

Models Linking African Indigenous Vegetables To Improved Nutrition, Income and Health Outcomes of People at risk for Malnutrition: Selected Lessons Learned

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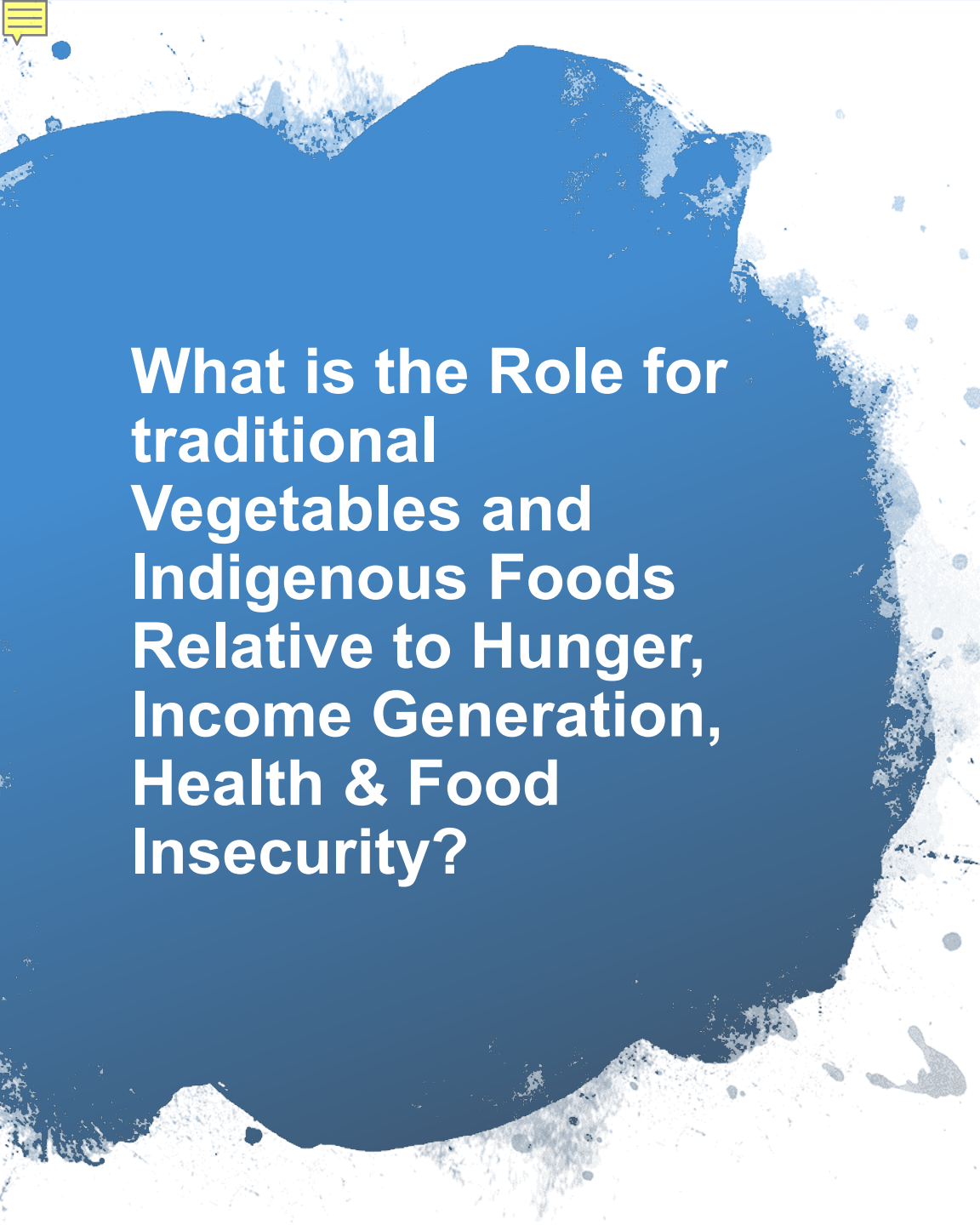


