Sweet Success? Interrogating Nutritionism in Biofortified Sweet Potato Promotion in Mwasongwe, Tanzania

By

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Abstract

This thesis is an ethnographic study of the promotion of biofortification, and specifically biofortified sweet potato (OFSP) as a solution to malnutrition in the Mwanza region of Tanzania, a major sweet potato producing area in the country. Through a feminist lens, I examine sweet potato, commonly considered a 'women's crop' in Tanzania, and the campaign to promote its use as entry-points to analyze the intersection between women's dynamic engagement in food-related labour and the gendered, economic and social conditions in which women sweet potato farmers' livelihoods are situated. Funded by private foundations and international agricultural research centres, biofortified sweet potato campaigns targeted thousands of women farmers in several Sub-Saharan African countries to address malnutrition by increasing the nutrient content of staple, subsistence crops such as sweet potato. My findings show that OFSP promotion reinforced existing normative gendered food production roles as well as scientific, technical interpretations of nutrition, while disregarding how socio-economic and environmental conditions mediate every day and seasonal dietary practices. A close examination of the research activities and marketing of biofortified sweet potato reveal the inherent gendered and social inequalities embedded in current strategies to address nutrition in agricultural development programs in Tanzania. My research suggests that women's associated labour and varying perceptions of nutrition were under-acknowledged in such campaigns. Analysis of discursive and material networks embedded in OFSP campaigns revealed both the intended and unintended long-term and seasonal, social, economic, health and environmental implications of these campaigns and their oversights on sweet potato producers in Mwasongwe village since 2006. As a result, OFSP benefits to the female sweet potato producers in my study remained short-term, uncertain, and dependent on external financing and international partnerships, and on individual farmers' access to economic, social and environmental assets.

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FIGURE 1: Map of Tanzania

Adapted from: Political Map of Tanzania. Nations Online Project. https://www.nationsonline.org/oneworld/map/tanzania-political-map.htm.

Chapter 1: Introduction

> I know of no other problem in the world that does so much damage, yet receives so little attention" *(*Melinda Gates, 2015, following her announcement of the Bill and Melinda Gates Foundation's USD$776 million investment into global nutrition interventions).

Introduction

In the news

2016 was a good year for sweet potato. In April, a media release arrived in my inbox regarding a team of four scientists who received the Norman Borlaug[1] World Food Prize. Named after one of the founding 'fathers' of the Green Revolution, the prize is given annually to scientists who significantly contributed to innovative agricultural technologies aimed at alleviating hunger in the Global South. The 2016 prize recognized the scientists for their role in advancing research and development in biofortification, a process of enhancing the nutrient content of crops through conventional cross breeding. The technology, when implemented in crop production, is meant to improve the nutritional health of populations prone to under-nutrition[2] and largely dependent on subsistence farming. Sweet potatoes are

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[1] Dr. Norman Borlaug is recognized for one of the scientists behind the green revolution in the 1980's. See https://www.worldfoodprize.org/en/dr_norman_e_borlaug/about_norman_borlaug for more on his legacy.
for more on his legacy.[1] See: Evanson et al., (2003), Action Aid (2009) and Bezner-Kerr (2012), for further analysis on the African Green Revolution in the east and southern region of Sub-Saharan Africa.

[2] World Health Organization defines malnutrition as "deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. The term malnutrition covers 2 broad groups of conditions. One is 'under-nutrition'—which includes stunting (low height for age), wasting (low

the 5th most grown and consumed crop in the Sub-Saharan Africa region (SSA) (Kapinga, 1991), but most varieties are white and yellow in colour and contain only trace amounts of beta carotene. These scientists led several research and development efforts in plant breeding, cultivating and distributing sweet potato with higher beta carotene content, which converts to vitamin A when consumed. Through numerous conference presentations, journal publications, and mass media campaigns, scientists provided evidence on how biofortified sweet potato decreased vitamin A deficiency in young children, a challenge recognized by International UN agencies, as affecting the overall cognitive and physical development of 40% of young children worldwide (UNICEF, 2007).

Presented at a ceremony in Iowa, the Norman Borlaug World Food Prize marked the individual contributions of each of the four scientists based on their particular expertise. Two African plant breeders, Dr. Robert Mwanga from Uganda, and Dr. Maria Andrade from Mozambique, established the first national sweet potato breeding programs in their countries. This laid the foundation for the development and distribution of a number of new varieties of vitamin A enriched sweet potato for the SSA region, including Tanzania, a major sweet potato-producing country. Dr. Low, an American agricultural economist, designed nutrition studies to determine the impact of consuming more orange sweet potato on vitamin A intake. As a scientist with the International Potato Centre, Dr. Low secured

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weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). The other is overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes and cancer)". See: http://www.who.int/features/qa/malnutrition/en/

millions of dollars in funding for regional breeding programs, and projects that attempted to increase the supply of biofortified sweet potato seeds (in the form of vines) for farmers. The media release stated that the result from these initiatives led to convincing almost two million households in 10 African countries to plant, purchase and consume these new biofortified varieties (Kivner, 2016). Dr. Howard Bouis is the founder of Harvest Plus, a research program under the global network of agricultural research centres, Consultative Group for International Agricultural Research (CGIAR)[3], which initiated biotechnology research and biofortification. Following the initial success of orange sweet potato, Harvest Plus, led by Dr. Bouis, went on to establish breeding programs for iron beans and millet, and vitamin A enriched maize. The award included a cash prize of US$250 000 shared between the four scientists, and garnered international attention for their achievements.

Later that same year, TIME magazine published their top 25 inventions of 2016. The list included the biofortified orange sweet potato. Ranked sixth out of 25, and in between the new Dyson silent hair dryer and a large, drone camera, the magazine described orange sweet potato as a "potato that saves children's lives" (TIME, 2016). A colourful photo above the description showed young African children, wide-eyed, smiling, and all holding a piece of the orange root crop in their hand in front of a dry, treeless landscape of recently harvested fields. The list

[3] Consultative Group for International Agricultural Research is a multi-lateral, global initiatives initiated in the United States, and closely linked with William Borlaug and the Asian Green Revolution. See https://cgspace.cgiar.org/bitstream/handle/10947/2761/cgiar40yrs_book_final_sept2012.pdf?sequence=1

described biofortified sweet potato as an invention that addressed problems with nutrition more efficiently than government-initiated vitamin A supplementation campaigns, which continued to take place across the Sub-Saharan Africa region. The article credited the efforts of the award-winning scientists with "helping countries grow their own solutions to food-related problems" (TIME, 2016).

These announcements came to me shortly after returning to Ottawa, Canada from conducting fieldwork in Mwasongwe[4], Tanzania, a small village of approximately 524 households, situated in a major sweet potato growing area in the country. Biofortified sweet potato is known as Orange Fleshed Sweet Potato (OFSP) in non-governmental organization (NGO) circles, and had been introduced to Mwasongwe in 2006 through the International Potato Centre, an international agricultural research centre based in Peru, with offices around the world. My fieldwork investigated the long-term impact of biofortified crops on farmers who initially adopted them.

The first announcement recognized the achievements of the scientists, while the *TIME* top 25 list of inventions showcased children benefiting from the scientists' achievements. Yet, between highlighting the technology, biofortification, and the picture of the happy, healthy children eating orange sweet potatoes, an integral aspect of the story remained overlooked: Who is growing this new crop? How did OFSP end up in the fields of sweet potato farmers in places like Mwasongwe, and how frequently were children readily consuming it? These announcements focused on biofortification as the technology for scientists and the crop, as a food source for

[4] Mwasongwe is also commonly referred to Mwasonga.

children, while disregarding the labour, the socio-environmental, political and gendered conditions in which the crop is grown and consumed.

Thesis Statement

This thesis investigates biofortified sweet potato as a perceived solution to malnutrition, as promoted by scientists and agricultural development actors, and through a feminist lens, examines its implications for farmers' everyday livelihood practices.

My research specifically investigates women's livelihoods in the presence of long-term promotion of biofortified orange-fleshed sweet potato (OFSP) in Mwasongwe village, in the Misungwi district, Mwanza region in Tanzania, a major sweet potato producing area (see Figure 1). My aim is not to determine whether OFSP is a viable solution to malnutrition. Instead I use OFSP promotional initiatives to examine rural women farmers' diverse perceptions of nutrition and their associated labour practices within the context of food production, preparation, consumption and sales. I situate this study within broader political and economic structures of agricultural and nutrition policies and rural development approaches. In particular, I examine the promotional campaign for OFSP in the Mwanza region of Tanzania, as it mediates certain values of food and nutrition over others through the recruitment and use of various international actors and tools. Through a feminist lens, I analyze institutional affiliations and events around OFSP promotion, including farmer groups, radio stations, NGOs, research organizations and development investors, and I examine their engagement in activities such as regional meetings, distribution of planting material and nutrition information, and

the other socio-economic spaces OFSP occupies. Overall, the study traces the material and discursive networks embedded in OFSP promotion, and seeks to "forge links between different forms of knowledge that are possible from different locations, and trace lines of possible alliance and common purpose between them" (Gupta and Ferguson 1997: 39).

The Problem

Sweet potato is widely known to be a crop solely grown for subsistence, and in Mwasongwe, largely grown by women in the Mwanza region. For biofortified orange sweet potato to be deemed a successful solution to poor nutritional health, thousands of women in Tanzania and in other SSA countries would need to grow it and prepare it for their children. Promoters would have to assume that this new biofortified variety would either seamlessly replace older white or yellow varieties or be added to their existing cropping systems, modifying practices in other ways, for example, reducing land for other crops or requiring farmers to acquire more land to grow the new varieties. What are the underlying social and economic reasons as to why so many women grew sweet potato? How do farmers in places like Mwasongwe perceive their own value of nutrition, and how does growing biofortified crops contribute (or not) to existing gendered livelihood strategies around dietary health?

My thesis centres particularly on female sweet potato farmers who started growing OFSP in 2006. Although there was no mention in the 2016 celebratory media pieces, many of these farmers were also heavily profiled in promoting the crop as a success, and were involved in the many interventions in two very specific

ways. First, researchers and partners with international and local NGOs presented OFSP as an answer to poor dietary health in places that depended on few staple food crops, such as maize, rice, and cassava. These crops offered sustenance, but not vitamins or essential minerals such as vitamin A, zinc or iron. Dependence on these staple crops in daily diets were assumed to contribute to nutrient-poor diets by dominant nutritional science narratives in international development. OFSP was presented as a solution to this inadequacy and female sweet potato farmers were seen to be the 'objects' of training, as efforts to ensure the production of the crop was intimately linked with household consumption. Certain OFSP activities included training and education on nutrition, in terms of certain health benefits from nutrients, and how to prepare OFSP dishes, and foods. These were largely targeted at women sweet potato farmers of varying economic and educational backgrounds. This is due in large part to the fact that the OFSP promotion emphasized that responsibility for the health and nutrient content of food prepared and served to children rested on the female members of the household, and often mothers of young children.

Second, the main marketing strategy for OFSP highlighted the potential for also increasing incomes by creating a market for the biofortified varieties. One of the slogans used in merchandise for the marketing campaigns said, "*viazi lishe kwa afya na kipato*" or 'sweet potatoes for health and wealth'. In addition to the nutritional benefits, marketing campaigns highlighted the potential economic benefits to women sweet potato farmers as this was seen as a 'win-win' scenario, able to improve the overall health of their children, and improve incomes through sales.

Women sweet potato farmers who produced OFSP were then not only resolving the problem of poor dietary health, but, more broadly, through this market creation, they would potentially be able to increase their cash flow, and contribute to the overall economic growth in their families. They were seen to be the potential 'heroes' or providers of both the 'health' and the 'wealth' through their production and sales efforts of OFSP.

