

# Smart Food in Tanzania: Pilot study to make healthier and cost-effective school meals

## Current situation and challenges:

- Despite progress in improving nutrition, protein malnutrition and nutritional anaemia remains very high in Tanzania
- Tanzania is one of the largest producers of pigeonpea (multipurpose drought tolerant, protein rich legume which also enriches soil fertility due to nitrogen fixing capacity)
- Pigeonpea is not only a vital source of income for smallholder farmers, but a potential source of protein for families and source of fodder for livestock
- Tanzania's annual production of pigeonpea is approximately 200,000 metric tonnes, 80% of which used to be exported to India as whole grain. This reliance on export exposes farmers to high risk, as seen with the restrictions on pigeonpea imports by India since 2017, leaving farmers with excess stock and low domestic demand to buy the produce
- Pigeonpea consumption is low despite the need for protein to be included in diets of rural and urban poor, which is dominated by maize and cassava
- Low production and consumption of nutritious and climate resilient cereals like sorghum and calcium rich finger millet
- Maize is the most produced food crop. In the arid regions more suited to growing sorghum and millet, maize fails 3 out of 5 years

Tanzania is one of the largest producers of protein-rich pigeonpea. Yet, consumption is low despite the need for protein to be included in diets of the poor

## Proposed solution: Nutrition education and diversified school meals

The Smart Food project in Tanzania was designed to test a solution to tackle the lack of market for pigeonpea, sorghum and millet. These come under the definition of Smart Food as they are good for you, the planet and the farmer. The project selected **four residential schools with a total target of 2000 high school students** to implement a nutrition education training and diversify the school meals composition to include pigeonpea and finger millet recipes (partially substituting beans with pigeonpea, and maize ugali porridge with finger millet porridge). Outcomes were measured for economic, social and nutrition impact.

## Project design and implementation

**Consultation and key partners included:** The Prime Minister's office, Ministry of Education, Ministry of Health, Tanzania Agricultural Research Institute (TARI) - Selian, Export Trading Group (ETG - Farmers Foundation working with farmers to build their capacities to produce more and profitably) and Agricultural Markets Development Trust (AMDT - A trust working to develop agricultural value chains to improve livelihoods of farming communities)

### 3 main questions were tested:

- Did the students accept the changes in school meals?
- Did the Smart Food meals make economic sense?
- Did the changed recipes improve the nutritional value of the school meals?





- School Locations: 2 in Babati and 2 in Kondoa. Sites were selected due to existing projects to support farmers growing legumes and sorghum/millet
- Student population: 2000 high school students in total
- Baseline: Project analysed existing diets, perceptions and food budgets
- Previous school meal: Pure maize meal porridge, maize ugali with boiled beans, rice with boiled beans, fruit/vegetable twice a week
- New school meals: Mixed maize meal/finger millet porridge, pigeonpea stew with peanut butter served with maize, pigeonpea stew with peanut butter served with rice, fruit/vegetable twice a week
- Baseline Perceptions: Pigeonpea is bitter, smells bad, not good for mental health etc

## School staff received training on new recipes and students were given nutrition awareness education

District level nutrition officers from the Ministry of Health and chefs trained school cooks on recipes with sorghum, millet and pigeonpea. Recipes included finger millet porridge, pigeonpea with groundnut and with coconut milk.

Students were educated on nutrition values of foods and importance of diversity.

**87%** Students changed perceptions and food choices

**91%** ✓ Wanted pigeonpea in school meals

**98%** ✓ Wanted finger millet or sorghum porridge



## School meals were changed: Pigeonpea was offered 2 times a week and finger millet 2 - 7 times a week



School meals were previously reliant on maize and beans purchased from outside local area as the region is too arid to grow these crops

Pigeonpea is grown by local farmers usually for export. India's restrictions on pigeonpea imports had left farmers with surplus harvests, which was now bought by the schools. Calcium-rich finger millet is also grown in the region.



### Recipes used in the study

Meal	Recipe	Average intake/child
Breakfast	Finger millet porridge	300 ml
Lunch	Pigeonpea stew with peanut butter served with maize	250 to 300 grams
Dinner	Pigeonpea stew with peanut butter served with rice	250 to 300 grams

## Nutrition comparison of previous and revised school meals

As the schools are residential, children eat breakfast, lunch and dinner there. The previous menu included ugali (maize meal) with beans, Makande (beans with maize) and rice with beans. This study used finger millet, pigeonpea, vegetables, peanut butter and maize to formulate recipes. Students' average nutrient intake was compared before and during the study intervention and summarized in the table below.