Hantambo Womens Group-Zambia



Mirror of Hope- Kenya



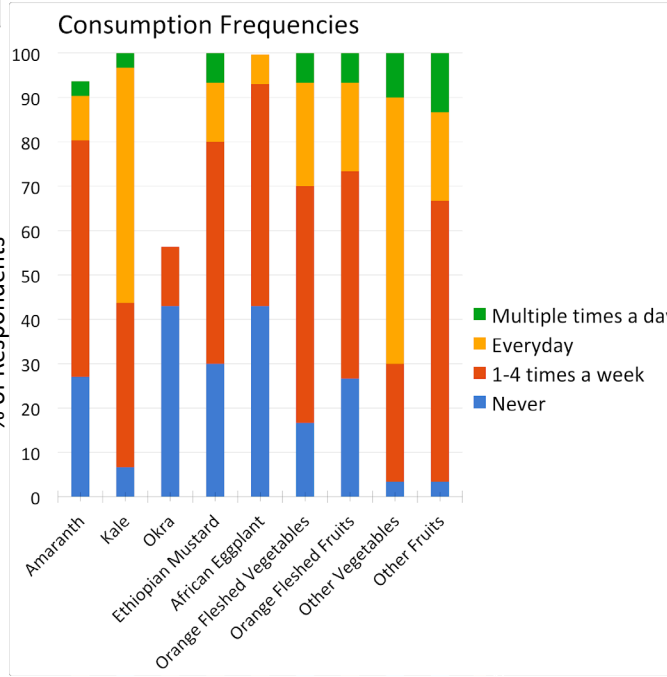
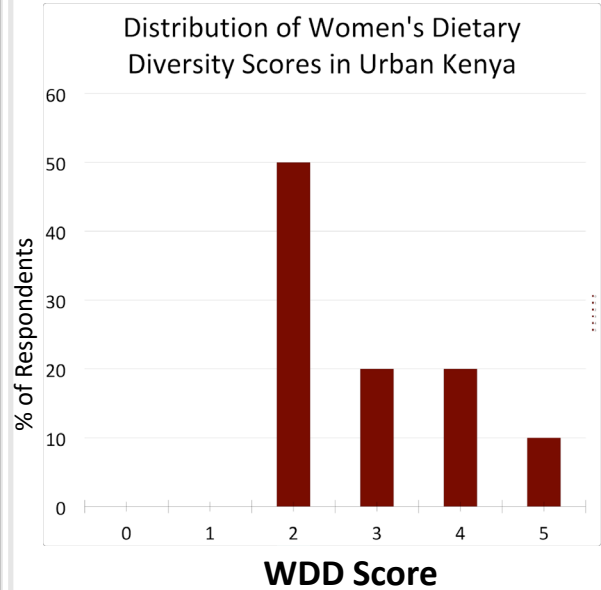


**What is the Role for
traditional
Vegetables and
Indigenous Foods
Relative to Hunger,
Income Generation,
Health & Food
Insecurity?**

- **African Indigenous Vegetables (AIVs) can provide significant opportunities to:**
 - **increase income**
 - **diversify diets**
 - **provide vitamins and minerals often lacking in single commodity based diets (cassava, maize/corn, rice).**
 - **adapt diets to environmental stresses from climate change**
- **Non-domesticated ‘crops’ such as amaranth, moringa, nightshades, spider plant can provide solutions to current problems of malnourishment when coupled to other factors.**

Why focus on indigenous fruits, vegetables & botanicals?

