

Preventing Micronutrient Deficiencies Using African Indigenous Vegetables in Kenya and Zambia

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Key messages

- > Many countries are now facing the “double burden of malnutrition,” in which a high prevalence of undernutrition coexists with an increasing prevalence of obesity.
- > The double burden of malnutrition is often associated with changing dietary patterns, and interventions that once focused on providing calories must now focus on ensuring that individuals and households consume adequate micronutrients.
- > African indigenous vegetables (AIVs), rich in such micronutrients and identified as limited in many populations, can meet nutritional gaps without promoting excess weight gain.

> AIVs are recognized by many communities that are at risk of undernutrition, but lack of access, availability, or cost considerations have prevented them from being consumed on a regular basis.

> While regionally consumed, AIVs are often not considered as cash crops, which has resulted in a lack of development for production and limited household consumption. Improved germplasm and production and post-harvest handling techniques, as well as culinary development and nutrition education, can improve access, availability, adoption, affordability and consumption.

The first 1,000 days

The time from conception through age 2 years, “the first 1,000 days,” is vitally important to the health of a child and for optimal lifelong health.¹ However, there are millions of women and children throughout the world without access to sufficient sources of energy, protein, minerals, and vitamins. The short-term effects of poor nutrition in childhood are manifested as nutrient-specific conditions including night blindness, anemia, poor growth and development, and severe wasting. An important long-term outcome of poor nutrition is growth retardation (i.e., stunting) and it is estimated that the global prevalence of stunting decreased from 40% to 27% of children under the age of 5 years between 1990 and 2010 and is expected to reach 22% by 2020.²

However, while in 2015 there were 98.5 million fewer stunted children than in 1990, this decrease is partly reflected by gains in some regions, but not others, as the number of stunted children in sub-Saharan Africa has increased by 12.4 million since 1995.³ At the same time, the prevalence of “hidden hunger,” a condition in which children and adults appear to be well nour-



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Children playing in Kibera, the largest slum in Nairobi, Kenya

ished or even obese, but are micronutrient-deficient, continues to increase throughout the world.^{4,5} Therefore, sustainable approaches to improving micronutrient intake are needed in low- and middle-income countries.

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The double burden in Africa

Aside from undernutrition, the prevalence of obesity is a major public health problem in high-income and many transitional countries, and has contributed to the ‘double burden of malnutrition’ – the coexistence of both obesity and underweight.^{1,2,6,7} Globally, it has been reported that the prevalence of obesity has doubled in the past 20 years in some African countries (e.g., Kenya, Niger, Rwanda and Uganda) and tripled in others (e.g., Zambia, Mali and Tanzania).^{8,9,10} Thus, while more research needs to be done to better understand the causes and implications of the double burden, interdisciplinary approaches to improving nutrition in lower-income countries remains an important public health priority.

The case for African indigenous vegetables

African indigenous vegetables (AIVs), such as African nightshade, amaranth, hibiscus, moringa and spiderplant, are traditional foods that are grown and utilized by many African communities. They are, however, often grown as subsistence crops, and often carry the social stigma of ‘famine foods.’ It is well established that a healthful diet should be diverse, with a high intake of various vegetables. Yet, in most sub-Saharan African countries there is a lack of dietary diversity and variety, and AIVs can fill this nutritional gap as an important and culturally acceptable source of nutrients.

These indigenous vegetables are generally harvested from wild populations, and often require lower inputs than ‘Western’ vegetables, are more adapted to local conditions and environmental stress and grow well under very poor soil conditions often found in parts of sub-Saharan Africa where resource-limited smallholder farmers live and farm. Aside from the nutrient density and other health-promoting properties of AIVs,¹¹⁻¹⁴ these vegetables can be used to diversify farming enterprises and improve income opportunities that generate cash over multiple time points – as compared to agronomic crops, where farmers receive cash for their product once or twice a year. These factors can mitigate risk of crop failure due to climatic change and environmental stress, and can thus be considered as candidates to promote food security and provide local opportunities for generating income and improving health and nutrition.¹¹



