

# Water and nutrition

## Sowing seeds of knowledge



*The University of Pretoria recently conducted a research project, commissioned and funded by the Water Research Commission (WRC), to understand what people in rural households in South Africa grow and eat. The project aimed to identify ways in which rain-fed and irrigated crop production can be strengthened to improve nutrition.*  
*Article by Karen Grobler.*

Half of South Africa's population – some 27 million people – live below the global poverty line. Government grants are often the only means of survival in poor rural communities. However, the grants fall far short of being able to cover the basic cost of nutritious food.

The experience of hunger is related to many different forms of deprivation. There is widespread 'hidden hunger', in the form of micronutrient deficiencies, growing rates of overweight and obesity and – perhaps most concerning – stunting and overweight tendencies among small children.

### **Taking a holistic view**

This study of consumption and production patterns investigated how crop production can lead to better nutrition by improving dietary diversity. This unique transdisciplinary study was conducted in four of South Africa's poorest rural communities – Ingquza Hill (Eastern Cape), Jozini (KwaZulu-Natal), Maruleng (Limpopo) and Ratlou (North West).

Qualitative and quantitative data were collected between October 2013 and November 2015 through focus group discussions, key informant interviews and a two-round panel survey to cover both the summer and winter seasons at each site.

The food security situation of the households was assessed using anthropometry (height, weight and arm circumference measurements) of children between 24 and 59 months and their female caregivers, food consumption frequencies and the diversity of their diets.

### **Findings on nutrition**

The researchers found that most households were food insecure. There was inadequate food available to meet the requirements of a diversified diet. Roughly one in four households reported experiencing hunger for most months of the year, but most households cited January as a difficult month.

The researchers found high levels of hidden hunger, overweight among adult women and children, and stunting in children. Of concern was the number of young children who were both stunted and overweight.

### Findings regarding consumption

Access to a diversified diet was problematic for households in these communities. They had a starch-based diet – consisting mostly of maize and bread – that lacked fruit and vegetables. Most households were able to buy enough maize meal for daily consumption, but their diets lacked diversity, and contained far too little, or no fruit and vegetables.

This was worse in winter when even fewer fresh fruits and vegetables grew and water was in short supply. Participants reported that drought and climate change had reduced their opportunities for diversifying production and that wild foods were also not available.

Contrary to expectation, the study found that an encouraging number of households supplemented their diets through crop production in the areas where such production was possible – Ingquza Hill, Jozini and Maruleng. The study also found an encouraging number of households engaging in crop production on farmland, home gardens or school and community gardens, despite low access to agricultural input, support and supplemental irrigation.

### Nutritional benefits of crop production

Producing fruit and vegetables allowed households to eat a more diverse diet and helped household members maintain a healthy body mass index. The income from farmland production and irrigated agriculture also allowed people to buy vegetables and fruit but, more importantly, meat, eggs, fish, milk, roots and tubers.

After studying the consumption and crop production patterns of the households, the researchers were able to determine what could be done to improve their diets and overall nutrition. Many crops can be grown to improve nutrition in these communities. But very few crops will yield food in winter. Irrigation offers the potential of increasing the amount and variety of fresh produce, as well as the period of availability.

The data was used to identify which crops could improve the dietary diversity and nutrition of the households. The agronomic conditions in the four sites were examined and crops that could grow in these areas were identified. The prioritised list of crops were presented to the communities for validation through a workshop held at each site.

Foods that were found by the study to be culturally acceptable and that could grow in these communities included:

Dark, green leafy vegetables	Swiss chard, broccoli, the leaves of beetroot, cowpeas, beans, pumpkins and sweet potatoes, as well as African leafy vegetables such as blackjack, cat's whiskers, amaranth, lamb quarters, nettle, nightshade and sow thistle.
Other vegetables	Cabbage, cauliflower, cucumber, eggplant, gem squash, calabash or other squash, green beans, green pepper, lettuce, peas, onion and zucchini (baby marrow).
Orange-fleshed vegetables	Beetroot, carrots, dark orange pumpkin, butternut or squash, orange-flesh sweet potato and tomato.
Legumes	Bambara groundnuts, cowpeas, dhal, dry beans and groundnut (peanuts).
Roots and tubers	Amadumbe, potato and sweet potato.
Orange-coloured fruit	Citrus fruit, mango, papaya, pineapple, spanspek (cantaloupe) and watermelon or maketaan.
Other fruit	Avocado, banana, figs, loquat and marula.

### Main recommendations from the study

Increased production is required of nutrient-dense crops.

As many of the crops will require supplemental irrigation, water harvesting and irrigation systems are recommended to reduce drudgery, especially for women. The provision of boreholes and piped water are essential in drier areas.

