

NO 17

October 2024

Decolonizing food systems: promoting traditional vegetables for sustainable nutrition in Kenya and India

THOUGHT
PIECE

Key words:

food systems
traditional vegetables
amaranth
curry leaf
food security

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Conflicts of interest:

Wairimu Muthike, lead author on this groundwork, is also a member of the Global Institute's Strategic Advisory Committee in NNEDPro. This had no influence over the content and direction of the Groundwork.

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Abbreviations and acronyms

ASALs	Arid and Semi-Arid Lands
ECD	Early Childhood Development
GAIN	Global Alliance for Improved Nutrition
IFNuS	Improvement of food and nutrition security through building adaptive capacity to climate change in arid and semi-arid lands in Kenya
JICA	Japan International Cooperation Agency
MTK	Mobile Teaching Kitchen
PRADAN	Professional Assistance for Development Action
SANGO	Sustainable Agriculture, Nutrition and Growth Opportunities -Kenya
SODOTO	'See one, Do one, and Teach one'
V4All	Vegetable for All



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Executive summary

In Migori County, Kenya, the revolution of Amaranth (*Amaranthus* spp.) from a weed to a staple food crop demonstrates the potential of indigenous vegetables to enhance food security and foster community resilience. For a long time, the plant occurred widely as a weed, most often referred to as 'pig-weed'¹, which meant that it could not be consumed as a food crop. The Amaranth, originally from South America, is a plant that produces edible leaves and grains upon maturity. The plant also boasts drought-resistance qualities and versatility. It has since found its place in local kitchens and commercial markets. Amaranth has various nutritional benefits including producing a high amount of fiber that aids with digestion and general gut health. Its leaves can be used as salad, its stem as livestock feed, and its grains can be ground into flour. Farmers in Migori, through training, have grown and utilized this super-food, resulting in a significant boost to their livelihoods and health.

Amaranth's journey from weeds to a valuable food source is one example of how traditional vegetables can empower local communities and create sustainable food systems when given the necessary attention and support. The African Nightshade (*Solanum Nigrum*), native to several African countries, and Gogu leaves (*Hibiscus Sabdariffa*) in the Asian continent, also hold similar potential to transform not only livelihoods but also nutrition and, ultimately, food security. Over the years, these traditional vegetables have adapted to local climates and acquired cultural significance among communities. For generations, amaranth has been used as both a food source and for medicinal purposes, demonstrating its resilience and versatility. In Kenya, we see Amaranth-based products like blended flour and popcorn.

Traditional/Indigenous foods, including vegetables, have an incredible potential to contribute to better food security and economic sustainability. However,

1 National Research Council (2006)



despite being readily available and superior nutrition-wise, the inhabitants of these communities continue to suffer the twin ravages of malnourishment and nutrition-based diseases as most ignore these naturally occurring foods, consuming conventional varieties instead.

Organizations like the NNEdPro Global Institute for Food, Nutrition, and Health exist against this backdrop. Busara, among others, has been tasked with supporting local communities in improving their health (through consuming locally available foods) and establishing income-generating ventures. This two-pronged approach helps combat malnutrition while uplifting the people economically. Their efforts contribute significantly to giving indigenous vegetables local acceptance and the global recognition they deserve.

(Bokelmann et al., 2022), argue that the sustainable development goals (SDGs) for food security set in 2015 are unattainable, especially in Africa, due to population pressure, unfavorable weather conditions, and inefficient agricultural systems. Promoting the production and consumption of indigenous/traditional varieties is an important strategy to address this problem. This is partly because of these varieties' ability to adapt well to their growing conditions and require minimal input of resources, allowing for subsistence and commercial value².

Traditional vegetables are gaining attention among development professionals and researchers due to their potential to address nutrition deficiencies. These deficiencies often result from limited dietary biodiversity, which is exacerbated by the reliance on a narrow range of staple crops. Traditional vegetables can diversify diets, providing essential nutrients that are lacking in many communities' regular food consumption patterns. In the larger global south, e.g. in Kenya, only 2% of Kenyans consume the recommended daily intake of 400g of fruits and vegetables. Average per capita fruit and vegetable con-

² Abukutsa-Onyango, 2007

sumption is currently at 140g. This is in contrast to the potential. Bokelmann et al. 2022 showcase that approximately 200 indigenous plant species are used as leafy vegetables in the country. However, only a few have been fully domesticated, a few semi-domesticated, while most are still wild.