These strategies, however, are based on gendered norms around food provision and agricultural production systems that subscribe to the static idea that rural women's food-related labour is dedicated to feeding their families, while men tend to engage in more commercial activities. Even though these norms have been widely challenged in terms of shared or even lead roles in commercial efforts (e.g., Schroeder, 1996; Hodgson, 1996; 1999; Bezner-Kerr, 2005; 2014), these perceived divisions of labour and women's reproductive work persistently remain the basis for encouraging women to grow biofortified sweet potato as a way to improve their child's nutritional health while offering up an opportunity for women to 'improve their own lives'. Yet, these expectations preclude a view of women's livelihoods as complex and diverse, where reproductive and productive labour investments are integrated into livelihood opportunities, and the daily choices they make to grow and prepare food and earn incomes. The fact that crops, such as sweet potato, cultivated by women are also widely considered a crop for the 'poor' (CIP, 2012) brings to light the inherent connection between social inequality and the gendered conditions embedded in development narratives around food and farming. I argue that promoting biofortified sweet potato reinforces gender norms to enact a

perception of nutritional health: the responsibility of female caregivers to grow more nutrient-rich foods for themselves and their families. Further attention paid to the tensions between the discursive influence of nutrition narratives and the actual experiences of women growing and preparing food will shed light into the complexity of dietary health challenges related to poverty-driven socio-economic inequality.

Proponents of biofortification and biofortified crops depend on the continuation of existing farming practices in resource-poor areas of Tanzania, especially in areas where the majority of sweet potato production is situated. Marketing OFSP assumes that farmers, and in particular female farmers, will smoothly integrate new biofortified varieties into their existing sweet potato cropping systems and daily diets. Yet, by narrowly focusing on the crop and biofortification as a solution to complex issues around poor dietary health, these efforts leave underlying structural causes of malnutrition unaddressed. This thesis aims to show the social and economic implications of introducing biofortified crops into existing cropping systems, the extent to which the crop remains a subsistence and 'pro-poor' crop, and the ways in which women in Mwasongwe village navigate these promotional activities as part of their everyday livelihood practices.

Field of Research

This research is situated at the intersections between critical nutrition studies and the anthropology of development and agriculture in Sub-Saharan Africa, particularly in Tanzania. Scholarly engagement in agricultural development interrogates the growing interest in nutrition, critiquing neoliberal national and

international policies (Sumberg et al. 2017; Mosely et al. 2015) and their emphasis on scientific innovation in agricultural development within an African Green Revolution agenda (Evensan et al., 2003; Moseley et al., 2015; Dano, 2007). Cornwall et al. (2007) show how gendered labour division norms are reinforced through neoliberal processes of development in general. Mbilinyi (2016) and O'Laughlin (2008) specifically expose the tension between the technically-focused agricultural interventions and gendered farming practices to reveal unequal control over productive resources or provision of entitlements, such as land, employment, or support from the state (see also Bezner-Kerr, 2005; 2012).

Biofortification is situated within this technocratic, science-based agricultural development agenda in meeting nutritional objectives. Most research on biofortified sweet potato prioritizes evidence on the quality of interventions, and the impact of the intervention on the nutritional status of a certain population (Vanjarsveld, 2005; Hotz et al., 2012a, 2012b; Brauw et al., 2015). Others emphasize reach, in terms of the number of farmers growing biofortified varieties, or the cost-effectiveness of biofortification as a strategy to address nutritional deficiencies (Low et al., 2013; 2017; Saltzman et al., 2013; Bouis, 1995; 2017). Brooks (2010), Stone and Glover (2016), Davidson (2010) and others examine the institutional networks behind the rise of biofortification and golden rice, with a focus on the relational dynamics between agricultural science institutes, such as the CGIAR and international donor agencies, such as the Bill and Melinda Gates Foundation. Schnurr and Addison (2014) reveal the labour imbalances created through trials of

genetically modified banana production in Uganda, where women are seen to invest more labour into these new production systems than men.

In spite of these specific contributions from these studies, very little attention is paid to the long-term social and economic impacts of promoting a single crop for the purposes of improving both health and economic conditions of farmers. More specifically, little research has been conducted on the diversity of women farmers' experiences within, and in the presence of these kinds of promotional activities. Gillian et al. (2014) examined the gender dimensions of sweet potato production in Uganda and revealed the significance of joint land holdings between men and women as a contributing factor to economic benefits. At the same time, the study showed little association between women's role in producing and preparing the crop and long-term, sustainable benefits of investing in a crop meant to increase incomes and improve the health of family members. My research aims to examine the associations between food production and provision systems in a rural setting, Mwasongwe, within the overarching global and national narratives of agricultural development and nutrition. In doing so, I aim to reveal often under-acknowledged changing and dynamic everyday livelihood practices of women in farming, and the accompanying social and economic values placed on nutrition and nutritional health at varying scales.

Research Questions

The research is guided by the following questions: How do female sweet potato farmers negotiate their own perceptions of nutritional health in the presence of OFSP promotional campaigns? What are the consequences (both intended and

unintended) for women farmers engaged in OFSP promotional activities? How do promotional materials inscribe gender relations in processes of biofortified sweet potato production, preparation and sale?

Central to my research is an enquiry into the competing objectives within the OFSP campaign as a material and discursive network that negotiate social and economic values of nutrition and associated labour: how these objectives play out in household farming systems and other sites where women's labour is invested; how such values are mediated through campaign events; and how these values are interpreted, interrogated and translated by those who experience or are in the presence of OFSP promotion in their everyday lives. These objectives guide the study in unpacking the underlying gendered assumptions embedded in the current emphasis on nutrients in nutritional health discourses. This research examines the ways in which nutrition is perceived, interpreted, and manifested in the everyday lives of farmers living in sweet potato growing areas against the backdrop of promoting OFSP to reveal unanticipated and under-acknowledged impacts.

These guiding questions and objectives aim to interrogate three particular aspects of the nutrition and agricultural development discourse:

1. A growing emphasis on large-scale commercial agricultural development expansion;
2. Institutional research and international development projects that support scientific, technical framing of nutrition in interventions such as biofortified sweet potato; and,
3. Underlying gender relations inscribed in structures and social dynamics

associated with male and female farmers' strategies for growing, consuming and earning incomes from food production. The literature below addresses these areas.

Literature Review

Agricultural Development in SSA

Current national agricultural policies in the SSA region, including Tanzania, prioritize commercializing and commodifying crops to boost farmer incomes, and reduce dependence on subsistence farming (Government of Tanzania, 2013). In his inaugural speech in October 2015, the newly elected President of Tanzania, John Magufuli, highlighted the potential for industrial growth in agriculture, livestock and fisheries, and pledged to modernize the sectors through better inputs (such as equipment, fertilizers, improved seeds, etc.). These kinds of priorities reflect broader market-oriented approaches introduced through the African Green Revolution[5] initially at the end of the 1990s, and which modeled the Asian Green Revolution in the 1980s (Djurfedt and Jirstrom, 2005; Moseley, 2002). Biofortification as a means to address nutrition objectives aligns with these strategies, where technological innovation responds to the perceived need of food crops containing more nutrients.

Nutrition in Agricultural development

The key premise for biofortification in agricultural development discourse in SSA highlighted the need to target households that "subsist on a single, staple crop,

which they cultivate primarily for domestic consumption''(Brooks, 2013: 2). For people in Mwasongwe, this was sweet potato. It followed, therefore, that their diet is determined by "…the nutritional content (and deficiencies) of whichever staple it is that is grown on the family plot" (Brooks, 2013: 2). This served as the entry point for linking health and nutrition with farming production in rural, resource poor areas, such as Mwasongwe. Thus, through an 'improved' variety of a staple crop developed by agricultural scientists (and supported by international donors), rural communities could receive the necessary nutrients by integrating a new crop into their existing cropping systems. This kind of 'technical fix', or prioritization of a technological solution to a complex challenge of nutrient deficiencies, aligns with the technologically-driven African Green Revolution[6] approach to agricultural development, which emphasizes high yielding, market-oriented farming practices, and integrating, small-scale farming into large-scale commercial systems (Moseley, 2002).

Gender in Agricultural Development

Biofortified crop production as a strategy to 'improving' nutritional health is neatly situated within dominant neoliberal gender and development discourses that emphasize women as individual economic agents in terms of productivity. Quisumbing et al. (2003) suggest that the emphasis on growing nutritious food contributes to addressing gender inequality in agricultural productivity. This economic approach views increased access and control to assets for purposes of

increasing productivity as key. However, in narrowing the purpose of assets to productivity, this approach fails to account for varying livelihood practices and choices, which are relevant in any effort to unpack the underlying causes of malnutrition or poor dietary health. For the marketing of OFSP, reinforcing the dual benefit to health and incomes, and specifically for women farmers, assumes that assets such as land, labour, agricultural inputs and financing will be consistently available while assuming that these assets are equally accessible to both men and women farmers.

O'Laughlin (2007) and Cornwall (2008: 2) argue that these normative gendered caregiver roles serve to reinforce existing social inequalities in agricultural development. Situating nutrition within the context of household food production and preparation in Mwasongwe assumes that reproductive and productive roles are static and that food-related challenges and shortcomings are mostly women's responsibility in the family. For biofortified sweet potato, NGOs approach female farmers already growing sweet potato to cultivate more biofortified than non-biofortified varieties, as a means to better nourish their family.

O'Laughlin (2007) sees certain myths regarding the benefits of productive resources as dismissive towards underlying structural barriers women often face due to reproductive work. Critiques of development projects that focus on the gendered conditions associated with the technical, commercial driven agendas of the Green Revolution approach reveal growing class and gender differentiation, along with the steady integration of small scale production communities into systems dominated by global finance (Mbilinyi, 2016; Koopman 2012a; 2012b).

Gillian et al.'s (2015: 13) study demonstrated that women's bargaining power from OFSP production led to greater decision-making power in the household in Uganda. At the same time, their study also revealed that adoption of OFSP is greater when land is either co-owned by both men and women in the household, than when land is solely owned by men.

Most national policies on gender equality are framed around women's potential for increasing productivity as a means to reducing social and economic inequality (Rasavi, 2009; O'Laughlin, 2008). For example, in Tanzania, gender equality is framed in the context of gaining more access to economic opportunities in order to contribute to national priorities (Government of Tanzania, 2014). Hodgson (2011) suggests that market-oriented policies can only benefit a minority of women who can access markets. These are mostly educated, middle-class women with close ties to urban and peri-urban markets. This is reflective of broader narratives or 'myths' that prioritize women's equal access to resources to increase overall productivity as a solution to inequality (O'Laughlin, 2008; Rasavi, 2009). Yet, these myths present gendered labour divisions as static, and often insufficiently portray rural women as food producers within particular development contexts, ignoring their other roles, their marital, class and education status that coincide with other economic activities, opportunities and interests. Targeting sweet potato farmers to grow OFSP perpetuates this narrowly defined identity.

Marjorie Mbilinyi (2009) suggests that these liberal policies and coinciding liberal feminist approaches are geared towards encouraging the commercialization of agriculture, without fully acknowledging the gender relations that are at play in

actually realizing these economic benefits, and that risk further displacing women's existing small-scale farming activities. Mbilinyi situates women as possible active contributors to the diversification of agricultural production for both subsistence and commercial purposes, and for the benefit of themselves and their families. Deborah Fahy Bryceson (2002: 36) highlights the "malleability of gendered divisions of labour, and the significance of how women negotiate their economic opportunities" within broader livelihood options that consider their "social networks, resource access and daily reproductive responsibilities". A shift in the attention from economic growth within agricultural development and nutritional health to processes of rural transformations will provide insight into the structural barriers beyond productivity; "considerate of the overlaps between productive and reproductive roles, and in the context of developing autonomous, self-sustaining national and regional economies and (Tanzanian) societies" (Mbilinyi, 2016:126). Yet the ways in which interventions are deemed a success are largely dependent on evidence on the impact and the potential for population level change.

