

# The potential of Conservation Agriculture to improve nutrition in Zambia—a brief

## Conservation Agriculture

Conservation Agriculture (CA) is an agricultural system based on three basic principles: 1) minimum mechanical soil disturbance 2) maintenance of soil cover, and 3) crop rotation, usually with legumes. CA has been supported by various organisations in Zambia for over two decades, including the Conservation Farming Unit (CFU), Concern Worldwide, and the Ministry of Agriculture and Livestock, supported by the Conservation Agriculture Scaling Up initiative (CASU). CA has been shown to increase productivity, build resilience, and protect the soil. However, CA research and implementation is largely production-oriented and there is little in the literature as to how CA currently impacts household nutrition or how it might be adapted to become



## Nutrition Sensitive Agriculture

Chronic malnutrition is still a serious problem in Zambia. 40% of children under five year of age in Zambia were stunted according to the latest Demographic Health Study (DHS) report (Central Statistics Office/MoH Zambia 2014). Acute malnutrition remains static at around 6% of children and obesity is on the rise. Guidelines and theoretical models have been developed over the past few years to help understand the links between agriculture and nutrition and evidence is emerging as to how agriculture can improve nutrition outcomes for children and adults. These models are helpful when trying to understand how CA might impact on nutrition, or how to make changes towards nutrition sensitive CA. FAO has developed 10 key principles for improving nutrition through agriculture (FAO 2013) and IFPRI and others have described how potential pathways can enable agriculture to contribute to reductions in under-nutrition (Gillespie, Harris et al. 2012).

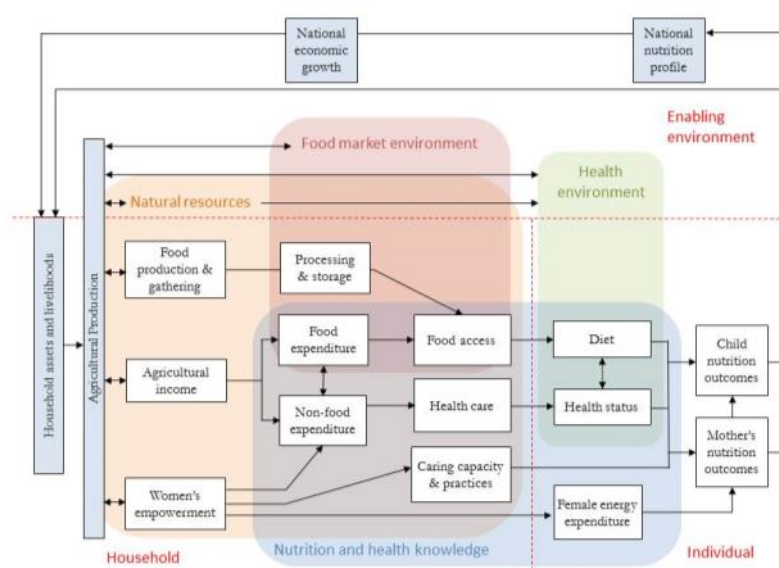


Figure 1. Conceptual pathways between agriculture and nutrition (adapted from Gillespie, Harris et al. 2012)

## The potential of Conservation Agriculture to improve nutrition in Zambia

Against the background of malnutrition and widespread promotion of CA, there is huge potential to use both the CA technology and its delivery mechanisms to improve nutrition. This brief presents findings from a study conducted by Anne-Marie Mayer PhD, an Independent Nutrition and Agriculture Consultant, in March and April 2015 to explore the potential of CA to improve nutrition.



This study brief was made possible by a grant from the USAID Technical and Operational Performance Support (TOPS) program. The TOPS Micro Grants Program is made possible by the generous support and contribution of the American people through the United States Agency for International Development (USAID). The contents of the materials produced through the TOPS Micro Grants Program do not necessarily reflect the views of TOPS, USAID or the United States Government.

