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## Using a One Health Approach to Promote Food and Nutrition Security in Tanzania and Zambia<sup>1</sup>

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**Abstract** – Food security is a global priority requiring a multidisciplinary approach. In Tanzania and Zambia stunting in children under five, a major determinant of individual development, is estimated to be 42% and 45% respectively, despite years of agricultural research and development. Both countries are seeking sustainable solutions to the food security challenge that will improve human nutrition through improved household income and dietary diversification. Despite increases in agricultural production over the past two decades, malnutrition rates in children have not diminished significantly in many developing countries. Local initiatives, such as enhancing traditional livestock-crop systems, can provide a sustainable solution to the ongoing demographic challenges in Africa which are driving the need for more food, improved livelihood opportunities and reduced migration to urban centres. The aim of this project is to reduce childhood undernutrition by analysing and testing opportunities to enhance the key role that women play in improving poultry and crop integration and efficiency to strengthen household nutrition in an ecologically sustainable manner. A One Health approach is being employed by the project in support of increased poultry and crop value chain efficiency and household food and nutrition security by bringing together animal, crop and human health specialists, economists, ecologists and social scientists to work with participating communities.

**Keywords** – Family poultry, sustainable agriculture, nutrition security, One Health, food security.

### 1. Introduction

Food security is a global priority requiring an multidisciplinary approach. Despite increases in agricultural production over the past two decades, undernutrition rates in children have not diminished significantly in many developing countries (Masset et al., 2012). The context to these poor achievements is that gender inequality and cultural issues have been inadequately addressed in most re-

search linking agriculture and nutrition (Hawkes et al., 2012). Undernutrition is a result of complex causes and to date little research has examined nutrition-specific, health-based approaches in collaboration with food system and livelihood-based interventions. Crucially, supplying women of childbearing age and their children with sufficient calories is important but it is not enough to optimise epigenetic programming; the proper balance of micronutrients is also essential for both short- and long-term

<sup>1</sup>This article is based on a presentation given during the 2nd GRF Davos One Health Summit 2013, held 17-20 November 2013 in Davos, Switzerland (<http://onehealth.grforum.org/home/>)

health (Kaput, 2010).

### *1.1. The disconnect between agricultural production and human nutrition*

Despite global industrial agribusiness increasing the availability of food in markets, for a significant number of people in many countries this food remains inaccessible as the price is relatively high for their purchasing power. In addition this processed food has variable nutritional content and the long-term sustainability of large-scale farming practices it is based on are questionable (Foley et al., 2011). In Tanzania and Zambia stunting in children under five, a major determinant of individual development, is estimated to be 42% (NBS and ICF Macro, 2011) and 45% (CSO, MOH, TDRC, UNZA and Macro International Inc., 2009) respectively, despite years of agricultural research and development. Human health-related multilateral agencies have been supporting micronutrient fortification and supplementation through Ministries of Health while agriculture-related multilateral agencies have been supporting increased agricultural production. The long term sustainability of these interventions is being questioned, because many of the rural poor are not able to access fortified foods and increased agricultural production has tended to emphasise energy-rich and nutrient-poor staples such as hybrid maize (Idikut et al., 2009). Although animal source foods (ASFs) have great potential to improve nutrition through their macro- and micronutrient content and high protein digestibility compared with plants, rural populations do not always benefit from adequate consumption of ASFs from the livestock they produce (Turk, 2013). Both Tanzania and Zambia are seeking sustainable solutions to the food security challenge that will improve human nutrition through improved household income and dietary diversification as outlined in the Tanzanian Government Vision 2025 and the Zambian Government Vision 2030. Local initiatives, such as enhancing traditional livestock-crop systems can provide a sustainable solution to the ongoing demographic challenges in Africa which are driving the need for more food. For these initiatives to succeed the authors believe that understanding the social, cultural and economic context of the food system is critical in gaining equitable access to food for the vulnerable.

## **2. One Health research in support of food and nutrition security**

Our project “Strengthening food and nutrition security through family poultry and crop integration in Tanzania and Zambia” was designed in response to the situation described above. It is a five-year project funded by the Australian International Food Security Research Centre and implemented by the University of Sydney (veterinary science, public health and agriculture and environment) in collaboration with the Tanzanian Veterinary Laboratory Agency, the Tanzanian Ministry of Agriculture, Food Security and Cooperatives, the Tanzania Food and Nutrition Centre, the Sokoine University of Agriculture (animal

and crop health and production), Muhimbili University of Health and Allied Sciences (public health), the University of Dar es Salaam (social sciences), the Tanzanian Commission for Science and Technology, the Zambian Ministry of Agriculture and Livestock, the Zambian Ministry of Health, the National Food and Nutrition Commission of Zambia, the Tropical Diseases Research Centre, the University of Zambia (animal and crop health and production, public health and social sciences), the Kyeema Foundation and the Royal Veterinary College, London.

Tanzania and Zambia were selected following a comprehensive review of the literature and visits to the Food Security Units of the East African Community and the Southern African Development Community. Both countries have high rates of undernutrition in children and provide contrasting circumstances concerning the control of Newcastle disease in village chickens: Tanzania has been producing and using the I-2 Newcastle disease vaccine in village chickens for over 10 years (Msami and Young, 2009), whereas Zambia has only recently introduced the vaccine following successful laboratory and field trials (Bagnol, 2013).

