting local production of nutrient-dense foods:* Widescale promotion of diverse nutrient-dense plant and animal food production will ensure the availability of nutritious foods in the district. Nutrition-dense food production may be enhanced through interventions such as the promotion of specific nutritious crop and animal enterprises, nutrient fortification of staples such as cassava with vitamin A and iron (see Montagnac et al. 2009), or enriching animal feeds with essential nutrients for improved animal products. The promotion of the different value chain enterprises should be backed by adequate gender-sensitive extension services for farmers.
- *Enhancing sustainable agricultural productivity and incomes:* Access to adequate income or resources can foster the acquisition of appropriate foods for nutritious diets (Hwalla et al. 2016). With over 90 percent of the Nwoya population reliant on agriculture for livelihoods, interventions that enhance agricultural efficiency and productivity in a sustainable manner are crucial. Such interventions may include gender-responsive labor-saving technologies, agricultural water management technologies, integrated soil fertility management, conservation agriculture, animal breed improvement and diversification, animal feed improvement, crop diversification and cultivars modified for tolerance to drought, heat stress, moisture stress, and resistance to pests and diseases, among others (see Bamanyaki et al. 2020).
- *Social and behavior change communication focusing on nutrition:* Social and behavior change communication (awareness and sensitization) that focuses on changing knowledge, attitudes, practices and norms related to nutrition, feeding habits (including food taboos and intra-household food distribution), food safety and preparation, child care

and feeding practices, hygiene and sanitation, health- and nutrition-seeking behavior, among others, are essential to address the general poor health and wellbeing of the population.

- **Provision of supportive institutions, infrastructure, and services:** A supportive environment that fosters the availability, accessibility, affordability, and stability of nutritious foods is necessary to improve food and nutrition security. Taking a value chain perspective, this may include ordinances and bylaws that ensure the certification of inputs, household production of nutritious food, improved marketing, and trade, improved post-harvest handling and food safety, among others. Supportive infrastructure may include improved storage facilities that increase shelf life and ensure food safety, good roads for transportation of food products to and from markets, established input and output markets; and food processing facilities (including bio-fortification). Necessary supportive services include extension workers, market information, climate information, linkages to markets and financial services.
- **Gender transformative approaches:** Increasing women's opportunities, participation and agency in agricultural enterprise value chains, as well as decision making power at household and community level, requires the use of participatory approaches and engagement with influential norm holders (traditional leaders, extension workers, religious leaders, local authorities, among others) to transform negative social and cultural norms, attitudes and behaviors that perpetuate gender inequalities (see examples of approaches in FAO, IFAD and WFP, 2020). Women and girls should be empowered to own and control assets of economic value, and equitably access education, information, extension advice, financial services, and improved technologies, among others.

Conclusion

This Info Note has documented the processes and results of action research undertaken by diverse stakeholders to address food and nutrition insecurity in Nwoya District amidst climate change. An adaptation of the Climate Risk Profiling Methodology developed by CIAT was used to identify, rank and prioritize four value chain enterprises important for farming households of Nwoya District.

The ranking and prioritization of value chain enterprises was based on economic importance, resilience to climate change, importance for food and nutrition security and gender sensitivity, respectively. Four value chain enterprises that were advanced as important for promotion to improve household incomes, food and nutrition security are cassava, poultry (local chicken), goats and beans. The suggested considerations for policy action to improve food and nutrition security in Nwoya

District, which may also be applicable to similar districts in the Northern Uganda region, include: (i) boosting local production of nutrient-dense foods; (ii) enhancing sustainable agricultural productivity and incomes; (iii) social behavior change, communication focusing on nutrition; (iv) provision of supportive institutions, infrastructure and services; and (v) gender transformative approaches to address underlying causes of gender inequality and empower women and girls respectively. Future research may explore the development to the respective value chain enterprises and their effects on improving food and nutrition security at household, community and district level.

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Patricia Aruho Bamanyaki (p.bamanyaki@cgiar.org) is a Visiting Scientist on gender, climate change, food security and nutrition at IITA.

Perez Muchunguzi (p.muchunguzi@cgiar.org) is a Project Manager at IITA.

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