The study assessed the potential of CA to impact nutrition security at the household level with emphasis on pregnant and lactating women, and children under 2 years old for prevention of chronic under-nutrition. The study comprised a literature review, key informant interviews, and qualitative focus group discussions (FGD) with farmers in Central and Western Provinces of Zambia. Key informants included promoters of CA, technical staff in the Ministry of Agriculture and Livestock, Ministry of Health, and representatives of NGOs. FGDs were conducted with four female and four male groups of CA adopters and two case studies from each province. Findings were shared, discussed and reviewed with stakeholders in Lusaka.

This research was made possible with support from the American people, delivered through the United States Agency for International Development (USAID).

## Findings

### Food production

Household food production can be critically important to the diets and nutrition of women and children. Literature shows that CA has a positive impact on household food security in terms of improvements in maize security (Nyambose and Jumbe 2013), but also on the production and consumption of legumes (groundnuts, soybeans, cowpeas) (Nyanga 2012). All FGDs clearly reported that CA increased their production and consumption of both maize and legumes, particularly groundnuts and beans. The main challenges of growing more legume crops were the limited access to seeds and markets.

Farmers also indicated that CA increased their time availability, which was used to grow more field crops (e.g., maize, cassava, sweet potatoes, groundnuts) and for vegetable gardening, increasing both food availability and food diversity. Evidence from Zambia suggests that greater agricultural diversity is associated with greater dietary diversification and those households with greater agricultural diversity had fewer stunted children (Kumar, Harris et al. 2014).

### Agricultural income

Agricultural income can be used for immediate or future household needs, including food and non-food purchases to support a healthy diet and life (Herforth & Harris, 2014). Most FGD participants reported increased incomes since practicing CA. The extra income was spent on food purchases (e.g. sugar, fish, meat, cooking oil, rice, tea, flour, refined maize meal and instant cereal products), productive resources, school fees, livestock (milk & draught) and increasing agricultural labour. Whilst the addition of a variety of foods (including animal sourced foods) may meet a nutrition gap and improve household dietary diversity, overconsumption of certain foods such as sugar, meat and refined cereals could contribute to the increasing problem of overweight.



The Demographic Health Survey (Central Statistics Office/MoH Zambia 2014) showed that 23% of women are overweight in Zambia.

The use of income for productive resources, purchase of animals, and enterprises has the potential to improve nutrition through increased availability of food or other pathways. If income is spent on school fees, there could be a long term benefit for nutrition because education levels of children contribute to prevention of malnutrition through the life course.

### Women's empowerment

Gender equality and women's empowerment are now widely recognized as important determinants of child nutrition (Smith & Haddad, 2015). In Concern's experience, the majority of primary beneficiaries and adopters of CA are women, so there is a high potential for women to link increased agricultural productivity under CA to nutrition provided they are able to make and influence decisions and control resources.

The amount of time or labor women spend on agriculture can affect their own health and energy expenditure. In addition, caring practices (such as breastfeeding and meal preparation) can be affected adversely where women's labour is heavy (Reid and Chikarate 2013). Women indicated during the FGDs that CA increased their time availability, which enabled them to breastfeed more frequently, prepare more healthy and diverse meals and take time to rest. The women reported to have increased the diversity of the diets of their children by adding groundnuts to infant porridge, and by purchasing additional food items such as sugar, cooking oil, and animal sourced foods. However, the diet diversity of most of these children is still not meeting the World Health Organizations (WHO) recommendations of at least 4 food groups daily. Nutrition promotion activities and demonstrations of food preparation could optimize infant and young child feeding practices based on the additional food production and food purchases achieved by CA.

Women in Zambia tend to have greater control over groundnuts as these are seen as 'women crops'. Groundnuts can be used for both home consumption and provide income which could both impact on nutrition (Nyanga, Johnsen et al. 2012). The use of inter-crops and crop rotations in CA with vegetables and pulses when under the management of women are likely to contribute to household food security and diversify consumption.

Increased time availability has the potential to improve nutritional outcomes of both the woman herself and her children. The women indicated that time availability was increased by both use of herbicides and mulches that reduce weeding demand and the opportunity to spread out labor for land preparation over a longer period of time under CA, compared to conventional practices. However, stakeholders contested that overall CA may not always decrease labor and increase time availability, and this is an area that requires further investment including expanding affordable access to ripping services and other labor saving equipment.