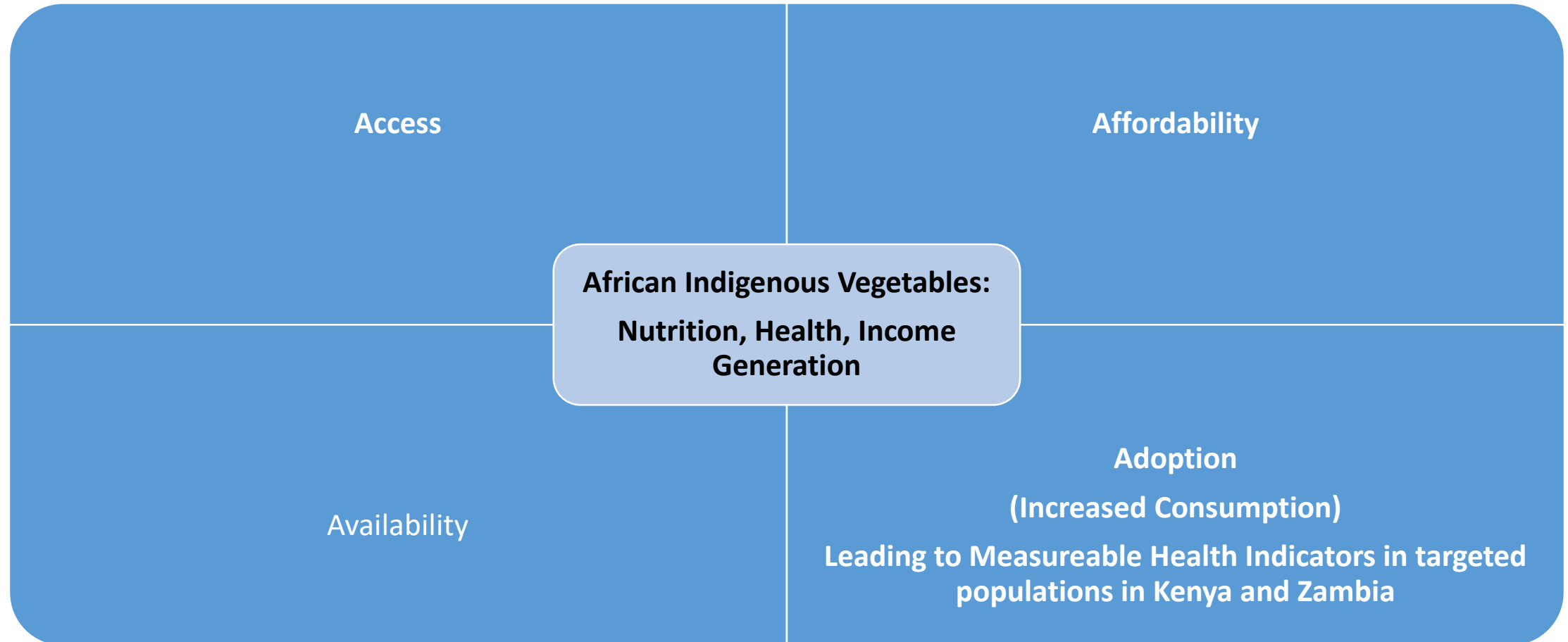
- AIVS are known to >90% of the populations in Kenya and Zambia and viewed as culturally acceptable, desired as preferred food options, but they are still rarely-to-periodically only consumed in urban areas. **An unmet market demand of more than \$100,000,000/year.**
- AIVs can provide **high income generation** (multiple harvests and seasons/year), **provide crop and dietary diversification assisted by systems approach to enhance access, availability, and adoption**
- Greater awareness to communities of their nutritional and health value coupled to recipe development and other BCC interventions can drive consumption and market demand.