In addition, both Tanzania and Zambia have relatively high Gender Inequity Indices (UNDP, 2013). Research indicates that resources under the control of women are more likely to be used to support the education and nutrition of children (Quisumbing et al., 1995). Thus, it is hypothesised that improving women’s production of family poultry and crops will have a beneficial impact on children’s overall nutritional status and health.

### *2.1. Research aim*

The aim of our project is to reduce childhood undernutrition by analysing and testing opportunities to enhance the key role that women play in improving poultry and crop integration and efficiency to strengthen household nutrition in an ecologically sustainable manner.

### *2.2. Key elements and overarching methodologies*

Family poultry (which comprises extensive and small-scale, intensive poultry production) have a special place in food security as they are owned by between 70 and 99% of households in the project area and are frequently the only livestock under the control of women (Alders and Pym, 2009; Bagnol, 2009). They require low investment and can contribute significantly to both poverty alleviation and food security. Newcastle disease (ND) is considered one of the most important poultry disease worldwide (Samal, 2011) and a model for its sustainable control in family poultry using thermotolerant vaccine is now available (Alders et al., 2003). Improved family poultry production can increase nutritional outcomes directly by providing meat and eggs and indirectly by providing cash income to purchase food. Poultry (including meat and organs such as liver) and eggs provide high quality protein and micronutrients (e.g. zinc, vitamin A and iron), which provide wholesome nutrition and are important for child growth. These benefits are also of notable significance

to vulnerable community members such as growing children, pregnant women and people living with HIV. Crops such as sunflower, millet, sorghum and indigenous vegetables are often under women's control and provide flexibility in the face of variable climate, a broader range of nutrients and a way of managing farmer risk. Any surplus grain production could also be utilised within the poultry production system or sold at market to supplement income.

A One Health approach is being employed by the project in support of increased poultry and crop value chain efficiency and household food and nutrition security by bringing together animal, crop and human health specialists, economists, ecologists and social scientists to work with participating communities. The project employs qualitative, quantitative and gender-sensitive research (including monitoring and evaluation) methodologies conducted on the basis of long-term relationships with communities, national government ministries and human research ethics committees, key private sector partners, research institutions and NGOs in line with the Theory of Change in international development. It also has a strong focus on developing effective transdisciplinary and transectoral collaboration in-country.

### 2.3. *Project objectives and expected outcomes*

The project is working with participating communities to assess the existing family poultry-crop systems and poultry value chains in order to characterise, assess and identify opportunities for improvements that are feasible under local conditions. Sustainable models for poultry-crop integration are under development, focusing on the role of women, and evaluating their impact on food security. The impacts of both improved family poultry production and a crop systems intervention on childhood undernutrition are being studied using a randomised trial design with delayed introduction of the crop intervention to enable the project to implement two different types of intervention and attribute outcomes. The use of a strong study design will enable us to provide sound evidence of the effect of each of these interventions.

Capacity strengthening and catalysing strategic long-term partnerships between key institutions and individuals associated with family poultry, food security, and sustainable agriculture are key components of the project. The capacity of core sectors to work as a multidisciplinary team to analyse the causes of and respond to food insecurity and undernutrition are being strengthened significantly at national and local levels. Skills in multidisciplinary collaboration and sustainable knowledge management are enhancing capacity in evidence-based policy development. The capacity of the next generation of transdisciplinary researchers is being built in Tanzania, Zambia and Australia.

### 3. **Added value to the One Health approach**

In the recent past, the One Health approach has focused on infectious diseases, especially emerging infectious dis-

ease (EID). The drivers of EIDs have been noted but limited attention has been given to chronic food insecurity which leads to risky practices that favour the emergence and spread of infectious disease (Alders et al., 2012). Practices of particular concern relate to the consumption and sale of contaminated livestock, meat and animal products.

However, the benefit of using a One Health approach to tackle food and nutrition security goes beyond a simple contribution to the prevention of EIDs (Rushton et al., 2012). Human nutritionists and maternal and child health specialists have generally worked in isolation from agricultural and livestock specialists, economists and others associated with food production and distribution. Likewise, agricultural researchers have tended to measure success in terms of gains in food production, without evaluating whether and how this translates into the desired goal of improved human nutrition security and health. Our project has facilitated and continues to facilitate the coming together of these two groups in both countries to focus on opportunities to improve nutritional security using locally available resources. Early outcomes of this collaboration include: increased attention on the impact of seasonal variations on food availability (both agricultural and wild) and the importance of noting during which period of the agro-ecological calendar human nutrition data is recorded; and introducing human nutrition and agricultural officers to each other at national, provincial and district levels.

### 4. **Conclusion**

Our project is already making significant contributions to the social and biological understanding of options for improving childhood nutrition through improving and integrating family poultry and nutritious secondary crop production. It also provides a rare opportunity to learn and reflect on models that can employ and integrate agricultural, livestock and human nutrition sciences to deliver quantifiable health benefits. The effective integration of these key elements will improve household food and nutrition security and also provide evidence for the benefits of adopting One Health and transdisciplinary approaches to solving complex field problems.

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