Scalability

Increasingly evident in multi-million dollar investments in agriculture from bilateral and private foundations is an emphasis on the large-scale impact of an innovation. The number of farmers reached, quantities produced, and income generated from sale of outputs are examples of evidence used to show or reinforce what is commonly termed 'impact at scale' in agricultural development discourses. The quality of an innovation, such as OFSP, is measured by its scalability. Tsing (2015: 37) considers processes of scalability as an integral component to defining

what constitutes 'progress', in that it is "defined by its ability to make projects expand without changing their assumptions". The characteristics situated within a scalable framework are largely measurable, quantifiable, and predictable, leaving little room for the non-replicable aspects of adapting to something new. According to Tsing, variations within a particular research finding counteract the intention that scalability entails. "A scalable research project admits only data that already fits the research frame. Scalability requires that project elements be oblivious to the indeterminacies of encounter; that they allow a smooth expansion… scalability banishes meaningful diversity, that is, diversity that might change things" (ibid: 37). A growing number of scholars acknowledge the necessity to consider processes beyond diffusion and adoption to take the political, socio-economic and environmental factors affecting processes of scale into consideration (Linn, 2016; Wigboldus et al., 2016). Development agencies describe varying approaches to scaling as an integral end-goal of long-term strategies, including the International Development Research Centre (IDRC) through 'scaling science' (Gargani and Maclean, 2017), the United States Agency for International Development (USAID) and Global Affairs Canada (GAC) as 'scaling-up'. For biofortification and crops such as sweet potato, processes of 'scaling' or descriptions of expanding the reach exemplifies an intervention's success, and therefore drives further political and economic investments.

Biofortification as a Scalable Solution to Malnutrition?

Biofortification is seen to adhere to the potential for 'impact at scale' for nutritional health. Combined with commercialization, it is situated within narratives

of modern agricultural development that emphasize technologically driven, large-scale expansion of farming as a means to boost economic benefits and reduce poverty. Coinciding with African Green Revolution[7] strategies, biofortification of existing staple crops emerged as a new strategy to address malnutrition in the early 2000's, which targeted rural, subsistence-based farming communities.[8] Sally Brooks (2011) broadly defines the technology as "an umbrella term for a range of projects that aim to develop and disseminate micronutrient-dense crops to 'populations at risk' from contracting malnutrition-related diseases" (Brooks, 2013: 1). Biofortification includes processes that are transgenic (genetically modifying particular genetic traits) as well as conventional cross breeding (breeding of particular traits onto other or new varieties). Earliest versions of biofortification began in Mexico in the 1970's, with the International Centre for Maize research conducting experiments around non-transgenic processes of breeding maize with higher protein content, which was called quality protein maize (QPM). These efforts aligned with international priorities around protein deficiencies in the Global South as a leading cause of hunger and under-nutrition (Semba, 2016). So far, results from recent studies of QPM harvests have shown mixed results in terms of farmers adopting the new varieties, and there was little proof that the new varieties improved nutritional status with families that grew them (Grotte et al., 2010, cited in Brooks, 2013:3). Ongoing challenges with climatic conditions in maize production

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[8] UNICEF reported that supplement provision fell short of meeting large rural populations at greater risk of malnutrition. See UNICEF (2007).

in general, including longer dry seasons and uncertain rainfall patterns, have seen many farmers in the East African region, including Tanzania, reduce the amount of maize they grow (Ngotho, 2017; Alward et al., 2017). Current policy-level discussion on QPM remains optimistic, based, for example, on CGIAR-commissioned research citing successful results in terms of increasing the yield (De Groote et al., 2016).

Biofortified golden rice became the first genetically-modified biofortification project that attempted to "genetically engineer the pro-vitamin A pathway into the rice endosperm" (Potrykus, 2001 from Brooks, 2013: 3). Since the technology relied on transgenic processes, contentious debates surrounding potential health and environmental impacts of GM foods and agricultural production followed the research and progress around golden rice. Scientists were also faced with challenges around regulations of GM production which limited where golden rice could be distributed. The project relied on private and public partnerships to manage the research progress and distribute seeds. Mason et al., (2001; cited in Brooks, 2013: 3) suggests that "justification of funding this research was that, while the likelihood of success was low, the potential benefits in public health terms would be significant, given that vitamin A deficiency was a priority concern for the international nutrition community". Similar to QPM, it took several years of research to develop varieties that increased the nutritional value, while also maintaining consumer preferences (Ibid: 3).

Sweet potato is the first biofortified crop to show evidence of improved nutritional status from children who consumed it. Starting in 1995, a study in South

Africa published results showing the change in vitamin A status between those who consumed orange varieties of sweet potato and those who consumed white or yellow varieties (Vanjarsveld, 2005). Other studies then aimed to demonstrate the potential for population level changes through large-scale distribution of biofortified varieties (Low et al., 2007). In 2014, a study conducted in Mozambique drew links between OFSP consumption and reduced instances of diarrhea (Jones and Brauw, 2015). Other studies focused on other aspects of production, such as seed systems (McCewan, 2015), the agronomic practices of increasing yield (De Groote et al., 2017) or comparison of adoption levels (Gillian et al., 2017). These studies centred around OFSP and the crop itself, rather than the farming and food provision practices of farming households, and how nutrition and dietary health is managed in these contexts. Actual uptake of biofortified varieties varies from country to country depending on national and regional investments, infrastructure and distribution of material (Low, 2017). The narrow scope in design and anticipated results of these studies leave social and economic factors unaccounted, for example, whether farmers cultivated sweet potato as a symptom of broader social, economic inequities that existed in the context of encouraging the production of nutrient-rich crops. There is little doubt that biofortified varieties of sweet potato or orange varieties of sweet potato will increase the vitamin A levels of those that consume it as the research has shown. But studies that focus on vitamin A underemphasize other aspects of malnutrition, such as quantity or diversity of food availability, access to natural resources, or other protein sources and sanitation and

water challenges that are often associated with increased instances of poor health (WHO, 2013).

In spite of these shortcomings, large-scale investments grew, as evidence of OFSP efficacy in publications became available. The Bill and Melinda Gates Foundation (B&MGF) supported the launch of a campaign in Tanzania, Ghana, Burkina Faso, and Rwanda starting in 2008. Large international NGOs or INGOs, such as Helen Keller International (HKI), World Vision (WV), and Farm Radio International received support from the Foundation to lead media campaigns and community events, distribute planting materials such as vines, and to develop a market around the new crop. By 2015, total donations amounted to USD$68 million in support of OFSP related scientific programs, research, and promotion initiatives from various sources, with the majority of funds channeled through the Bill and Melinda Gates Foundation. This large-scale financial commitment reflected new global development priorities in nutrition, which shifted from caloric and protein in-take to micronutrients.

Nutrition Narratives

Hidden Hunger

Enthusiasm for biofortification came at a time when there was a global recognition of micronutrient deficiencies or 'hidden hunger' as a source of under-nutrition in the Global South. The term 'hidden hunger' was first coined by New York Times reporter, Nicolas Kristof in 2009:

> One of the great Western misconceptions is that severe malnutrition is simply about not getting enough to eat. Often it's about not getting the right micronutrients—iron, zinc, vitamin A, iodine—and one of

> the most cost-effective ways outsiders can combat poverty is to fight this "hidden hunger."(Kristof 2009, cited in Kimura 2013: 1)

Hidden hunger gives social context to the scientific meaning of deficiencies in micronutrients. It grew out of the gradual acceptance by the nutritional science and international development community that protein interventions alone could not address ongoing challenges with food insecurity in the Global South (Kimura, 2013). Previous priorities focused on caloric intake and protein deficiencies. This new description of nutrition as a challenge that is unseen, yet detectable through scientific approaches and solvable by administering specific nutrients reset the global nutritional agenda in international development. Agricultural investments coincided with this past priority in large-scale production systems, providing staples such as maize, cassava and rice in the quantity required to feed populations of people without adequate access to food. Hidden hunger framed the 'problem' of nutrition as a lack of essential micronutrients needed for overall optimal growth in young children. This reframing is shown in the varying approaches to scholarly engagement in nutrition as described below.

Critical Nutrition Studies

In socio-cultural anthropology, nutrition is widely associated with the field of biological anthropology studies (Goodman, 2013) and, to a lesser extent, by research into the specific medical and health aspects of nutrient deficiencies (Pollok, 2007). Howard and Millard (1997) viewed causes of malnutrition and hunger as results of shifting kinship relations, political priorities and changes to land use surrounding Mount Kilimanjaro in Tanzania. Kuhnlein and Pelto (1997) specifically

addressed vitamin A deficiency in the Global South and the social aspects of malnutrition through an anthropological lens, highlighting the social and economic determinants of poverty that may lead to vitamin A deficiency. However, approaches to studying nutrition remain embedded in a normative interpretation of nutrition, centered on a largely American science-based definition of food broken down into nutrient content. The quantitative assessment of nutrient levels is easily monitored and measured to determine the dietary health of an individual, on the assumption that intake of proper nutrients is the most important determinant of dietary health. This approach justifies scientific and technical interventionist approaches. In contrast, critical nutrition studies as described by Biltekoff et al. (2014: 34) see the social, physical and economic underpinnings as:

> Understanding nutrition as a social reform requires thinking both with the grain, bringing focused attention to the language and practices that comprise 'health' and nutrition, but also against the grain, seeing and naming the social processes that inform and result from knowledge that asserts itself as purely factual.

Further to situating nutrition at this disjuncture, Biltekoff et al. (2014) and other scholars such as Guthman (2014), Hayes-Conroy (2014), and Landekar (2014) examine nutrition interventions to identify the "social and ideological dimensions of nutrition … and the unintended effects that are quite different from the ones nutrition [actors] claim as its goals and objectives" (Biltekoff et al., 2014: 34).

The technological focus on nutrition which describes certain biomarkers such as vitamins or nutrients as abstracted from foods, diets and bodily processes is what Gyorgy Scrinis described as nutritionism: "Removed from their broader cultural and ecological ambits, they come to represent the definitive truth about the relations

between food and bodily health" (Scrinis, 2008: 2). Aya Hirata Kimura (2013) applied nutritionism to analyze golden rice commodity formation in Indonesia. Her study critically analyzed the evolution of nutritional science with a focus on Vitamin A, and examined the political power dynamics that enabled vitamin A and the micronutrient priority to take precedence in global meanings around nutritional health. While vitamin A initially had been associated in international nutritional science circles with particular problems affecting eyesight, Kimura described the scientific research that presented linkages between vitamin A deficiency and poor immune systems (Sommer, 1986; 1997; 2008) which eventually led to expanding opportunities for global investment in child health and preventing child mortality. Her analysis showed that political influence in these studies might have over-emphasized a linkage between child mortality and vitamin A deficiency in order to gain economic support to expand vitamin A supplement campaigns. The emphasis on the nutrient composition of food, builds on this valuation of vitamin A and micronutrient as 'life-saving'. OFSP invoked a similar valuation, and linked food production and consumption with vitamin A.

Nutritionism recently seeped into more specific studies of food insecurity and agricultural development. Patel et al. (2014: 22) argued that nutritionism discourse is not 'free flowing', but rather "articulated with the possibility of material shifts in ways to control land and state resources within both the Global North and the Global South". Jane Dixon examined nutrition studies in the context of critical agrarian studies and the discursive framing of food as 'the diet' problem. Bringing together "history, epistemology and political economy of nutrition science" Dixon

pays attention to the "governmentality of bodies," (Dixon, 2016: 1112). Emily Yates-Doerr (2017: 304) views nutrition education as nutritional reductionism, which obscures foods' intricate social histories and complicated physical interactions. Borrowing from Latour, Yates-Doerr calls nutritionism, "nutritional black-boxing, or the process of consolidating technical and historically contingent ideas about nourishment and the myriad relationships surrounding dietary practices into seemingly unproblematic terms: a vitamin, a nutrient" (Ibid: 294). She argues that ancestral knowledge passed on through cooking practices is devalued in this black-boxing, and as a result, de-values the role of women in preparing food and nourishing their families. This feminist approach to critical nutrition studies demonstrates the close connections between food production and provision in women's everyday lives. For biofortified sweet potato production, recognizing this link from a political economy perspective furthers the analysis around the underlying gendered framing that depends on static gender roles in farming and food provision. A close examination of the gendered dynamics in how sweet potato is grown, prepared and institutionally set up to transform into a market crop illuminates the political, environmental and social conditions embedded in the intersections between health and food systems at varying scales.