This thought piece presents emerging insights from specific nutrition and food security-facing work. The work, independently taken on by NNEdPro and Busara in India and Kenya, explores the importance of promoting traditional/indigenous vegetables. It highlights programs working within the food value chain, reimagining what global nutrition solutions could look like. Special reference is given to The NNEdPro Mobile Teaching Kitchen (MTK) initiative in India and its growth potential in similar locations, such as Kenya. The MTK is an international award-winning initiative, implemented by the NNEdPro Global Institute for Food, Nutrition, and Health.



Background

The definition of ‘vegetables’ remains inconsistent, despite being a central focus in health research. Universal definitions exist for fruits, but not for vegetables. **Cultures and norms play a significant role in defining indigenous vegetables** in different parts of the world, hence the existing definition variations. Vegetables are classified into two major categories;

1. Global or exotic vegetables include cabbages, tomatoes, peppers, and onions, which are typically grown and consumed globally.
2. Traditional vegetables are grown on specific continents.

Box 1

Eteka et al., 2010 define traditional African vegetables as plant species, wild or cultivated, originated or naturalized in Africa, and whose leaves are used in diets. He further describes them as containing high nutritional qualities and medicinal properties. Traditional African vegetables can also be referred to as African indigenous vegetables. They are defined as crops of African origin or crops that have been cultivated in the continent for such a long time that they have adjusted to the local climate and soil conditions. **There are over 400 species of leafy green vegetables domesticated or cultivated in Africa** that have been grown and consumed on the continent for several centuries³.

³ Henze et al., 2021, pp. 8

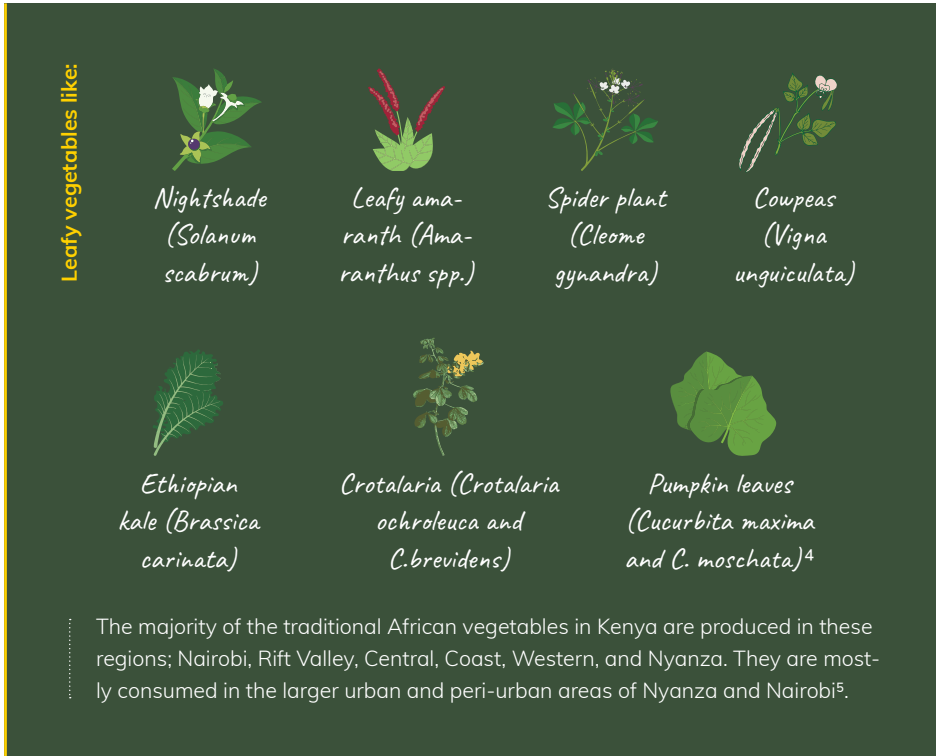
We focussed on vegetables native to India (specifically amongst the Santhali community in Bihar and Jharkhand regions) and Africa (specifically Kenya). Additionally, we introduced vegetable crops that have been integrated into local food cultures and become indigenized (Dinssa et al., 2016). As Abukutsa-Onyango (2010) indicates, the word 'traditional' typically refers to indigenous or introduced vegetable species that have been used for a long time, thus becoming part of the culture of a people. Figure one below explores the most common indigenous vegetables in India and Kenya.