Research is urgently needed to investigate the impact of climate change on growing patterns to advise on adaptations to production techniques, irrigation practices, production timing and the potential for the development of early- and late-maturing crops to extend

the growing season and make food available for longer periods.

Biofortification of crops is needed to increase the nutrient density of multiple micronutrients, especially in dual crops such as beetroot or where the nutrient water productivity of more than one nutrient could be enhanced (such as vitamin A, iron and zinc in carrots). Dual crops are crops where more than one part of the plant is nutrient-dense such as the leaves, roots, fruit or seeds.



South Africans' overreliance on maize has led to a situation of hidden hunger.

## Many challenges

A number of fruit and vegetable crops can be produced in these communities. However, very few crops produce edible food in winter. In the higher rainfall areas of Ingquza Hill, Jozini and Maruleng, some of the recommended crops can be produced under rain-fed conditions when normal weather conditions prevail.

Communities reported that this is not possible in drought conditions. Most crops that will produce nutritious fresh vegetables in winter require irrigation. Access to irrigation is essential to overcome these constraints, extend the range of crops possible, extend the growing season, reduce the risk of crop failure and improve yields.

Communities face different constraints where irrigation is concerned. In all the communities, there is potential to enhance household and smallholder irrigation. In some cases the obstacles are technical.

In the arid Ratlou site, water is simply not available. In Maruleng, a partly functioning irrigation system needs repair and maintenance to serve a wider community, so the problem is financial.

In Jozini, the vast potential of the irrigation scheme is crippled by conflicting commercial interests, managerial incompetence and stakeholder inequality.

In Ingquza Hill, highly productive, rain-fed terrace farming of staples and livestock has shrunk to small, fenced home gardens. These rely on rainfall or arduous manual irrigation. Although there is abundant river water, the rugged topography could demand expensive investments to use it.

For many small producers and home gardeners, agricultural inputs and extension services are inaccessible or simply inappropriate. But there is a will and energy to adapt farming to changing conditions. An example would be doing this by planting local and more drought-resistant crops.

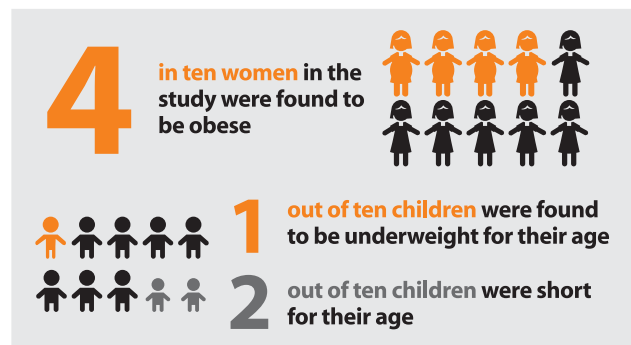
## Community involvement

Translators presented the findings in the relevant local languages to maximise the communities' understanding of the issues at hand. In general the response to the research was positive – community members appreciated that researchers took the time and effort to communicate their results.

Communities were well aware of the unhealthy nature of modern, store-bought foods. The most common objection from the communities was that a diverse diet was not affordable, despite suggestions in the data to the contrary.

Lack of water was the major reason cited by communities about why this was the case. The researchers' information was based on long-standing agronomic data, suggesting that growing conditions have changed drastically over the past few decades. This idea was corroborated by community members, who said that many crops that could be grown in the past no longer grew due to a lack of water or a changing climate.

Communities asked the researchers to focus on water use and adaptive farming methods that could help them cope with climate change.



## The way forward

For all the assembled data to amount to meaningful change, it needed to be provided to communities in a way that was relevant to them. The researchers' recommendations were based on what is possible to grow in their areas, while ensuring that the recommended crops met the nutritional needs of the communities. Their goal was to find the most nutritious crops that required the least water. Striking such a balance is key to ensuring that poor rural communities are able to sustain themselves in the long term.

Recommendations were usually based on one or more specific nutrient that the crop could provide. Several species were recommended as multi-purpose crops, as in the case of cowpea, a traditional crop that could provide grains and leafy greens, as well as animal feed.

The University of Pretoria's Institute for Food Nutrition and Wellbeing (IFNuW) created a series of posters and brochures in partnership with the communities. Community leaders and agricultural officers would then spread the information to improve their people's knowledge of nutrition and their farming ability. By making better farming and dietary choices, researchers hope that the nutrition of these communities will improve.

An easy-to-use app has been developed that provides information to communities about the crops that will thrive in their areas. Gathered data are also used to craft recommendations for policymakers, as well as to inform the new South African Food Security Information System.

To download the SmartGrow app visited the IFNuW website, <http://www.up.ac.za/institute-for-food-nutrition-and-well-being>