Theoretical Underpinnings

Based on the literature above, three overlapping theoretical lines of thinking are threaded throughout the thesis: a feminist political economy critique of agricultural development, nutritionism, and science translation.

Feminist Political Economy of Nutrition and Agricultural Development

In general, critical political economy examines the relations between the state and the private sector, and assumptions and political interests inherent in public policies that tend to identify 'winners and losers' that result from policy. Reich and Balarajan (2012) identify four main themes that have emerged in the literature on the political economy of nutrition: first, the nutrition intervention approaches are fragmented and uncoordinated, from the global, and regional levels; second, national government engagement is uncoordinated, and rarely addressed by a particular sector in the government; third, the large number of actors in the nutrition sector creates a multiplicity of narratives about nutrition; and fourth, the limited capacity of "nutritionists" to manage the broader political dynamics of creating nutritional policy. Many studies on 'the political economy of nutrition' are focused less on the structural causes of malnutrition per se, than on the political economy of nutrition as a discipline and set of institutions guiding and funding projects and programs (Balarajan, Y., & Reich, M. R., 2016; Pinstrup-Anderson, 1993).

A feminist political economy lens gives prominence to the inherent tensions between the everyday livelihood practices and the discursive power of the institutional and financial networks in support of nutrition interventions. The gendered conditions of growing food and managing the health and well-being of household members are submersed in the discourse for biofortified sweet potato, its description as a subsistence crop with nutritional value, and as an imagined commercial crop with market value in Mwasongwe village. At the same time,

moving beyond the household unit, a broader perspective of women's everyday livelihood practices is considered, where "internal workings of families and structures explicitly denote the unitary household model and diversify notions of family and labour,"(Guyer and Peters, 1987; Brysceon, 1992). The broader and more systemic relations between domestic, economic and political structures that either reinforce or challenge these contestations require further attention (Rasavi, 2009: 200). For example, in the case of OFSP, the emphasis is on productivity as leading to gender equality, where the "production of a single crop is treated in isolation from farming and livelihood systems as a whole" (Rasavi, 2009: 200). A close examination of the relational dynamics between OFSP, processes involved in promotional activities and the everyday lives of female farmers in Mwasongwe will reveal a contextual understanding of opportunities to earn incomes and engagement in political and economic activities in Mwasongwe through which biofortified sweet potato is situated. Using a feminist lens to deconstruct the technical framing of nutrition brings to light the 'friction' (Tsing, 2005) embedded in the institutional and financial networks associated with promotional efforts around biofortification; more specifically, the focus on OFSP a single-crop strategy for nutritional health. These promotional discourses enable a particular form of power relations within these networks.

Nutritionism

Nutritionism as a reductionist emphasis on the technical descriptors of food, such as calories, nutrients and fat content is implicitly rooted in the concept of biopower. In particular, it is defined in this context as "the controlled insertion of

bodies into the machinery of production and the adjustment of the phenomena of population to economic processes" (Foucault, 1976: 140). Rabinow and Rose (1984: 14) elaborate on this concept as a means to: "seek to individuate strategies and configurations that combine a form of truth discourse about living being…strategies for intervention upon collective existence in the name of life and health; and modes of subjectification, in which individuals can be brought to work on themselves." In the context of nutrition, Scrinis (2008) suggests that nutritionism conveys a social conditioning in which a "nutri-biochemical level of knowledge is not used merely to inform and complement, but instead, tends to displace and undermine food-level knowledge, as well as other ways of understanding the relationship between food and the body" (Scrinis 2008: 40).

The value of biofortified sweet potato, as a source of vitamin A is marketed as both a means to better health and a means to improve lives of farmers, for both men and women who grow it. OFSP invokes a 'nutritional fix' to solve a third world problem in the Global South. Through nutritionism, complex problems around under-nutrition, and dietary health are solvable by growing, harvesting and consuming it. This nutritional fix is neatly packaged and marketed, utilizing the orange-coloured flesh as a promotional tool to associate OFSP with 'progress': modernized approaches to health and well-being. Through nutritionism, the creation of a simplistic narrative around health is created with a close association with the orange colour, and with vitamin A.

Charismatic Crops

Kimura describes vitamin A surrounded by a certain 'hype' that inflates its value and terms it charismatic nutrient. Human charisma is a way in which power is manifested through a certain quality and 'setting apart' or differentiation from the ordinary (Bach, 2011), for example, in the form of a religious leader as described by Weber (Joost, 2014). Others point to the relational emergence of charisma. In this definition, charisma is situated in relation to particular social and economic actor interactions and created by the social and political power surrounding them (Cloette, 2009). Non-human charisma utilizes the similar diffusion of power, for example, with conservation and wildlife initiatives (Ferreria and Hofmeyr, 2014; Tubjerg, 2007). The panda bear, depicted in the logo for the World Wildlife Fund, is described as a charismatic species, or megafauna, that signifies conservation efforts, while occluding, for example, tensions between conservationists and indigenous groups who advocate for rights and access to the same resources. According to Lorimer (2007: 915), non-human charisma "emerges in relation to the parameters of different technologically enabled, but still corporeally constrained, human bodies, inhabiting different cultural contexts". OFSP's charismatic qualities as a nutritious crop with potential economic value is formed by scientists, international and local NGOs, donor agencies supporting nutrition interventions, and who all share an interest in contributing to resolving the 'problem' of nutrition in the Global South.

Science in Translation

Perceptions of nutrition as a scientific endeavor, understood in terms of micronutrients (as in the term, hidden hunger), and regulating processes in the

body, currently dominate global and SSA regional narratives of dietary health. This kind of technical breakdown of food enables a nutritional fix, in the form of material and discursive networks, to be constructed and operated to accommodate certain financial, political agendas. Adapted from Latour (2007) and Law (2002) I refer to this type of science translation as a process of transformation, where meanings and values are re-interpreted by different actors within heterogeneous networks of material and discursive actors/actants, in ways that reflect personal and institutional interests. These translations are developed through complex and dynamic networks of institutions, individuals, and materials that support production, consumption and sales of OFSP. Scientific organizations and networks have an interest, in terms of furthering the progress of biofortification, in positioning it as a solution to malnutrition in the Global South. Within these networks and processes of transformations, there is also displacement of goals and interests caused by unequal and unpredictable relations of power, where some actors have control over others (Callon, 1986: 86).

What are missing from the science-based nutritional fix narrative are the social aspects of nutrition in a more broadly defined context: processes of nourishment, of feeding the body, the cultural and environmental aspects of health and well-being. However, these social aspects are confronted by, and in tension with, the technical approaches that are rooted in science-based narratives of food. Translations can occur in moments, or defined spaces of transition, but are always aspects of power (Tsing, 1997: 255). Network interactions become these moments of translation (Callon, 1986), where meanings arrive from the 'slippages' of the

confrontation, and any meaningful discourse is already the product of multiple translations (Tsing, 1997: 256). These moments are seen in interactions between researchers and farmers, researchers and NGO staff and farmers and the media. There is no original version of any concept, but only a continuous path of translations and processes of rewriting, reinterpreting, re-integrating, through which originality and meaning are pursued (Tsing, 1997: 256). Characterizing OFSP campaigns as heterogeneous networks of both material and discursive 'nodes' then serves as a means to recognize the significance of the campaign's presence in the everyday lives of women farmers in Mwanza, and how meanings and values around nutrition and nourishment ascribed to feeding and producing food are shaped. The 'slippages' serve to reveal the unintended consequences of certain movements within the networks that shape and re-interpret how women perceive nutrition and their labour investments with OFSP and food, and elsewhere.

The naming of biofortified sweet potato is a useful way to examine how meanings are transformed in certain moments of translation. Orange fleshed sweet potato is the term used by scientists and international NGOs involved in promoting the crop across SSA. The term does not refer to the biofortification technology or vitamin A. At the same time, reference to orange sweet potato maintains the element of distinction from the older white, yellow varieties. Including the particular part of the roots, the flesh refers to the body, and the inside of the root crop. Without a constant reminder of its affiliation to biofortification, prospective cultivators are open to re-associate the crop to their changing versions of nutrition in their own context.

Kiswahili is the official national language of Tanzania and is widely spoken as a second language for most Tanzanians. Nutrition in Kiswahili is *lishe*, which also contains a dual meaning of nourishment or the action of nutrition. When biofortified varieties were introduced in Tanzania, the new varieties were known as *viazi lishe* or nourishing potatoes. White or yellow and non-biofortified sweet potato are called *viazi vitamu* or simply, sweet potatoes. Regular non-sweet potatoes are *viazi*. The OFSP acronym associates the crops with the NGO world, of programs and projects introduced through development initiatives (Green, 2012; Cornwall and Brock, 2005) In Kiswahili, biofortified sweet potatoes are distinguished only by their association with nutrition or nourishment, *lishe*, and, by contrast, the older varieties are described as sweet implying they lack nutritional qualities.

As I show below, giving a more specific context to the construction of the OFSP 'story' in Tanzania also demonstrates the ways in which institutional networks in farming, nutritional and financial investment operate to maintain OFSP's prominence in development circles. The Tanzanian government's approach to agricultural development is also shaped by the political agenda of its ruling party, Chama Cha Mapinduzi (CCM) which indirectly brings to the foreground the contentious and dynamic conditions in which nutrition is addressed.

On Tanzania and Development

October, 2015, in the middle of my fieldwork, national elections took place, which, according to one local media source, were expected to be the most contentious elections since independence in 1962 (Anderson, 2015; Sperber, 2015).

There was an air of excitement and anticipation of positive political change in both Arusha and in Mwanza, that would put an end of years of economic stagnation, growing inequality and corruption. Yet, the elections also showed that the historical hold of the ruling party on the rural population superseded the overall hope from citizens seeking a more drastic change. Notwithstanding a name change in 1975 (from Tanganyika African National Union, on the occasion of union with Zanzibar), Chama Cha Mapinduzi (CCM) has remained the leading governing party since Independence in 1962. In October 2015, after two terms and ten years as President, Jakawa Kikwete was set to step down. In the months leading up to the elections, much of the media coverage in both Kiswahili and English newspapers covered stories of the rising popularity of the opposition party, CHADEMA or (Party for Democracy and Progress), sometimes called 'the people's party'. CHADEMA formed an alliance with the other smaller opposition parties (National League for Democracy (NLD), NCCR-Mageuzi and the Civic United Front (CUF) and renamed the party as *Ukawa* or 'becoming' . Edward Lowassa, the former Prime Minister, defected from the CCM to CHADEMA weeks before the election and was subsequently chosen to the lead the newly formed opposition coalition. This was in spite of Lowassa recently resigning from his role as Prime Minister due to corruption charges, which he denied.

Election campaigning and media coverage demonstrated the regional alliances and also political tactics to gain votes from citizens. CCM continued to have a strong following in the rural areas, whereas in many urban centres, people sided with CHADEMA. Kikwete left a legacy of severe corruption and moderate economic

growth (Mohammad, 2015). The new CCM candidate John Magufuli campaigned to fight against corruption and build the country's economy. Magufuli's previous role as Minister of infrastructure gave him the reputation as diligent, but technocratic in his leadership style (Allison, 2015). Prior election violence in 2010 incited fear of violent protests, and as a precaution, schools and public institutions closed for two weeks prior to, during and shortly after the elections. When the winner, CCM's John Magufuli was announced, there were no protests on the mainland,[9] and those strong opposition supporters, including my research assistant, were hopeful that any change was better than none. With the Mwanza region as Magufuli's birthplace, the region, including residents of Mwasongwe for the most part, were pleased with the results, as this would suggest further investment in the region. This hope seemed to come to fruition since in 2017 it was announced that a new, larger airport will be constructed in Mwanza. His campaign slogan, *Hapa Kazi Tu* ("we are here to work") became Magufuli's presidential tagline following his win, and the basis for a myriad of social media memes, hashtags, and alternative interpretations. The slogan signified the newly elected leader's commitment to accelerating economic growth for the country.