Vegetable image credit: <https://stock.adobe.com>

Figure 1: Most common indigenous vegetables in India





Vegetable image credit: <https://stock.adobe.com>

Figure 2: Most common indigenous vegetables in Kenya

⁴ Abukutsa-Onyango, 2010; Oendo et al., 2015

⁵ Ndinya et al., 2021

Contextualized learnings

In the case studies that follow, we explore some of our ongoing programs and/or interventions promoting traditional/indigenous vegetables as a mechanism for improving nutrition and food security in India and Kenya.

Case Study 1

Organization: NNEdPro Global Institute for Food, Nutrition and Health

Project: Mobile Teaching Kitchen Initiative

Importance of the topic: NNEdPro's Mobile Teaching Kitchen (MTK) international Initiative can help unlock families' economic potential, transforming the livelihoods of entire communities by combating nutritional deficiencies and promoting economic prosperity through nutrition training and microenterprise,

Understanding the work: The MTK international Initiative started in 2017 in Kolkata, India, and was designed to empower communities by equipping them with knowledge and skills in nutritional best practices and micro-enterprise. Its goal is to improve the health and well-being of families, particularly marginalized children, women, and those vulnerable to nutritional deficiencies and financial constraints.

MTKs act as community hubs for health promotion as well as disease and malnutrition prevention. They run education and training sessions to encourage the adoption of low-cost healthy diets, cultivate self-sufficiency, and offer a sustainable solution to food insecurity and financial instability.

Following the project's success in Kolkata, plans are underway to adapt and scale the MTK model in several locations worldwide (the UK, the US, and Mexico) to reach more communities and positively impact their health.



The MTKs work by training women in micro-entrepreneurship, culinary health, and attaining wholesome nutrition in meals with locally sourced ingredients. This means the women can better provide their families with nutrition by learning about healthier dietary patterns and how to access affordable yet nutritionally balanced meals.

Participants are then equipped with the knowledge and skills to establish small-scale businesses centered around food, helping them further improve their economic independence. The curriculum emphasizes the importance of culinary health and the creation of wholesome meals utilizing locally sourced ingredients. This approach promotes sustainable food systems while fostering healthier dietary practices within the community and seeks to address the interconnected issues of food security, economic empowerment, and public health, ultimately contributing to the overall improvement of the community's quality of life, as explained below.

Key components of the project

- 1. Studying local cuisine:** MTK's dietitians, nutritionists, and doctors study a community's food culture, local cuisine, eating habits, and related costs. The team then researches further to fully appreciate the community's dietary needs. This helps create low-cost recipes using culturally relevant ingredients rich in micronutrients and prevents nutrition-based diseases.
- 2. Knowledge and skill sharing:** The team trains local volunteers to improve their diets and cook nutritious meals. The volunteers then pass on the teachings to other members, creating MTK champions ready to transform the entire community.
- 3. SODOTO model implementation:** This model follows the 'See one, Do one, and Teach one' principle. Participants receive nutrition advice while observing how to cook low-cost, nutritionally balanced, and tasty meals using local ingredients. By participating in the cooking process, trainees gain hands-on experience. Afterward, they teach their new culinary skills to others in the community.

4. **Training in microentrepreneurship, event planning, and project management:** Additional training enables participants to launch platforms (MTK vans) to disseminate nutritional education and sell healthy food. Establishing small businesses allows them to generate a livelihood for their families. Thereby strengthening the project's sustainability and impact. (Mitra & Bradfield, 2021).

Key impact points of the project

1. Combating nutritional deficits in marginalized and vulnerable communities through promoting the consumption of locally available food.
2. Transforming people's lives by unlocking their potential for economic growth.
3. Empowering community members to set up income-generating platforms.
4. Enhancing members' financial status and spreading prosperity to entire communities.
5. Strengthening community resilience against food insecurity through changing attitudes and dietary practices, enhancing nutrition, food sustainability, and delivering positive health impact in participating communities.

A great example of this case study would be the diet diversification the NNEd-Pro and the PRADAN team carried out for the Santhali people in India. With support from PRADAN, young Santhali people collected over 100 traditional recipes from their communities. The dietary assessment team at NNEdPro selected 32 individual recipes and 26 consumed menu templates for analysis. The outcomes and recommendations were documented in [this blog post](#).

The work undertaken in the Santhal community laid the foundation for a subsequent evaluation of the nutritional content of the Santal diet in comparison to the EAT-Lancet Commission's 2019 dietary guidelines for healthy and sustainable diets (Armes et al., 2024). This was published as part of the Nutrients



special issue on 'Plant-Based Diets for Human and Planetary Health from Diverse Food Cultures: Nutrient Adequacy and Health Effects.' The findings highlight the importance of creating culturally sensitive dietary recommendations that honor traditional diets while promoting sustainability.