## Natural resources

In theory, improvements in soil fertility lead to improved nutritional quality of foods (Lal, 2009). Links between CA and nutritional quality of foods could be mediated through soil improvement, for example the pH of the soil affects nutrient uptake by plants; arbuscular mycorrhizal symbiosis could be better preserved in by practices that minimise soil disturbance (Antunes, Franken et al. 2012). Also by improving nutrient uptake by plants, and the additional soil organic matter could improve nutrient content of grains (Baraski, Srednicka-Tober et al, 2014). CA projects could theoretically reduce mycotoxin contamination by promoting various measures, such as use of lime, farmyard manure, and crop residues. Any gains in nutritional value of crops achieved by these means need to be maintained post harvest, through nutrient-retaining methods of storage,

## Potential impacts on nutrition from CA

Based on the testimonials of CA farmers, dietary and nutritional improvements resulting from CA could include the following:

1. Increased own production and consumption of CA crops (cereals and legumes),
2. Improved infant and young child feeding practices due to increased time availability and increased agricultural diversity,
3. Production of livestock products, and vegetables due to additional time available,
4. Purchase of other foods with extra income derived from CA,
5. Possible improvement of nutritional quality of food grown on improved soils,

6. Possible negative consequences from the introduction of highly processed foods and excess animal products through food purchases,
7. Possible negative consequences of herbicide contaminated foods.

## FAO key programming principles for improving nutrition through agriculture

### 1. Incorporate explicit nutrition objectives and indicators into their design

Include specific nutrition objectives into CA projects and means of verification, M&E systems to include agricultural diversity and consumption indicators, and mitigation of possible harm by introducing testing for herbicides and testing for mycotoxins.

### 2. Assess the context at the local level

Consider the impact of labor on women. Different agro-ecological zones need tailored CA approaches and encourage farmers to experiment with cropping systems.

### 3. Target the vulnerable and improve equity

Women and poor farmers need to be included in CA and provided with necessary inputs if they are unobtainable

### 4. Collaborate and coordinate with other sectors

CA to work with other sectors to identify synergies and gaps in addressing causes of malnutrition

### 5. Maintain or improve the natural resource base

CA is well designed to improve natural resource base particularly conservation of soil and water use.

### 6. Empower women

Women need to be targeted for technical support as they are gatekeepers for nutrition and often underserved by extension and support services. Recruitment of female extension staff for CA promotion, use of labor saving tools and inclusion of actions that promote gender equality can support women's empowerment.

### 7. Facilitate production diversification, and increase production of nutrient dense crops and small scale livestock

Crop rotations/intercropping with legumes is one of the pillars of CA. There is potential in diversifying cereal crops and the use of nutritious intercrops and groundcover crops. The nutritional quality of food produced by CA needs investigation through research.

### 8. Improve processing, storage and preservation

Support is needed on post harvest handling of cereals and legumes to extend supply for household and sale. Aflatoxins testing and measures to reduce contamination are important as well as attention for post harvest processing methods that retain nutrients.

### 9. Expand markets and market access for vulnerable groups particularly for marketing

The market for legumes and access to seed needs support because these are limiting production.

### 10. Incorporate nutrition promotion and education

Support to improve utilization and processing foods is needed to improve infant and young child feeding practices and raising awareness on healthy diets. Risk of overweight and healthy food choices should be taken into account in promotional activities



## Future research

The study highlighted some areas for further research

- Consumption surveys to compare diets in Conventional and Conservation Agriculture related to production with a focus on legumes,
- Investigation to see whether increased income leads to improved nutrition or over consumption of unhealthy food choices,
- Further understanding of women's roles and time schedules related to different aspects of CA, with a special focus on what can be done to reduce the labor burden?
- Operations research on best methods for introducing nutrition promotion in CA promotion.



**Concern Worldwide** is an international humanitarian organization dedicated to tackling poverty and suffering in the world's poorest countries.