[9] The situation was very different in Zanzibar. Residents of the island claimed that CCM stole the election which resulted in riots, reports of police brutality and a 'nullification of the election results. A re-election there was then scheduled for 2016. CCM formed and political alliance with part of the opposition party. The re-election in March 2016 led to the CCM representative, Ali Mohamed Shein declared was declared the winner. After the main opposition candidate Seif Sharif Hamad of the Civic United Front boycotted the re-election after rejecting the initial October 2016 election result annulment. See: https://www.csis.org/analysis/political-crisis-zanzibar.

Priorities in national policies on agriculture, nutrition and gender equality leading up to the elections, and preliminary discussions by the new leader continued to focus on boosting productivity and increasing revenues from commercial production (Government of Tanzania, 2013). Tanzania is also a 'priority' country of the Bill and Melinda Gates Foundation (B&MGF), and Canadian and U.S foreign assistance (B&MGF, 2013; GAC, 2013; USAID, 2011). The government's priority seeks to include "greater involvement of private sector in agricultural production, processing, marketing, and the provision of support services, while also addressing challenges to low productivity that include over dependence on rain-fed agriculture; weak agro-industries and low quality of agricultural produce" (Government of Tanzania, 2013). Tanzania signed onto Scaling up Nutrition (SUN)[10], an international advocacy network that works to set global, regional and national agendas to address nutrition-related challenges. Initiated by various governments and Foundations, SUN works with government representatives to set priorities that consider nutrition-related health matters. As part of their engagement with SUN, the Tanzanian government recently revised their National Nutrition strategy (2012-2015). The strategy outlines specific implementation principles including: community participation, integrated delivery of services, universal coverage, appropriate technology, inter-sectoral collaboration and working in partnerships with businesses? (Government of Tanzania, 2011: v). As part of this strategy, an

[10] The SUN Movement was launched in September 2010. It was jointly created by individuals from a range of governments, agencies and groups, who were concerned that rates of malnutrition in some countries were not decreasing despite economic growth see: http://scalingupnutrition.org/ and Gillespie et al (2013).

emphasis on a 'business approach to nutrition', that included private-public partnership led to the legal requirement of fortifying oils and flours produced in the country in 2012. Wheat flour production is largely carried out by commercial farms, but sunflower oil producers range in size, from large-scale operations, to small-scale village or district based processes. These operations are now required to add trace amounts of iron, zinc and vitamin A into their final products. This means that smaller businesses must be legally required to comply with these new regulations, while competing with the larger commercial operations. However, by 2015, compliance monitoring of the requirements remained minimal.

The regulation of the fortification of oils and flour demonstrate the government of Tanzania's commitment to meeting nutrition objectives, but specifically driven by private sector involvement and large-scale post-harvest processing. Does this regulation reveal that, for the government, nutritional health is mitigated primarily by industrial-level intervention, rather than underlying poverty related causes? Do these regulatory processes exclude challenges such as limited access to diversity of food options, seasonal variability or lack of cash for food purchases from income sources? For biofortified sweet potato to expand into large-scale operations as envisioned by scientists, researchers and funders supporting it, further emphasis on the industrial-scale investments risks diverting funding from places like Mwasongwe to locations where companies are equipped to manage post-harvest business, such as Mwanza or Dar Es Salaam. Further to this, the aspiring transformation of a subsistence sweet potato to a commercial success (as I will discuss) displaces and discounts how, if at all, smallholder farmers, and in particular

female farmers who depend on the crop would adjust or benefit from such changes. This directly concerns how the political and governing policies of Tanzania influenced gender relations and interest in women's livelihoods.

Gender and Agricultural Development in Tanzania

Agriculture in Tanzania is the main driver of the country's economy, generating 68% of the GDP (FAO, 2011). Statistical data shows that women farmers contribute almost 58% of agricultural labour in Tanzania. Yet, they may not always directly benefit from their contributions (Leavens and Anderson, 2011). The country's history of dramatic shifts in national policies since Independence in 1961 show a range of attempts to promote rural development, with varying effects. This next section provides a brief overview of the historical and political context of agriculture, nutrition and gender equality discourse in the country.

Ujamaa

President Nyerere first used the term *Ujamaa or familyhood,* in a speech in 1962, and it later became the basis for a formal national policy in 1967. *Ujamaa* encouraged national unity and self-reliance through the creation of settlement schemes, and support for cooperative forms of labour (Fouéré, 2014; Green, 2012; Scott, 1998). This resulted in country-wide forced relocation of rural settlements, and eventual labour migration from newly developed villages. Initial enthusiasm for the redistribution of land and collective cash crop production quickly dissolved as hunger and food shortages swept the country. This was seen to be a result of the prioritization of cash crops over subsistence production, and the failure of centrally-planned agriculture to account for socio-economic and agro-ecological diversity

(Scott, 1998). Villagization, involving the relocation of thousands of farmers into new settlements, was also enforced through bylaws, fines and sometimes imprisonment (Green, 2012). The bureaucratic systems for managing *Ujamaa* slowed down any progress in its implementation, and often only benefited those working within the bureaucracy (Gibbon, 2001), and mostly men (Feierman, 1991). Thus, to rural farmers, *Ujamaa* represented the prioritization of national public, political interests over the livelihood needs of individual men and women farmers. Further to this, *Ujamaa* and the social policies under Nyerere reinforced women's roles in subsistence farming and household activities, as men were forced to migrate to seek work on larger farms and plantations under intense working conditions, leaving women to tend to household fields (Lovett, 1996). Debates surrounding what may have led to the eventual collapse of Ujamaa are often focused on either external or internal political forces (Skarstein, 2005). The negative impacts of the *Ujamaa* policies eventually led to the government acquiescing to the involvement of the IMF and development agencies in the 1980s to 'repair' the damage to social and economic welfare systems.

Since the early 1990s, liberalization policies have dominated Tanzanian's political landscape. The ruling Chama Cha Mapinduzi (CCM) party's current agricultural strategy reinforces a market-centred approach, prioritizing private sector involvement while still promoting small-scale farmers. Stefano Ponte and Rune Skarstein's studies into commodity chains, yields, labour and inputs in Tanzania showed that the transition from *Ujamaa* to liberalization policies between 1977 and 1999 brought few benefits to the majority of farmers, other than those

with larger land-holdings (Ponte, 2002; Skarstein, 2005). Nonetheless, liberalization efforts have dominated the direction of current agricultural policies in the country. O'Gorman (2009) suggested that these policies support agribusiness more than small-scale farmers. Today, many rural-based farmers in the Mwanza region continue to support the CCM, because of the government's ongoing *Kilimo Kwanza* (farming first) discursive framing of its strategies as privileging them.

Priya Lal asserts the long-standing emphasis on 'self-reliance' in the political discourses of Tanzanian independence sees the dual purpose of boosting the *Ujamaa* experiment of nationhood, indirectly creating a reliance of "developmental responsibilities" on citizens themselves. This carried forward through to post-*Ujamaa* political landscapes. Lal (2012: 212) suggests that 'self-reliance' played out in different ways politically, during *Ujamaa* and post-*Ujamaa* policies, but all the while maintaining certain dependencies on international institutions, local NGO involvement and the participation of its citizens. Self-reliance can also be seen through what Green (2015) and Jennings (2008) call a 'development state' model where civil society organizations are formed in an effort to navigate their own needs (or the needs of Civil Society Organizations, CSOs) within a certain regional and geographical boundary while relying on international organizations or foreign investors and donors. Green (2015) suggests that CSOs benefit more than the intended beneficiaries, and take the role of state-sponsored public services, such as dietary health and nutrition. For biofortified sweet potato, promoting the production and consumption of nutrient-rich foods (rather than depending on supplements), and emphasizing women's role in ensuring that this is achieved, is

also a means to lessen dependence on state-led health services, thus placing more responsibility on its citizens, and, for nutrition, implicitly on its female citizens.

In addition to encouraging self-reliance, both *Ujamaa* and liberalization policies have disadvantaged most rural women in Tanzanian regions where agriculture is the primary source of income. Hodgson (2001), Snyder (2005), Lovett (1996) and Lal (2010) showed that women farmers have increasingly lost control over their farming activities, where state resources oriented towards market-focused farming often benefitted their male counterparts and non-household-related production. Differing analysis show how gender relations might have been shaped by these policies. Priya Lal suggested that the *Ujamaa* policy "normalized gender roles and celebrated a generic ideal of the nuclear family" (Lal, 2010: 19). At the same time, Mbilinyi (2016) pointed out that villagization also enabled women who remained in the villages to work collectively, while their husbands migrated. Feiermen (1993) showed the limitations with formalization processes for women's cooperatives during post-*Ujamaa*. When international development agencies emphasized women's engagement, men would still benefit, while using their wife's name to access certain services and opportunities (see also Snyder, 2005; Hodgson, 2011). The allocation of services for women also depends on class, ethnicity and household structures. As Hodgson points out, many women who are able to benefit from these women-focused projects are of a moderately educated middle class, with greater opportunities for activities outside of the household than those more dependent on subsistence farming (Hodgson, 2011).

In line with recent emphasis on gender in agricultural development, a surge in 'women' focused projects appeared during my fieldwork, primarily through discourses of women's empowerment in Tanzania, and more broadly narratives of gender inequality. For example, OXFAM UK launched a 'Women Food Hero' television program or *Mama Shujaa Wa Chakula* in Swahili reality show in 2011. Similarly, Helen Keller International partnered with the International Food Policy Research Institute to implement a USD$15 million nutrition, gender and market project, Creating Homestead Agriculture for Nutrition and Gender Equity (CHANGE) program in Tanzania which focused on introducing high value vegetable production systems, planted close to the home and led by women in the household (HKI, 2015). The project emphasized an increase in incomes while also boosting the nutritional health of women and their families by introducing or expanding vegetable gardens that also included biofortified sweet potato. A significant portion of the budget allocated to evaluating the projects aimed at demonstrating evidence of success and the potential for replicability (or scalability) in other countries. In both these examples, the emphasis on women's livelihoods in the project theme contributed to the project execution and its anticipated success, but through a narrow, production-focused lens. Other aspects of rural livelihoods and the gendered conditioning of access to water and other natural resource, education and employment opportunities, and health and sanitation infrastructures are omitted from these kinds of framings.

The political influence on agricultural and nutrition development in Tanzania is seen to directly influence how gender relations are perceived, reinforced, and

rarely challenged. In the case of biofortified sweet potato, initiatives promoting the crop did not directly set out to explicitly 'empower' women. But because it was a crop that many women grew, and there was a strong emphasis on its nutritional aspects, the potential benefits for women became a central component to the narrative. At the same time, the success story, as mentioned at the beginning of the chapter, revolved around the crop itself, where farmer labour and their other investments seemed irrelevant to notions of success. My research aimed to unpack this tension between the success narrative and the everyday realities of growing food in the presence of biofortified orange sweet potato promotion activities in Mwasongwe village. In the following section, I present the overall methodology.

Methodology

This research traces the discursive and material networks of biofortified orange sweet potato through a feminist political economy lens. My fieldwork followed the various discursive and material networks around cultivation, marketing and consumption of OFSP. This included observing interactions between international research institutes, non-governmental organizations and farmer groups, examining women's actual labour investments in the household and other sites, and identifying the discursive framings of normative gendered labour divisions. I situated the OFSP campaign as a network with multiple roles, as an instrument of power relations, and a manifestation of tensions between state-based agricultural research centres, donor agencies, NGOs, communication technologies and materials, and different segments of rural life. My theoretical tools derived from

the literature review enabled me to critically examine the flows of material and the discursive exchanges embedded within campaign activities and how they intersect with the everyday experiences of different women farmers (who are growing OFSP or not growing OFSP) in different production spaces.