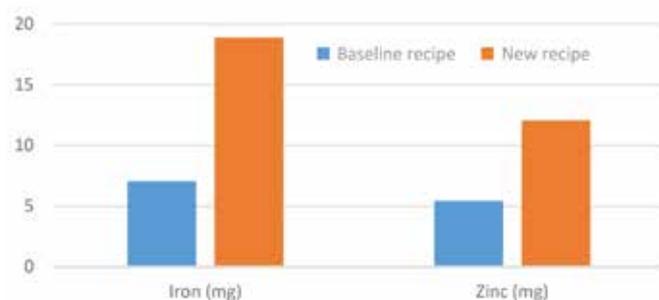
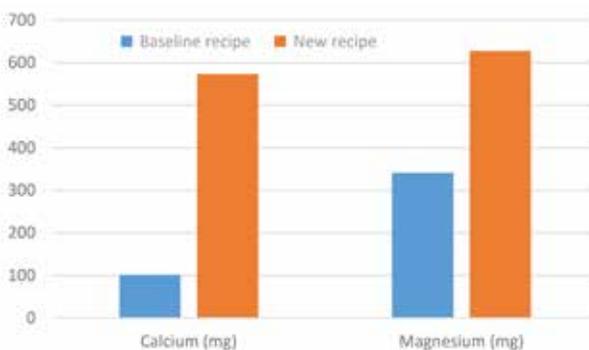
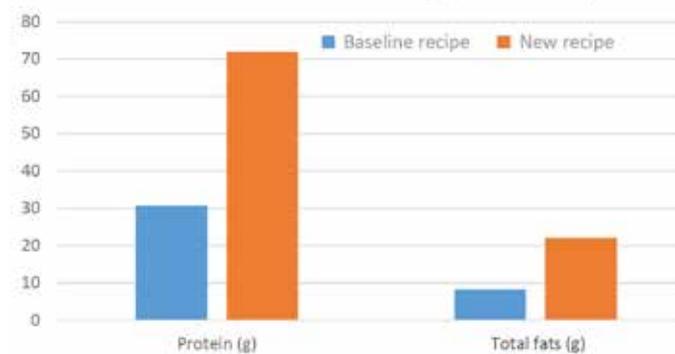
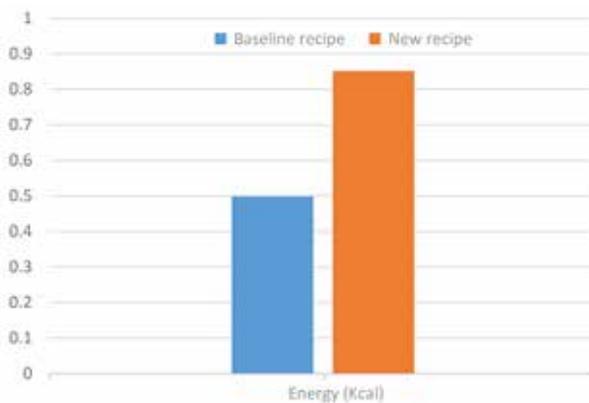
The Tanzania food composition table (Lukmajni et al., 2008) was used to calculate the nutrient value of recipes consumed before and during intervention. Each food item consumed by the students was calculated from dietary assessment which gave an average nutrient consumption per day for each child.

Though the students ate three main meals per day before the intervention, the calorie intake, and intake of protein and major micronutrients, especially iron and calcium, was low during baseline as shown in table below. These students were adolescents who especially need more nutrients as they are in a critical growth period when nutrients, in particular, micronutrients (iron and calcium), along with protein and calories, are essential.

### Baseline nutrient value Vs nutrient value of Smart Food recipes provided at school

Average Nutrient intake	Energy (Kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Zinc (mg)	Magnesium (mg)
4 School average	898.78	30.65	8.29	101.64	7.05	5.44	341.16
New recipe	1541.00	71.90	22.15	572.69	18.90	12.07	627.11

### Nutrient Value of Baseline Recipes Vs New Recipe



## Economic impact of changing school meals to include locally available pigeonpea

	Cost reduction for the school (Tsh)
School A	99388
School B	41700
School C	97200
School D	19800

Substituting one meal of beans with locally available pigeonpea (half the price of beans) = **significant savings**

**19,800 - 99,388** Tanzanian shillings Tsh  
**(US\$ 8.5 - 42) per meal** depending on number of students in the school and the volume of beans they consumed prior to intervention



**Savings per meal means more budget for extra fruit/vegetable to further improve nutrition**



## POTENTIAL NEW MARKET FROM SCHOOLS NATIONWIDE

700 metric tonnes of pigeonpea per week = \$300,000  
 140 metric tonnes of sorghum/millet per week = \$200,000

### Challenges faced during implementation:

- Access to fresh pigeonpea – parents prefer the fresh green pigeonpea which cooks quicker and tasted better in their view
- Increased demand for pigeonpea = increase in prices which then affect the school budget
- Insect damage in stored pigeonpea
- Cost and availability of crushed groundnuts which students like in the recipe
- Cost of finger millet
- Changing mindsets on school meals (this was addressed through nutrition awareness training)

### How to address some of the challenges:

- Get improved pigeonpea varieties for school meals supply
- Increase training on recipes and sensitize other schools
- Farmers use safe storage methods to prevent insect damage like triple layer bags

## What needs to be done next?

- The project outcomes support a call to scale this out to other schools
- Train further schools to adapt nutritious recipes for their student populations
- Train and support schools to enable crop access and safe storage
- Reinforce this study with a detailed clinical trial on the nutritional benefits of the different meal combinations

**Citation:** 2019. Smart Food in Tanzania: Pilot study to make healthier and cost-effective school meals. Patancheru 502 324, Telangana, India: International Crops Research Institute for the Semi-Arid Tropics. 4 pp.



**Good for you - the planet - the farmer**

Executive Council:



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