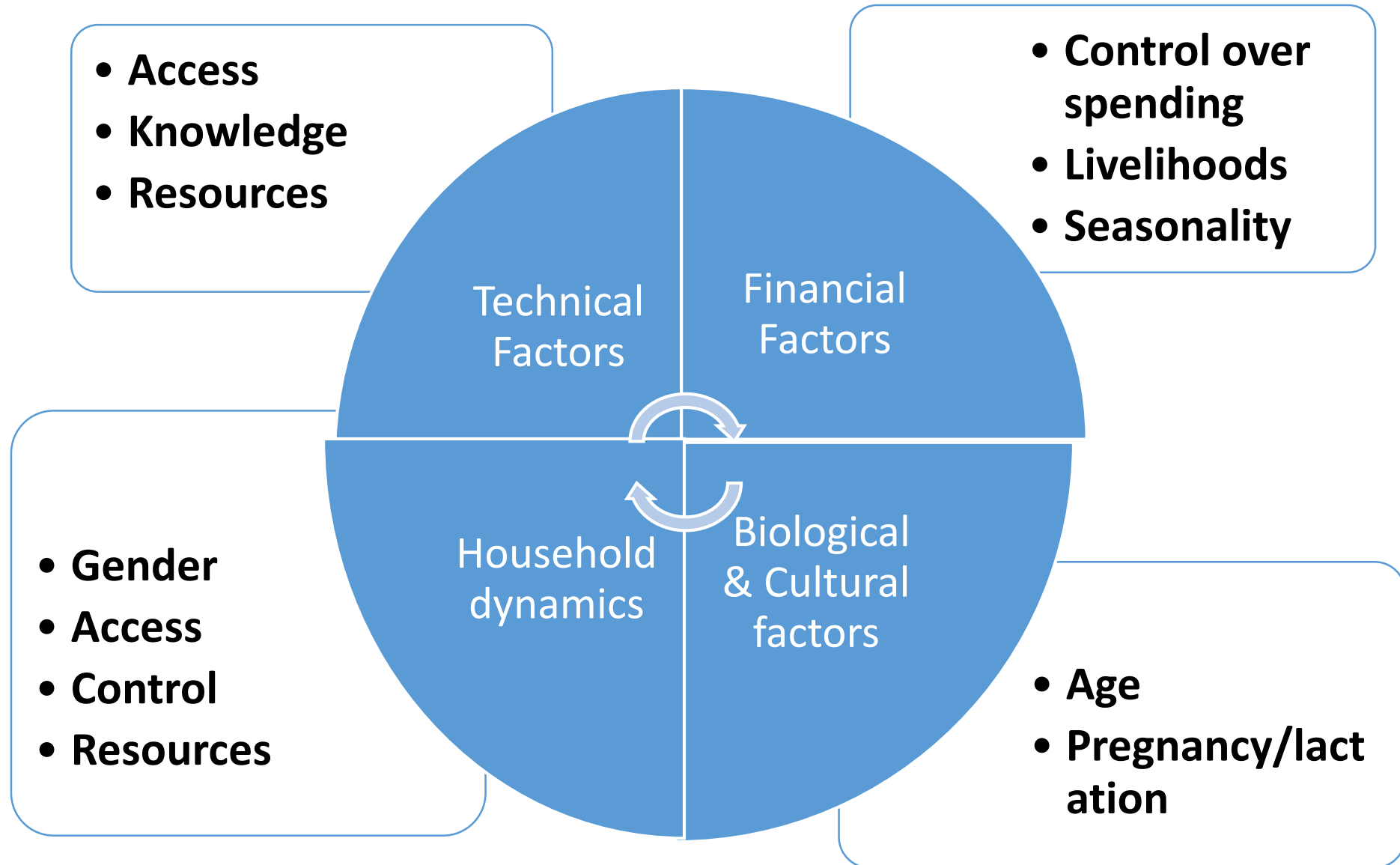
Vegetable Consumption Frequencies Urban Kenya

Project Goal: improve production of nutrient rich AIVs and increase their to improve nutrition, generate income and improve health of nutritionally at risk populations in Eastern and Central Zambia and Western Kenya

Horticulture Innovation Lab Nutrition Research Program Builds Upon the 4 A's:



Factors Impacting Nutritional Success



Nutrition and Horticultural Success Requires Many Champions and Collaborations

Private
Sector

Researchers

Seed
Developers

NGOs

Smallholder
Farmers

Funders

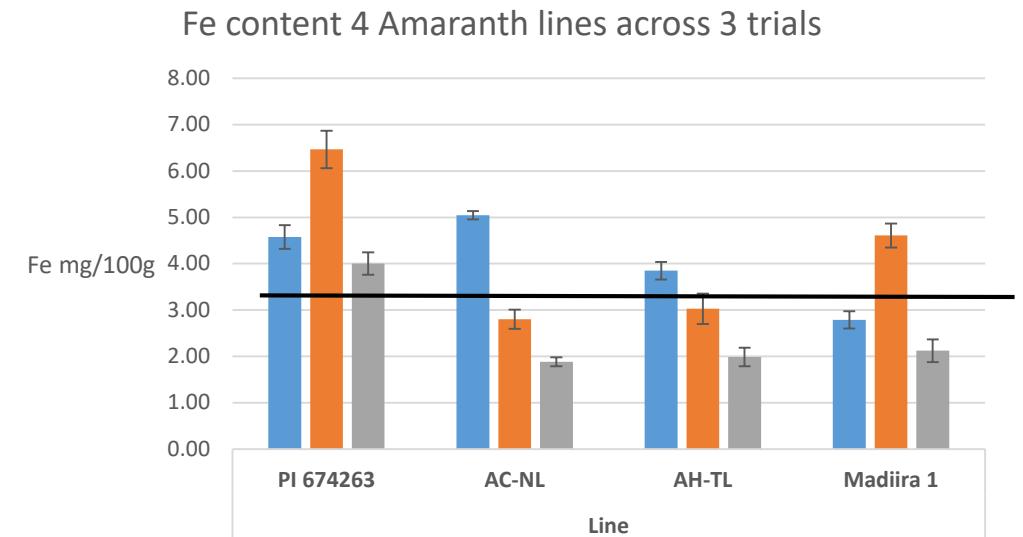
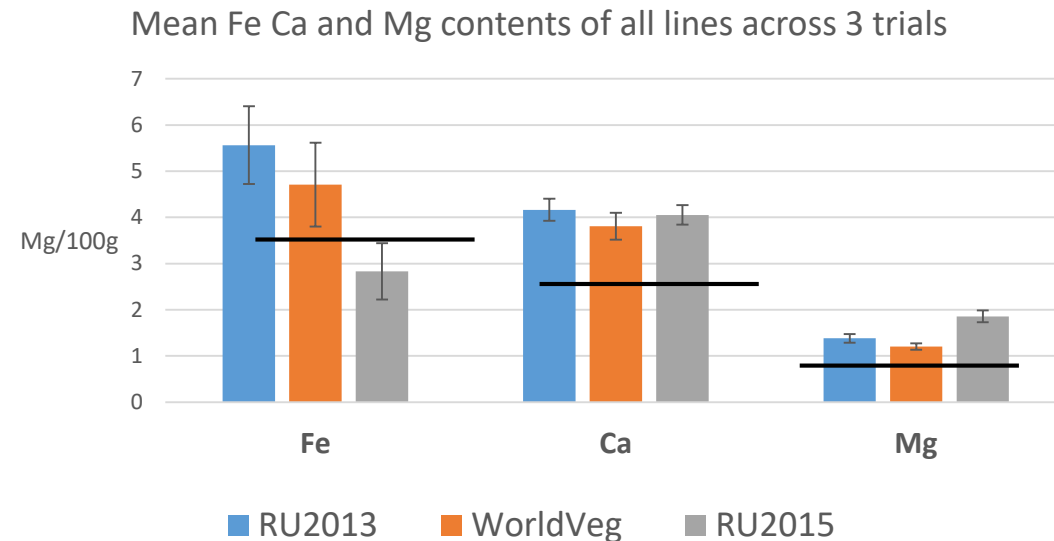
Government

Public Health
Policy

Local
Educators

Micronutrient profiling & social implications for better health: A case study with just 1 AIV; Amaranth for Elevated Fe, Ca and Mg.

- Ca and Mg above “high-source” thresholds in all amaranth populations *grown in East Africa in all field trials and across years*
- Fe varies by line and environment. *We developed high stable iron amaranth, RUAM24 which ‘appears’ to meet **growers** field performance expectations and **consumer** taste preferences. Similar micronutrient benefits shown with moringa, nightshades, and spiderplant.*



Black horizontal lines represents *Codex Alimentarius* “high-source” thresholds per micronutrient

The RUAM24 will be used in leveraged pilot funding trials to analyze blood micronutrition levels of school children in rural Kenya.

Takeaways from year 5:



Our market-first science driven models work

*includes surveys and focus groups as to what they now consume vs. what they would consume

*an effective way to plan interventions and build-in sustainability strategies from the outset

*behavior change study (BCC) venues identified by community members



New introduced AIV lines (mostly originating from collaboration with WVC) are:

*well accepted by growers

*aligns with improved nutrient composition

*must still meet grower's field performance needs, market acceptability and consumer (buyers) needs (taste, preferences) and fit into their agric. enterprises



Educational and outreach programs are effective in increasing interest and awareness of the benefits of AIVs.



Takeaways, con't:

- **Generation of income from AIVs (and other horticultural crops):**
 - Emphasis in rural communities
- **Community participation in AIVs selection**
 - Selection occurred by survey participants and which can be scientifically shown to be nutrient rich. Nutritional benefits can be a key driver in the increased consumption & trade in indigenous plants such as AIVs.