Fieldwork took place between April 2015 and March 2016 and included particular sites in Mwasongwe village and the surrounding areas including Ukerewe district, Mwanza town, meetings in Dar Es Salaam and Arusha and Nairobi, Kenya. In Mwasongwe village, I conducted participant observation in the commercial centre, the homes of members of the the farmer group *Imala Gihabu*, the health dispensary, food vendors, various field plots of farmers and local market places. In order to study the spaces where biofortified sweet potato is developed and promoted, specific field sites also included regional and national meetings. These included: meetings initiated by the International Potato Centre (CIP) in April, 2015 in Nairobi, Kenya and in Dar es Salaam in March, 2016, NGO meetings in Mwanza and Dar es Salaam in March, 2016, and an international conference hosted by the international NGO, Catholic Relief Services held in Nairobi in September, 2015.

Central to the study is the engagement with the various actors involved in biofortification, nutrition interventions and OFSP promotional activities. These include farmers, NGO staff, scientists from both national and international institutional settings and media personnel. In Mwasongwe and surrounding areas in the Mwanza regions I traced varying forms of exchanges between these actors and women sweet potato farmers, and other residents of Mwasongwe to reveal how labour investments, and understandings of nutrition are re-contextualized in

women's lives in the presence of long-term OFSP initiatives. I interrogated the multiple perceived values that are manifested in OFSP campaigns; for example, how nutrition is framed either through a scientific lens, or described as having monetary or non-monetary value. My research contrasted the experiences of growing, preparing and selling food by both men and women with the growing emphasis on a scientifically-defined concept of nutrition and health, in order to reveal often under-acknowledged forms of dietary habits and strategies for nourishing themselves and their families.

Participant Selection

My initial entrance into Tanzania began in Arusha, where many of the civil society organizations were headquartered. My previous employment with Farm Radio International as well as the CGIAR familiarized me with the NGO landscape in the central region. While in Arusha, I visited NGO and donor offices, such as Helen Keller International and USAID, and spoke with scientists from the International Potato Centre to get a better sense of the overall campaign plans across the country. I also consulted with Dr. Regina Kapinga, who at the time worked with the Bill and Melinda Gates Foundation, and Dr. Rose Shayo from the University of Dar Es Salaam, and others, and reconfirmed Mwanza region as my main field site to work with sweet potato farmers. Through my engagement with Farm Radio International and Tanzanian Home Economics Association (TAHEA), I regularly met with members of the farmer group, *Imala Gihabu*, based in Mwasongwe who had been involved in biofortified sweet potato promotion since 2006. This farmer group became the central basis through which I studied interactions between farmers in various

institutions, and the actual production, preparation and sale of OFSP. In addition to meeting with the farmer group, I interviewed other residents and business owners in Mwasongwe village. My regular engagements with farmer group members paralleled occasional interactions with NGO staff and their OFSP promotional activities, and observations of international and national meetings with scientists and NGO staff. I conducted a total of 122 interviews over the course of the fieldwork, which included regular discussions with key members of the *Imala Gihabu* group in Mwasongwe.

Mwasongwe Village, Misungwi District, Mwanza Region

Three main sweet potato regions dominate the OFSP campaign geographical targets: Lake District, Southern Highlands and the Coast or Eastern Zone. However, other regions have recently started to grow OFSP as a result of vine distribution activities through NGOs. My research focused on the Lake Zone and farming communities in the Mwanza Region, where 99% of households grow some variety of sweet potato (Sindi and Wambugu, 2012). Sweet potatoes are customarily considered a 'default' crop, a food to depend on during times of low productivity or drought. The sweet potato production in the Lake Zone is mainly for household consumption, where crops such as maize, beans and rice, which are grown mostly for sale, dominate the agricultural landscape. The yellow and white traditional varieties are the third most popular staple crop, next to maize and cassava. Its short growing season of three months deems sweet potato (both biofortified and non-biofortified varieties) as a food secure crop, since it can be harvested up to 4 times a year.

The main ethnic group in the Lake Zone, the Sukuma make up 90% of the population in Mwanza (Government of Tanzania, 1997). However, as a result of *Ujamaa* policies, where villagization included a re-organization of regional territories that cut across ethnic boundaries, the region is home to many other ethnic groups and those who have moved from rural, drought prone areas, to places closer to water sources. Of all the arable land in the Lake Zone, 23% of total agricultural production is allocated to sweet potato (Kapinga, 1991), yet this figure may have changed due to current and previous promotional efforts as well as other changes to cropping systems. In 2015, the Mwanza region hosted a number of international initiatives through international non-governmental organizations and church-based initiatives that included aspects of nutritional health and growing nutrient-rich foods to consume and sell (HKI, 2012; BMGF, 2013). Based in this setting, the following describes the specific methods used for the research.

Methods

I worked closely with Anna Bayona, my research partner, who assisted in translation and in arranging for meetings and interviews. Anna previously worked at an NGO, and prior to that with the government. Anna was semi-retired, and passionate about politics and women's rights. She helped me to navigate the various challenges I faced during fieldwork, at varying degrees. From adjusting the seams to my Katanga (a cloth worn over clothes), to finding us shelter away from a man chasing us armed with a mango, Anna provided the necessary collegial support during my time in Mwasongwe and the region.

Ethnographic methods, including participant observation and semi-structured interviews, enabled me to trace normally unaccounted for spaces of labour, time and resources investments situated in everyday experiences of residents of Mwasongwe village. I did not digitally record the interviews as an effort to maintain a more open, informal presence and observational perspective to my research. I took extensive field notes during my interactions, and added to these notes at the end of each day.

In Mwasongwe, I conducted participant observation with women farmers, as they went about their daily work on the farms, in the household and in the community. While I mostly interacted with members of *Imala Gihabu*. Anna and I also met with other residents, business owners, and visitors to Mwasongwe. This occurred regularly, during the day, for the duration of my fieldwork. I focused on observing various activities, including; meal preparation, childcare, running errands, health related challenges, group meetings and farming.

I translated, reviewed and analyzed a selection of radio broadcast episodes on OFSP that profiled the members of *Imala Gihabu*. These broadcasts revealed how nutrition is defined and framed, and the ways in which food production and provision are presented in terms of challenging or reinforcing gender norms.

Limitations to Methods

While my data are mostly drawn from the Misungwi district, and in particular, Mwasongwe village, I also conducted interviews in the Ukerewe district for comparative purposes. A focus on collecting data in Mwasongwe, however, enabled a more in-depth analysis of the everyday and long-term impact of OFSP

promotional activities. At the same time, a focus on one field site reduced my breadth of analysis to regional and district level political, social and environmental influences and could, therefore, not take into account other sweet potato regions with differing geographical and political landscapes.

Positionality

Development Practitioner to Anthropologist

Following feminist anthropological theory, I explicitly recognize that my particular past professional experiences, alongside my racial and gender identities, influence the direction and outcomes of my research activities. As Rose (1997: 308) asserts, "continuing discussions of situated knowledges, ideas of positions, between researchers and research participant becomes inextricably linked to relations of power, and entwined with many 'facets of the self'".

I lived and worked in East Africa between 2003 and 2007 and made regular visits to the region as a research coordinator with an international NGO, Farm Radio International, from 2007 until I began my fieldwork in 2015. Just prior to beginning my fieldwork, I initiated the process of shifting away from managing development projects and consulting with international NGOs to becoming a sociocultural anthropologist / researcher. This gradual shift proved to be both challenging and advantageous. By maintaining connections with former colleagues and NGO staff close to projects promoting OFSP, I risked losing some objectivity. At the same time, the institutional and social networks and administrative support, proved invaluable to executing my fieldwork in Tanzania (for example, in terms of securing a research permit). My professional networks and affiliations with International NGOs and

agricultural research centres allowed me to develop contacts for my fieldwork, while also building a strong network of institutional affiliations engaged in biofortified crop promotion in some way. Farm Radio International, Helen Keller International and the Tanzania Home Economics Association (TAHEA) provided invaluable direction and guidance, which I would not have had access to without my initial NGO affiliation.

Identity

As a mother and woman of colour, I recognized that this would influence the ways in which I was able to interact with sweet potato farmers, both men and women, as well as bring out the gender politics that surrounded the OFSP project and promotion around it. Having the ability to connect with other mothers in Mwasongwe provided numerous moments of connection and shared experiences with motherhood. At the same time conducting research without my children present brought out certain perceptions of gendered divisions of labour outside of household. For example, the Catholic priest assigned to Radio Maria radio station in Dar es Salaam asserted that I was selfish in my choice to pursue studies while a mother to two young children. These experiences and my identity influenced my relationship with my research partner, Anna, as we were able to discuss at length the varying difference between raising children in Mwasongwe, and in the city, Mwanza and with my experiences in Ottawa, Canada. Anna would often explain to residents of Mwasongwe that I was a student and a mother. Given the long-term engagement in Mwasongwe and in Tanzania, and previous experiences of living and working in the country, it was my position as a mother that enabled me to collect

data on the experiences of women in Mwasongwe which might have otherwise gone unnoticed.

Chapters Overview

The order of the following chapters allows me to trace the growth of the biofortified sweet potato story as it evolved in Mwasongwe Village and as it was influenced by the broader nutrition discourse taking place regionally and internationally.

The thesis is organized around various elements of material and discursive networks of growing, consuming and selling biofortified sweet potato. Chapter 2 begins with the introduction to biofortification alongside the 'discovery' of orange sweet potato in East and Southern Africa by American scientists in Uganda. This story of the discovery of orange sweet potato paralleled the growing recognition by international development actors, nutritional scientists and agricultural scientists of under-nutrition challenges with populations dependent on single staple crops, such as maize, rice or root crops, cassava and sweet potato. I argue that the story of discovery acted as the main 'origin story' to the OFSP narrative that sparked the creation of the crop's charisma and, as a result, masked the gendered labour divisions involved in growing and preparing food. The chapter then traces how the first batch of biofortified varieties arrived in Mwasongwe village in 2006. I describe how, as OFSP activities took root in Mwasongwe, sweet potato farmers discovered new forms of earning incomes, and building social assets in Mwasongwe. Initial accounts of success by farmers in Mwasongwe emphasized the economic potential

and benefits to growing the crop with little mention of the heightened nutrient content. The local NGO=, farmer group *Imala Gihabu*, and the specific members of the group I worked with during my fieldwork are introduced in this chapter.

Chapter 3 examines how sweet potato is cultivated in Mwasongwe and how it is situated in the everyday lives of the residents of Mwasongwe. This is analogous to 'producing' the value of OFSP as more than just a crop grown in rural areas for sustenance and mostly by women, but a gradual transformation into a crop with potential market value, and one that can address more complex challenges related to malnutrition, and to a lesser extent poverty. At the same time, a close examination of this kind of 'production' in Mwasongwe, in meetings with scientists and NGO staff show that growing OFSP also reinforced certain power relations and gendered conditions in growing food while challenging others. This chapter presents the argument that the charismatic qualities of OFSP increased the production of sweet potato in the Mwanza region, yet also reveals underlying structural and institutional limitations, in terms of the availability of planting material, the narrowed presentation of nutritional health and the ways in which women sweet potato farmers were mostly perceived as producers of food for their families in OFSP narratives.