Case Study 2

Organization: GAIN and Busara

Project: Vegetable 4 All

Importance of the topic: Increasing vegetable consumption is crucial for improving nutrition and health outcomes among low-income consumers in Kenya. Vegetables are a key source of essential vitamins and minerals, and their regular consumption can help prevent malnutrition and related health issues.

Understanding the work being done: The Global Alliance for Improved Nutrition (GAIN)'s Vegetable for All (V4All) project aimed to address nutritional deficiencies and promote healthier eating habits. This initiative sought to increase vegetable consumption among low-income consumers in Kenya by improving availability, affordability, and desirability.

GAIN collaboratively worked with various stakeholders in 2020 to explore the systematic aspects and depict linkages in the vegetable supply chain, including visualization of the pathways leading to low consumption among consumers. The main output was the systems dynamics model. Further, they identified broad interventions that could increase vegetable purchases and assessed their feasibility within the framework laid out by the model⁶.

Busara, in partnership with GAIN, conducted a study in Kenya from May to June 2022 to gather data on vegetable purchasing and consumption among

⁶ Global Alliance for Improved Nutrition & Busara Centre for Behavioral Economics, 2022

low-income consumers. The data from this work was used to refine the systems dynamics model and V4All interventions.

Relationship between indigenous crops and reduction of malnutrition: By focusing on improving the vegetable supply chain and consumer purchasing behavior, the V4All project directly targets the reduction of nutritional deficiencies among low-income populations.

Increased vegetable consumption can improve overall health and well-being, particularly in vulnerable groups such as children and pregnant women. The project's interventions aim to make nutritious vegetables a regular part of the diet for low-income households, thereby contributing to better nutrition and long-term health benefits.

Key components of the project

1. **Participatory systems dynamics modeling:** GAIN worked on this in 2020 to identify and map the linkages in the vegetable supply chain and understand the pathways leading to low vegetable consumption. This modeling helped identify broad interventions to increase vegetable purchasing.
2. **Behavioral economics study:** In 2022, Busara conducted a study that gathered data on vegetable purchasing and consumption habits among low-income consumers. The findings refined the systems dynamics model and inform V4All interventions.

Key impact points of the project

1. Improved understanding of the vegetable supply chain and consumer behavior.
2. Identification of feasible interventions to increase vegetable consumption.



3. Enhanced availability, affordability, and desirability of vegetables among low-income consumers.
4. Potential for improved nutrition and health outcomes in targeted communities.

Case Study 3

Organization: JICA

Project: Improvement of food and nutrition security through building adaptive capacity to climate change in arid and semi-arid lands in Kenya (IFNuS)

Importance of the topic: The utilization of indigenous crops is vital for improving nutrition, addressing malnutrition, and preserving cultural heritage in ASAL regions. Indigenous fruits and vegetables, such as Ndare (Mulberry), Nathi (Gooseberry), Kiwano (Thorn melon), Komamanga (Pomegranate), Mapera (Guava), Mchicha (Amaranthus species), and Osuga/Managu (Black nightshade), offer nutritional benefits and contribute to the biodiversity of ASAL regions.

Understanding the work being done: The IFNuS Project's mission is to enhance food and nutrition security in Arid and Semi-Arid Lands (ASALs) in Kenya, with a current focus on Turkana and Kitui. The project aims to build adaptive capacity to climate change by utilizing neglected and underutilized indigenous plant species.

Relationship between indigenous crops and reduction of malnutrition: The IFNuS project targets the reduction of malnutrition by focusing on indigenous crops, particularly in households and schools. Within IFNuS work, we recognize the potential positive influence on households and school-going children's diets. This is demonstrated by successful initiatives like the 'Ekamong'o Lunch' program, which integrates nutritious indigenous foods into school lunches.

Key components of the project

1. **ECD Vege-Lunch program:** The Early Childhood Development (ECD) Vege-Lunch aims to educate children on cultivating vegetables in their school gardens. The culled produce is then incorporated into their school lunches, the intent being to enhance the general nutrition in children⁷.
2. **Ekamong'o lunch initiative:** This initiative aims to assess the perceived value of the conventional indigenous wild vegetable, Ekamong'o (*Leptadenia hastata*). By incorporating it into primary school lunches, the program provides additional nutrients to the school meals without any extra expenses.