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Preparation of soil and manure for Home Harvests

Current use of AIVs in Kenya

The availability and use of AIVs varies somewhat by country and region, but many are already known to, or consumed by, many people in sub-Saharan Africa. The stigma attached to them limits their adoption and promotion, however. It is therefore no surprise that these nutritious leafy greens have had little culinary development and systematic scientific examination compared to European vegetables. In Kenya, the traditional method of preparing AIVs is to pan-cook the vegetables with oil, tomatoes and onions, often for several hours. Aside from the culinary monotony, lengthy cooking times reduce much of the vegetable's nutritional value. Improved culinary habits can minimize monotony and promote more frequent consumption of AIVs with higher nutrient content. Thus, our team is designing and implementing a series of nutrition interventions to improve diet quality, AIV consumption and new, yet tradition-based, recipes for preparing AIVs in Kenya and Zambia.

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“Home Harvests promote more frequent consumption of AIVs”

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Promoting AIVs in urban settings

Recently, as one component of our broader program in Kenya and Zambia to promote cultivation and consumption of AIVs in

these countries, we coordinated the training and implementation of ‘Home Harvests’ in Kibera, one of the largest urban slums in Nairobi, Kenya. A Home Harvest, also known as ‘sac gardens,’ is a garden model that provides a readily available source of vegetables to families for consumption. Residents of Kibera have access to small, informal markets, but the quality and supply are often questionable and limited. Our survey found that 53% of women reported a lack of availability of dark, leafy greens due to seasonal shortages. Moreover, the dietary diversity score of the women who participated was 3 out of 10 and 90% scored below the threshold of 5. This indicates a low dietary diversity, suggesting relative food insecurity, and is a risk factor for micronutrient deficiencies. Only 3% of the women reported eating AIVs every day, while 47% consume them one to four times a week and 38% never eat AIVs. Home Harvests promote more frequent consumption of AIVs, increasing daily intake of essential vitamins and minerals and improving dietary diversity.

In addition to household consumption, Home Harvest products can be sold to generate revenue. As income, social norms and customs influence food choice, our program was supplemented with nutrition and agricultural training conducted at the community level in partnership with Mirror of Hope, a local community group. Home Harvests are located within Kibera, reducing the need for long, daily trips to larger markets. Reducing energy required for high levels of daily activity is an important factor, as this increases the risk of undernutrition for women who may be HIV-positive or have poor access to sufficient food. The results from this pilot program will be available in 2019 when a full report of changes in income, diet, daily activity, time use and non-food expenditure will be published.



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Women from Kibera planting seedlings



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Instructions on maintenance of Home Harvests as provided by Naman Nyabinda

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“The overall objective of our programs in Kenya and Zambia is to promote the cultivation and consumption of nutrient-dense vegetables”

Using agriculture to promote development and health

The overall objective of our programs in Kenya and Zambia is to promote the cultivation and consumption of nutrient-dense vegetables, such as AIVs, to improve dietary diversity while supporting economic development. To achieve this, we use a market-first, science-driven approach to provide significant economic benefits to smallholder farmers and expand crop diversity for family farms and communities to reduce dependency and risks associated with single commodity crops.¹¹ When AIVs are introduced using excellent germplasm, alongside trainings in water collection, irrigation systems, horticultural production, post-harvest and agri-business management, these plants can be exploited to achieve food and income security.

Key interventions needed along the value chain include the identification and introduction of the best available germplasm, improvement of production systems (e.g., pest management, scheduling of plantings, water management to ensure

production across wet and dry seasons), post-harvest handling, nutrient-enhancing preparation methods, improved market access, and consumer awareness of the nutritional benefits of AIVs. Using participatory research and outreach-based activities to build capacity of stakeholders (e.g., farmers, suppliers, and consumers) through practical production technologies, narrowing knowledge gaps, and improving utilization can have major impacts on livelihoods and food security. In summary, the model described is scalable and replicable, and can be integrated into larger development initiatives to promote a healthful diet and economic development in lower-income countries, especially given that the use of AIVs has great potential to address many of the issues central to the first 1,000 days.

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