In Chapter 4, the focus is on how OFSP is consumed in the context of seasonal and daily meal preparation, availability of food and everyday health and dietary practices in Mwasongwe. I suggest that promoting the consumption of biofortified sweet potato encouraged particular forms of food preparation that reinforced normative divisions of labour as well as disregarding the structural and

environmental constraints to managing dietary health faced by residents of Mwasongwe. Ideas of 'consuming' OFSP also meant strengthening the charismatic qualities of the crop through ongoing promotional activities; activities which remained in tension with actual everyday investments in the food-related labour of women sweet potato farmers and others living in Mwasongwe. A focus on the dietary practices in Mwasongwe exposes the everyday and seasonal variability that characterized the consumption of biofortified sweet potato at different times of the year. The chapter reveals actual dietary practices in Mwasongwe, and described the range of opportunities and experiences in preparing, growing and serving food in Mwasongwe. It ends by showing how some women play important roles as preparers of food and of income earners outside the household, as *mama lishes* or informal small-scale providers of warm, fresh-cooked foods.

Chapter 5 takes a closer look at the imagined and actual efforts to transform sweet potato from a subsistence crop grown only for consumption, to a crop produced for the markets and for further processing. In the promotional discourse, selling OFSP coincides with selling or marketing of the potential for vitamin A in OFSP to meet the complex dietary needs of residents of Mwasongwe. In reality, I show how the potential for OFSP to meet this kind of success is hindered by the structural constraints such as limited access to and availability of processing tools and machinery and energy sources to support them. At the same time, residents in Mwasongwe integrated opportunities associated with OFSP into their existing income generating opportunities, without fully depending on or subscribing to the overall promotional discourse.

The conclusion chapter of the thesis summarizes the tensions identified in the OFSP success story by analyzing the main aspects of the narrative; creating, producing, consuming and selling OFSP. In concluding the research, I show how the charismatic nutrient, vitamin A is manifested in the processes of cultivation and consumption of sweet potato. It is seen to mark an isolated, singular, yet tangible step to 'better nutrition' without disrupting other aspects of overarching market-focused agricultural investments prioritized by development actors and government alike. I make the case for broadening the framing of food systems beyond production and consumption practices to challenge the dominant framing of 'women as food producers' in agricultural development, and to consider informal labour conditions of *mama lishes* and the diversity of income sources that contribute to and affect the health and well-being of people living in Mwasongwe. I suggest future research areas, around the social and environmental conditions in which *Mama Lishes* operate, and how the current political climate, and John Magufuli's theme of "*hapa kazi tu*" (we are here to work) could either benefit or hinder the potential for *mama lishes* and other business opportunities to flourish. In particular, this chapter considers how the ongoing focus on self-reliance extends to the expectation of Tanzanian citizens to practice self-reliance of overall health and living conditions, thereby further reducing the role and responsibility of the state for its citizens' well-being.

Chapter 2: Discovering OFSP

Introduction

In the mid 1990s an American social scientist made a routine visit to a farmer's field in rural northern Uganda, collecting data on rural livelihoods. She was studying farmers' decision-making processes and food security as part of a larger US-based university research project at the time. As she accompanied one of the farmers to his field to harvest his crops, she noticed that the farmer discarded the sweet potato roots that showed a tint of orange in the flesh of the root. The scientist questioned why the farmer threw away the orange varieties. He explained that no one in his family would eat them and surely no one would buy them. His family preferred the white or yellow-fleshed varieties. He explained to the scientist that his family preferred the thicker, dense texture of the whiter varieties and that the orange colour also indicated to him that those varieties were sweeter and thus less desirable.

From the American scientist's perspective, this appeared to be a missed opportunity. Orange sweet potato has been a major staple food in the southern United States for most of the 20th century. It is regularly referenced as a main ingredient for family holiday meals. George Washington was a sweet potato farmer before he became the first President of the United States. This root crop in the US is a vibrant orange colour (a similar shade to carrots) and contains high levels of beta carotene and vitamin A and is known to have prevented hunger during the depression in the 1930s (Husted, 2017). The orange varieties found in the fields of northern Uganda were paler in comparison to those available in the United States. The scientist caught a glimpse of the slight orange tint in the ones the farmer discarded and saw this as a lack of knowledge from the farmer's perspective. The scientist realized that the farmer was unaware of the nutritional quality of the orange varieties. If she could simply encourage this farmer to not throw out the orange varieties but rather include them in his existing cropping systems and dietary practices, this could improve the nutritional health of a region dependent on nutrient poor staples and grains such as cassava, maize, rice. If this farmer had not been aware of the orange varieties, then perhaps others were not aware either. Thus, the potential impact of increasing production of orange varieties of sweet potato could be large-scale, not just in Uganda but across the region.

A version of this story of OFSP's origin circulated in a meeting I attended in April,

2015, and was mentioned again in discussions with scientists and NGO staff in

Tanzania. As it was told and retold, it offered insight into how biofortified sweet potato evolved into a charismatic crop.

This interaction sparked the beginnings of a long-term campaign to integrate orange varieties of sweet potato into a series of research and development projects geared towards reducing malnutrition in young children and mothers, starting in Uganda, then eventually spreading across the east and southern Africa regions.

This 'origin' story is not new in terms of contemporary agricultural development discourse in the Sub-Saharan Africa region (Moseley et al., 2015). This story of the scientist 'discovering' orange sweet potato offers insights into two sources of 'hype' over the food crop. First, it brought forward the idea that farmers growing sweet potato were 'unaware' of the nutritional quality of orange varieties they were throwing out. As Richards (1993) suggests, farmers' discussions of agricultural knowledge with researchers are often performed, in that responses to scientists' queries are tailored specifically to the question and in the narrow context in which it is being asked. When the farmer explained his family's preference for the white varieties, it was assumed that these preferences were based on taste, texture, and colour, as he mentioned. This enabled the scientist to formulate her own conclusion as to the implications from this decision. A questionable emphasis placed on the 'lack' of knowledge by the farmer allowed for the realization of the subsequent untapped knowledge from the scientist.

Second, the discovery complicated the idea that orange sweet potato was a new crop introduced through the technology of biofortification. In this accounting, through this brief interaction the sweet potato was made 'new' in the context of the

scientist's knowledge and the farmer's perceived lack of knowledge. The story of the scientists 'discovering' orange sweet potato seeped into promotional materials for biofortification, and through project descriptions promoting OFSP (HKI, 2012; CIP, 2012). In actuality, orange varieties existed, but only in small quantities, with low amounts of beta carotene (a plant-based pre-cursor to vitamin A) and were not preferred by farmers who grew them. This myth, and this particular introduction of a new crop by the scientist, overshadowed the actual presence of existing orange varieties and associated knowledge of their social value. By narrowly describing the interaction in terms of knowledge of the specific crop being harvested, and around the scientific aspects of nutrition, the scientist assumed that there were few nutrient-rich foods available to the farmer and his family; or if there were, the farmer was unaware of them.

Third, the origin story offers insight into how the framing of nutritional science in agricultural development unintentionally disregards the gendered, economic and historical context of food systems in a given area, and in the Sub-Saharan Africa region more broadly. The scientist is privileged in this narrative as single-handedly identifying the central gap in agricultural development - the lack of knowledge of and availability of nutritious crops - that biofortified crops could fill. In the process of discovering OFSP as a 'new' version of a familiar and commonly grown crop, a global discourse on nutrition in agricultural development was also 'discovered', one that was detached from the actual realities of rural livelihoods situated in historically contingent and politically reinforced gendered economic inequalities.

This chapter traces the origin of biofortified sweet potato's arrival in Mwasongwe through various material and discursive networks surrounding the crop. Influenced by political priorities in agricultural development in the region, including Tanzania, proponents of biofortification saw OFSP as an entry-point into refocusing nutritional health efforts on agricultural production. OFSP was meant to be the first crop to directly and effectively respond to the 'hidden hunger' agenda, while also maintaining the priorities of increasing yield, and increasing sales from yields, as set out in Tanzania's agricultural policies and, more broadly, international agendas supporting commercial over subsistence-based agricultural development. At the same time, a growing interest in nutritional health, and in particular vitamin A, in international development reinforced OFSP's socio-economic value towards a perceived solution to vitamin A deficiency. I argue that this created the material and economic value of nutrition embedded in nutritionism discourse (a technical, science-focused way of assigning value to food), while utilizing the performance of gendered labour processes and reifying the dominant identities of women as mothers, housewives, caregivers and agricultural labourers. In doing so, I show that this 'origin' story of a scientist's 'discovery', the creation of orange sweet potato value, and the proceeding institutional and financial backing that took place, reinforces, rather than challenges, gender inequality in farming and food production.

Theoretical Underpinnings

Bridget O'Laughlin (2008: 23) sees theories of social life as types of myths, which often "employ narratives, vignettes, anecdotes and imagery to invoke a

preferred subtle understanding than skeletal propositions can convey." The retelling of stories formulates the basis for overarching myths, in which complex problems are solvable by simplistic, often universal solutions. "Myths present a technical rationale for reducing gender inequality that simplifies its political complexities – since co-operation within inequality can be and often is economically efficient" (Ibid). Myth-making around sweet potato utilizes a specific interpretation of nutritional health (described in terms of individual nutrients) in order to fit the aspiring story of biofortification. The focus on nutrients depoliticizes dietary health. Further to this, this myth making generates a certain kind of story of women's livelihoods that contributes to the biofortification story through OFSP's success, removing them from their "specific historical context of capitalist development in colonial and post-colonial settings, [which] leads to misrecognitions of the causes of poverty" (O'Laughlin, 2008: 22).

The brief interaction between the farmer and scientist sets the scene for how the OFSP story unfolded and suggests how this kind of framing omitted particular social and gendered conditions that surround the process of growing food for household use and, in particular, growing sweet potato. The scientist focused on what the farmer 'could' be growing and consuming, and argued that the farmer and his children could be healthier by making these changes. Under-nutrition in this context is an assumed challenge that could be easily resolved through integrating more vitamin A through biofortified sweet potatoes.

Rai and Waylen (2014: 43) recognize the "need to consider processes of gender analysis not just in the Global South but also the Global North, where aspects

of gender are discursively engaged with agenda setting in international development". The absence of any mention of the gendered aspects of food production in the opening interaction between a female scientist and a male farmer points to the disconnect between the scientific promotion of biofortification, based on the materiality of the crop, and the inherent labour divisions shaped by political and historical processes surrounding sweet potato cultivation in Tanzania. In particular, I refer to women's role in growing and preparing food for their families and their assumed responsibility for nutritional health in the household as well. Joan Scott suggests that analyzing livelihoods from a feminist perspective is "less about highlighting the important role and deeds of women, than exposing the silent and hidden operations of gender that are none the less present, and defining the forces in the organization of most societies"(1988: 25, cited in Brigitte-Chung, 2017: 102). The gradual insertion of women into the narrative as simultaneously an integral cause of malnutrition and a potential solution provider is a result of superficial economic analysis of gender equality where "gender inequality is understood and captured – not as inequalities in social relations of gender that are shaped by broader economic and political process, but as a simple gender disaggregation of crops and inputs" (Rasavi, 2011: 207). The gradual narrative that evolved through OFSP promotion is situated in this superficial view of gender inequality through a narrowed and technical construction of nutritional health.

Nutritionism discourse emphasizes two aspects of the development 'problem' of nutrition: lack of awareness of the availability of nutrients in crops grown by farmers in Tanzania, and the static gender norms where female household

members are responsible for the quality and quantity of food that is consumed in a household. The gradual unfolding of these two narratives focused the OFSP narrative on the charismatic nutrient, vitamin A, and utilized a selectively narrowed view of female farmer livelihoods living in Mwasongwe village. Female farmers are central to the construction of development discourse that highlights women's inadequacies around dietary health and suggests that malnutrition could be rectified by a charismatic crop. These inadequacies are based on their limited capabilities to secure enough social, financial, and environmental assets to guarantee that they and their children are nourished (Bezner-Kerr, 2005) At the same time, through cultivation and preparation of OFSP as an example of nutrient-rich food, female farmers are also seen as the potential heroes of under-nutrition, by adopting and speaking of technologies such as biofortification. A brief history of sweet potato situates the crop and its social identity in the current context.