Concern has a CA promotion project in three districts in Western Province since 2010 that targets 6,000 extremely poor households, over 40% of which are female-headed. The approach is adapted to marginal environments and poor access to market infrastructure. Training is done through 60 lead farmers, who run farmer-led experiments and demonstrations with different methodologies and seeds utilizing CA principles. Beneficiaries are supported with training and a once-off input pack sourced from local agro-dealers. Concurrently, the project supports 180 seed growers within the same project areas to produce certified seeds to provide diverse seed sources to support CA adoption.

The **Conservation Farming Unit** has led CA promotion in Zambia since its founding in 1995. Currently, CFU works in 20 districts across Zambia, supporting over 2000 lead farmers to demonstrate, train, and promote CA principles to over 180,000 follower farmers. CFU also promotes the uptake of inputs and equipment through the private sector to enable faster uptake of CA by the small-scale farming sector.

## References

- Antunes, P.M., Franken, P. et al (2012). Linking soil biodiversity and human health: do arbuscular mycorrhizal fungi contribute to food nutrition? *Soil ecology and ecosystem services* D.H.W. et al. Oxford, Oxford University Press.
- Baraski, M., Srednicka-Tober, D et al. (2014). Higher antioxidant and lower cadmium concentrations and lower incidence of pesticide residues in organically grown crops: a systematic literature review and meta-analyses. *British Journal of Nutrition* 112(05): 794-811.
- Central Statistics Office MoH Zambia (2014). Zambia Demographic and Health Survey 2013-4.
- FAO (2013). Synthesis of guiding principles on agriculture programming for nutrition.
- Gillespie, S., Harris, J. et al. (2012). The Agriculture-Nutrition Disconnect in India, What Do We Know? IFPRI Paper 01187.
- Herforth, A., Harris, J. (2014) Understanding and applying primary pathways and principles Brief #1. Improving nutrition through Agriculture Technical Brief Series. Arlington VA: USAID/Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) Project.
- Kumar, N., Harris, J. et al. (2014). If they grow it will they eat it and grow? Evidence from Zambia on agricultural diversity and child under nutrition. Not yet published.
- Lal, R. (2009). Soil degradation as a reason for inadequate human nutrition. *Food Security*.
- Nyambose, W. and Jumbe, C. (2013). Does Conservation Agriculture enhance household food security: evidence from smallholder farmers in Nkhosha in Malawi. 4th International Conference of the African Association of Agricultural Economists. Hammamet, Tunisia.
- Nyanga, P. H. (2012). Food security conservation agriculture and pulses; evidence from smallholder farmers in Zambia. *Journal of Food Research* 1(2): 120-138.
- Nyanga, P. H., Johnsen, F.H. et al. (2012). Gendered impacts of Conservation Agriculture and the paradox of herbicide use amongst smallholder farmers. *International journal of technology and development studies* 3(1): 1-24.
- Reid, J. and Chikarate, J. (2013). Final evaluation of the Accenture funded project: effecting improvements in livelihoods through Conservation Agriculture Malawi and Zambia.
- Smith, L.S., Haddad, L. (2015) Reducing child under nutrition: past drivers and priorities for the post-MDG era. *World Development* 68: 180-204.

We acknowledge the support of the Conservation Farming Unit (CFU) in organising the field trip and their valuable contributions to the study and this report. We also appreciate the time and efforts made available by the farmers, extension staff and stakeholders to participate in the focus group discussions and interviews.

A full report of the study is available from Concern Worldwide [www.concern.net](http://www.concern.net) or [concern.lusaka@concern.net](mailto:concern.lusaka@concern.net)

Photo credits: front page 1. Imakando Kangwa, Kaeya (Senanga), by Carl Wahl. 2012; page 2; Diverse foods produced in Mumbwa by Gareth Bentley, 2013, page 3; CA field in Lui Wanyau, Senanga by Carl Wahl (2015)

## OUR CONTACTS

### Concern Worldwide

5466 Libala Road, Kalundu, P.O. Box 36700  
Lusaka, Zambia

Tel: +260 - 211 - 291580/ 292467;

Fax: +260 - 211 - 290106

Web: [www.concern.net](http://www.concern.net)