- **Low yields with AIV on small-holder farmer due to:**
 - poor soils, low fertility, low inputs, lack of knowledge, and perception that AIVs are not considered 'commercial crops'.

Leafy Greens

Amaranth with Groundnuts

Ingredients

- 2 bunch amaranth leaves
- 1 onion
- 2 tomatoes
- ½ cup groundnut flour
- 1 cup coconut milk
- 4 tbs cooking oil
- Salt, to taste

Directions

1. Sort amaranth leaves, wash and chop finely.
2. Wash and chop onion and tomato.
3. Fry the onion lightly, add tomatoes and stir until soft.
4. Add chopped amaranth and salt. Stir well and cover the pan for 5 minutes. Simmer.
5. Prepare individually the coconut milk and groundnut flour.
6. Mix the coconut milk with groundnut flour thoroughly and add to vegetable while stirring for 5 minutes.
7. Season to taste, serve hot.

Recommended Servings

1 serving of fruit or vegetables daily. Serving is the size of the person's stomach.

Cooking Recommendations

Pre-cook the vegetables for a short time to preserve the nutrients.

Keep Food Fresh and Fun

Prepare different meals by adding local ingredients such as garlic, onion, turmeric and peppers.

Created In Collaboration With

- **More on-farm improvements needed:**
 - Introduce more improved AIV varieties
 - water management year round
 - pest management
- **More Supply Chain improvements needed in:**
 - postharvest handling from farm-storage-cleaning/grading & transportation
 - collection centers/aggregation points for bulking

Takeaways: The Four “A”s

Our key goal is to link and bridge horticultural production by producers to increased consumption by consumers using the four ‘A’s: Access, Availability, Affordability, and Adoption.

For growers: Adoption=producing the AIVs and possibly consuming them.

For others, Adoption means purchasing and/or possibly starting to grow AIVs increasing consumption to improve health.

We are tracking the nutrient content of the AIVs grown locally, and identifying those which are rich sources of vitamins and minerals.

We are now tracking 1,000 households (500 in Kenya; and 500 in Zambia) and separating them into different treatment groups mentioned, will allow us to better understand what drives individuals to purchase and consume more AIVs and/or to grow their own.

What are most important challenges to meet this need?



Access and availability of water, high quality AIV seeds, and knowledge



Implementation of Good Agriculture Practices (GAP) and Global Gap to be accepted in the formal marketplace (safety and more)



Closing the 'yield gap' and introduction of appropriate technologies



As with many crops, 75% of producers can't access credit (agric. inputs after medical bills identified as primary use of credit)



From a research perspective, difficulty to document scientifically via blood samples and other measures the direct linkage between higher consumption of an AIV and the improvement in human and animal nutritional status, and the improvement in fighting infections and/or disease burdens



Our consumer and producer surveys showed growers and consumers in urban and peri-urban areas reported lack of access, affordability, availability, and while many were aware of their historical and cultural role were largely unaware of their nutritional benefit.

What do we need to do to overcome challenges? Where will the opportunities be in 10 years from now?

- **Global R&D shift from a production paradigm to a market-first paradigm**
- **Realization of economic, cultural & environmental impacts of indigenous plants for commerce, trade and value in improving health** and in strengthening entrepreneurial.
- **Including local and regional preferences for the wide diversity of AIVs-** for which we are only just touching the surface: from moringa, amaranth, nightshade; linking food choices with plants nutritional richness and consumers/families understanding or providing the fresh or final products in acceptable venues to better compete with processed food; main steaming naturally biofortified foodstuffs and value-added products
- **Ensuring safe, available & affordable water** for irrigation for year round production, access to other growing materials and land.
- **Merging of engineering with food systems:** Introduction of green technologies to support horticulture for water management (pump) to power, milling, value addition, processing, mechanization, and connections to internet and information; from solar to hydro and wind to power transport from farms to urban markets.
- ***Innovative systems to ensure social, economic and environmental sustainability***
- **Urban and peri-urban farming-** from sac gardens to intensive protective cultivation and vertical farming using significantly less water.
- **Shift from donor development focus to private sector development**