Key impact points of the project

1. **Improved nutritional status:** The implementation of the ECD Vege-Lunch program has improved young children's nutrition by incorporating cost-effective, fresh, locally-grown vegetables.
2. **Education and awareness:** The project has increased students' and the community's knowledge of the nutritional value of indigenous and traditional plants.
3. **Sustainable practices:** The project's focus on cultivating local indigenous vegetables enhances sustainable farming, thus preserving the local food ecosystem.

Case Study 4

Organization: SANGO - Kenya

Project: Food and nutrition security for mothers, children, families and communities

⁷ Japan International Cooperation Agency, 2023



Importance of the topic: Promoting cultivating and consuming traditional African green leafy vegetables is crucial to enhancing food and nutrition security in Kenyan communities. These vegetables are well-suited to local climatic conditions and offer significant nutritional benefits. The SANGO-Kenya project addresses malnutrition and food scarcity while preserving cultural heritage and biodiversity by empowering small-scale farmers, particularly women, to grow and consume these vegetables.

Understanding the work being done: Sustainable Agriculture, Nutrition and Growth Opportunities (SANGO)-Kenya project is set up to support small-scale women producers in increasing demand for and access to food and better nutrition during the long rain seasons. The project aims to offer agricultural training, nutrition training, and agricultural support to small-scale farmers in Kenyan villages.

Relationship between indigenous crops and reduction of malnutrition: The SANGO-Kenya project aims to reduce malnutrition in local communities by focusing on traditional African green leafy vegetables. The initiative targets households, particularly those with pregnant women, children, and infants, promoting the consumption of these nutritious vegetables to improve overall diet and health.

Key components of the project

- 1. Agriculture training:** The initiative educates small-scale farmers on how to employ environmentally sustainable agricultural practices to increase the productivity and efficiency of their indigenous vegetable farming. Additionally, it teaches about selecting proper harvest techniques to enable post-harvest consumption and seed conservation. It also focuses more on the enlightenment of farmers on the nutritional and climate-smart characteristics of African traditional vegetables.
- 2. Nutrition training:** The initiative entails training small-scale farmers on the nutritional value of the traditional African vegetables they produce, ways

in which they can incorporate the vegetables into their diets (especially for pregnant women, children, and infants), and preparation of traditional African vegetable recipes to enhance taste and nutrient conservation.

- 3. Agricultural support:** The SANGO-Kenya initiative provides small-scale farmers with farm inputs and reusable implements. It also offers professional support, including land preparation and conservation, planting, and harvesting.



a)

Source: (SANGO-Kenya, 2020)



b)

Key impact points of the SANGO-Kenya Initiative

1. Higher crop yield and lower cost of vegetables as they are consumed from the farm.
2. Improved financial security for small-scale farmers as they sell surplus vegetables.
3. Increased traditional vegetable consumption and access to nutrition at the household level.
4. Increased farmer empowerment and awareness of traditional African vegetables.



Lessons and recommendations

Before we delve into the specific lessons and recommendations from our case studies, it's important to highlight that the following insights are drawn from a comprehensive analysis of multiple case studies. These findings summarize the collective experiences and evidence gathered across various contexts, providing a holistic understanding of the potential benefits and strategies for leveraging traditional vegetables in development initiatives.

Nutritional powerhouse: Traditional vegetables are rich in essential vitamins, minerals, and dietary fiber. Many varieties contain high levels of vitamin A, iron, calcium, and other micronutrients, often missing from diets relying primarily on staple crops. Incorporating these vegetables into daily meals can significantly improve nutritional status, especially among vulnerable populations such as women and children disproportionately affected by micronutrient deficiencies.

Adapted to local climatic conditions: Besides their nutritional benefits, traditional vegetables are often well-suited to local climates and soils. This makes them more resilient to droughts, floods, and other extreme weather conditions threatening conventional agriculture. By cultivating and consuming traditional vegetables, communities can enhance food security through diet diversification, reduce reliance on imported foods, and ensure a stable source of nutrition even in challenging environments.

Cultural significance: Traditional vegetables hold deep cultural significance in many Global South communities, representing a connection to heritage and tradition. Promoting their cultivation and consumption can empower local farmers, preserve biodiversity, and revitalize traditional food systems. Developing value chains around these vegetables can generate income for small-holder farmers and contribute to local economies.

Barriers to adoption and proposed solutions

Despite their numerous benefits, several barriers hinder the widespread adoption of traditional vegetables:

Barriers

- **Limited awareness:** Many consumers and policymakers are unaware of traditional vegetables' nutritional value and culinary versatility.
- **Market access:** Traditional vegetable producers grapple with inadequate infrastructure and market linkages to reach consumers.
- **Research gaps:** There is insufficient research on many traditional vegetable varieties' agronomic properties, nutritional content, and potential health benefits.

Proposed Solutions

- **Awareness campaigns:** Implement comprehensive educational campaigns to raise awareness among consumers, farmers, and policymakers about the benefits of traditional vegetables.
- **Market development:** Establish and strengthen value chains for traditional vegetables, including improved infrastructure, storage facilities, and market linkages.
- **Research and development:** Invest in research to identify and promote traditional vegetable varieties with high nutritional value and resilience to climate change.
- **Policy support:** Develop supportive policies that incentivize the production and consumption of traditional vegetables. These include subsidies for farmers, incorporating traditional vegetables in school feeding programs, and regulations promoting their inclusion in food markets. Opening value chains around these vegetables can generate income for smallholder farmers and contribute to local economies.



Conclusion

Promoting the consumption of traditional vegetables is crucial for achieving global nutrition goals and building resilient food systems. By investing in awareness, market development, research, and policy support, we can unlock traditional vegetables' full potential to combat malnutrition, enhance food security, and empower local communities.

NNEdPro Global Institute and Busara are working together to contribute significantly to decolonizing and democratizing food systems in India and Kenya.

Leveraging past successes

The team aims to achieve this ambition by replicating the Mobile Teaching Kitchen (MTK) Initiative in various localities in the Global South, including Kenya. This initiative has received substantial support and recognition, including a seed fund from TIGR2ESS (Transforming India's Green Revolution-II by Research and Empowerment for Sustainable Food Supplies), in partnership with the Indian and UK governments.

The TIGR2ESS project promotes sustainable food systems and addresses nutritional challenges in India through collaborative research and empowerment efforts. Previously, Flagship Project 6 of the TIGRESS project focused on enhancing well-being in rural and urban communities by addressing key determinants of health, such as heredity, environment, diet, lifestyle, and socioeconomic factors. The project emphasized education and empowerment as vital elements for improving nutrition, health, and economic outcomes. It brought together social science, land economics, and nutrition experts to explore innovative intervention models through two main research themes: Nutrition-specific Education, Food, Nutrition and Empowerment (EFNE) and Education, Employment, Entrepreneurship, and Empowerment (4E). The EFNE theme involved participatory research in Indian rural communities to revive

traditional dietary practices with modern science. The 4E theme focused on enhancing skills and livelihoods through education, particularly for female smallholders. The Mobile Teaching Kitchen (MTK) and Innovation Farms were central to the project, which was tested and adapted to provide sustainable nutrition education and technology in rural settings.

Areas of Interest and Collaboration Opportunities

We aim to foster collaborations with like-minded organizations to amplify our impact and drive meaningful change. By partnering, we can leverage our collective expertise, resources, and networks to effectively address shared challenges. If you're interested in exploring collaboration opportunities, please contact the authors.

Avenues to promote the consumption of traditional vegetables include:

- **Conducting research on barriers to consuming traditional vegetables to develop interventions addressing these barriers.**
- **Developing educational campaigns targeting consumers, farmers, and policymakers to raise awareness of the benefits of consuming traditional vegetables.**
- **Working with farmers to improve the production and distribution of traditional vegetables. This includes providing training, and support, and investing in infrastructure to improve market access.**
- **Using behavioral economics such as nudges, incentives, and social marketing to design interventions that encourage the consumption of traditional vegetables.**



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About Busara

Busara is a research and advisory organization, working with researchers and organizations to advance and apply behavioral science in pursuit of poverty alleviation. Busara pursues a future where global human development activities respond to people's lived experience; value knowledge generated in the context it is applied; and promote culturally appropriate and inclusive practices. To accomplish this, we practice and promote behavioral science in ways that center and value the perspectives of respondents; expand the practice of research where it is applied; and build networks, processes, and tools that increase the competence of practitioners and researchers.

About Busara Groundwork

Busara Groundwork lays the groundwork for future research and program design. As think pieces, they examine the current state of knowledge and what is needed to advance it, frame important issues with a behavioral perspective, or put forward background information on a specific context.

How to cite:

Muthike, Wairimu; Nyaga, Wanja and Kiarie, Wanjiku. *Decolonizing food systems: promoting traditional vegetables for sustainable nutrition in Kenya and India*. Busara Groundwork No. 17 (Thought Piece). Nairobi: Busara, 2024. DOI: doi.org/10.62372/DUTW3025

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