The Roots of OFSP's Charisma

History of Sweet Potato in the Region

Sweet potato is not indigenous to the African continent. Historians and agricultural scientists believe that it arrived via Portuguese traders in the 16th century, possibly on both sides of the continent, through Angola and through Mozambique, and north via the Kenyan and Tanzanian coast. Another theory points to imports from India to the East African region, through British colonial rule and the initiation of indentured labourers from the South Asian region. It is commonly known that it existed in the food systems in certain areas of the continent for several hundred years before the Irish potato, which only arrived in the 1800s. Low

et al. (2009) suggest that the slave routes between North America and the African Sub-continent might have contributed to the spread of sweet potato across the continent, through routes that included Latin America. While it is not indigenous to the continent, the root crop has existed longer than maize, an even more widespread crop imported to Africa.

In Tanzania, early references to sweet potato described its use as a replacement crop, when maize harvests failed in the late 19th century (Bryceson, 1992). During British rule from 1919 onwards[11] district agricultural and administrative officers who were in charge of what colonial authorities called 'famine prevention strategies' in the rural areas utilized sweet potato as a main crop in their strategies. Coinciding with strong economic policies on production towards commercial use, officers were required to ensure that farmers also grew enough cassava and sweet potatoes as a means to offset risks of grain shortages or the possibility of locust infestations in maize, sorghum, and rice. Cassava and sweet potatoes were not susceptible to the same pests, and were therefore encouraged to be planted to ensure there was enough food for farmers to consume. This reliance on the root crop continued through to post-independence. The introduction to villagization, as part of Tanzania's *Ujamaa* policies, led to labour migration of many male household members, leaving the female members to ensure that there was enough food to consume. Lovett (1996: 19) mentioned that women shifted their interest from millet production to maize and cassava to reduce the labour burden.

[11] German colonizers occupied the land of Tanganika since 1884. British administration took over from German occupation in 1918, following the end of the WWI.

Sweet potato in the Mwanza region (or what was previously Sukumaland) also became the 'go to' crop for subsistence, where female household members depended on the crop to feed their children, and when eaten by adults in the morning, to offset hunger for the remainder of the working day. These historical references also contribute to common contemporary idea that OFSP is a crop for 'the poor' (Low et al., 2015; Bouis, 2008) and as a means to reduce chronic hunger.

While there might have been early indicators of malnutrition in Tanzania, it was only formally recognized in the 1930s when two men from the British colonial class in Tanzania at the time, A.T. Jerrod and G.M. Culwick, commented on "the monotony of the peasant's diet and low protein content" (Bryceson, 1992: 44). In the 1940s, the Mwanza region saw a period of major food shortages, that the colonial authorities believed to be caused by growing population pressure on resources, soil fertility and overgrazing. Two main grains grown prior to German rule in 1890 (until 1919) were millet and sorghum. However, the weevil and other pests were seen to wipe out harvests, leaving the population vulnerable to food shortages, and chronic hunger. Introducing maize production was meant to counteract these vulnerabilities in peasants' diet. A continued, deliberate adjustment of what was grown for consumption also reinforced the colonial authority's influence over food in the country. At the same time, the colonial authorities enjoyed drastically different diets that were supported by imported goods and services, wheat production and peasant-led transportation services to

deliver and import other foods from different regions of the country.[12] The ordering and control of food production of certain crops perpetuated a certain cyclic availability of food and as a result, ongoing challenges with under-nutrition or food scarcity with Tanzanian labourers.

Along with the colonial acknowledgement of malnutrition, the historical significance of sweet potato showed how the crop evolved into a 'pro-poor' staple food, and as a reliable food crop in times of drought and harvest loss. This acknowledgment of malnutrition by colonial authorities established a starting point for defining nutrition challenges in Tanzania as deficiencies contained in food and that could be technologically resolved.

Protein Malnutrition, Hidden Hunger and Vitamin A Deficiency

Malnutrition is commonly defined by UN agencies and other organizations as a chronic state of under-nutrition caused by a deficient intake of calories and /or proteins, and micronutrients arising from a continuously inadequate supply of food (WHO, 2017; UNICEF, 2013; Bryceson, 1992; Burchi et al., 2011). According to UNICEF, 34% of children under five, are stunted or chronically malnourished (UNICEF, 2016) This definition, and the accompanied statistical data for regional, country and district level malnutrition prevalence work to produce the notion that malnutrition is a quantifiable condition, even though it is shaped by non-scalable, non-quantifiable political, social and historical conditions. Latour suggests that the

[12] At the time of British rule (post-WWI), indentured labourers arriving from the South Asian continent slowly took up business posts that would service and supply British authorities. (see Bryceson, 1992).

input/output processes, or 'black-boxing' of nutrition (Yates-Doerr, 2015), make malnutrition invisible by its own success. The success of nutrition strategies such as integrating biofortified crop production into existing food systems hinges on the acceptance of the technical framing of nutrition. Latour suggests that "the more science and technology succeed, the more opaque and obscure they become" (Latour, 1999: 304). A focus on micronutrient intake as a measurable indicator for nutrition as the 'input' and the resulting measurements as the 'outputs' produce national and international statistical information that is narrowly based on a specific aspect of dietary habits. Such narrowly defined nutrition omits the social and economic conditions of food access and control and maintains an emphasis on simplified solution to complex social, environmental and political conditions that related to dietary practices. A brief summary of the historical context of malnutrition in the Global South offers background to the significance of OFSP's discovery and its potential impact on the livelihoods of female farmers in Mwasongwe. As Latour advised, "by moving in time and space, closer to places where black boxes are made, we will encounter controversies illuminating their process of assembly and their underlying complexity, as well as the means through which they gain their appearance of authority and immutability (Latour, 1987: 3 cited in Yates-Doerr, 2015: 294).

Protein Malnutrition

An American pediatrician identified the prevalence of kwashikor, or protein malnutrition, in Sub-Saharan Africa in the 1930s. The condition was first described by Cicely Williams, and characterized by "peripheral edema, wasting, and diarrhea" (Semba, 2016: 80). Study missions in the region commissioned by the World Health Organization and Food and Agriculture Organization (FAO) thereafter found a high prevalence of kwashikor in many communities, with the exception of Maasai and Batutsi people who both produced and consumed vast quantities of milk (Semba, 2016). A further comparison between Kikuyu and Maasai people in Kenya showed similar results (Gilks and Orr, 1927). John Conrad Waterlow and Nevin Scrimshaw advocated for a focus on protein deficiencies as a way to address 'third world' food problems at the time (Kimura, 2013). The findings from these studies resulted in global advocacy efforts and financial investment by UN agencies in increasing protein intake in resource poor regions in the global South. Some suggest that "the identification of protein as the 'problem nutrient' was driven in part by the Western belief in the value of a high-protein diet, as well as by milk surpluses in the U.S. and other wealthy nations (Cannon, 2002: 14). In descriptions of these accounts, the focus on the nutrients reinforced the nutritionism discourse, while further distancing the gender, social, and environmental considerations of food-related challenges in Global South.

In 1955, as a result of several international meetings and further confirmation of protein deficiency as a problem nutrient, the Protein Advisory

Group (PAG) was formed out of the Food and Agriculture Organization (FAO) headquarters in Rome. PAG was made up of nutritional scientists from the United States and Europe. One of their roles was to design and implement experiments and development initiatives to enhance high protein content of commonly prepared foods. Investments from UNICEF and Rockefeller Foundation provided enough resources to experiment with creating new commercially viable high protein content food products. Examples of these products included: *Lac-tone* in India, made from groundnut flour, with skim milk powder, sugar, vitamins and calcium; and, *Supro* in East Africa, made from maize or barley flour, torula yeast,[13] skim milk powder, salt and condiments. Issues around cost, production and acceptability (i.e. demand) tainted the success of these products. Eventually, PAG lost its creditability for not realizing its designs in reality. By 1974, a *Lancet* journal article titled "the Great Protein Fiasco[14]." outlined the failures of the nutritional scientists' and UN agencies' efforts to reduce malnutrition by high protein food development (Maclaren, 1974). By the early 1970s, nutritional scientists started to realize that "protein deficiency rarely occurred independently of caloric deficiency" (Leviason and McLauchlan, 1999). Emphasis was placed more on the problem of food supply and the quantity of food, rather than the quality of food available. The failure of the protein initiative led to a redefinition of the food problem as an issue of calorie and

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[13] This is a yeast cultured for use in medicine and as a food additive, especially as a source of vitamins and protein. It was used at the time as a replacement for monosodium glutamate (MSG).

[14] A 1974 article published in the LANCET declared UNICEF's attempt at curbing malnutrition through protein products as a failure. The author, and scientist labeled the decade long effort by UN agencies as 'The protein fiasco,' meaning the emphasis on protein malnutrition and investment in product development failed to attract markets and as a result failed to addressed the perceived global problem of protein deficiencies.

quantity shortage, shifting from a "protein gap" to a "food gap" (Kimura, 2006: 14). This redefinition and inclusion of supply opened the discussions around who were the most susceptible to this food gap and who were in charge of the supply. The commodification of food into marketable products exemplifies the 'technical fix' approach to dietary health. This account of PAG shows how globally coordinated efforts through the UN to address protein malnutrition led to an emphasis on the development of food products. Studies citing the general different dietary practices assumed a certain framing of nutrition in which the nutrient intake was synonymous with nutritional health. UN agencies prioritized processed product development, technological advancements as a means to address protein deficiencies. A focus on the nutrient deficiencies solidified the dominant technological, and marketable solutions and omitted other aspects of the food production and provision, availability of other (underutilized), protein sources or the cultural considerations, such as the social and economic values placed on livestock and vegetable crops,

Hidden Hunger

By the time orange sweet potato had been 'discovered' in the mid 1990's, and the publication of the article regarding the 'protein fiasco', the nutritional science world had abandoned protein malnutrition focus altogether, and re-prioritized a research agenda that had initially begun in the 1930s with the discovery of vitamin A. This time hidden hunger or micronutrient deficiencies took centre stage, and support of supplementation interventions became the focus of a series of international meetings, committees, and research initiatives that led to several

large-scale initiatives. Nutritional scientists suggest that humans require 51 different micronutrients, 19 of which are considered 'essential' "for physical and mental development, immune system functioning and various metabolic processes" (Burchi et al, 2011: 361). Out of the 19 essential nutrients, current programs addressed through hidden hunger focus on iron, zinc, vitamin A, and iodine.

Vitamin A

Early research from the 1930s emphasized vitamin A's significance for addressing malnutrition. Vitamin A deficiency or *Xerophthalmia* was initially defined as severe damage to the eye, the cornea and the inability to see in low light environments, or 'night blindness'. Early studies showed that prevalence of night-blindness also indicated high prevalence of child mortality. Yet other factors associated with child mortality, including water-borne diseases, dietary practices, social and cultural influences were not considered in these initial studies. Both laboratory trials using animals, and trials involving children suggested that a higher prevalence of infections and poor health was associated with lower levels of consumption of animal fat products and foods. This is because vitamin A is stored in animal fat in the form of retinol ester and in plant-based food as retinoid. The most well-known retinoid is beta carotene.

While research in the 1930s made early links between vitamin A and immune function and cellular communication, further research on this link did not take shape until the 1970s, as a counterpoint to the 'protein fiasco'. During an international UN meeting, scientists associated night-blindness with higher instances of infections and attributed this association to the lack of vitamin A. This

finding reintroduced an interest in studying the nutrient further, and specifically to identify the best intervention method in reaching vulnerable populations in the Global South. Alfred Sommer, a leading America-based nutritional scientist published an article in 1986 in the Lancet journal that presented data showing the impact of supplementation campaigns and lower instances of vitamin A deficiency, and subsequently lower mortality rates in general. Sommer (2008: 1837) later noted that it is still unknown how vitamin A increases resistance to infection, although there has been ample laboratory evidence that it does. Research surrounding vitamin A's efficacy on overall health and immune system remains uncertain, yet the bulk of vitamin A focused initiatives, including the promotion of OFSP, assert that vitamin A is medically valuable in ways that go beyond eye health.

Several long-standing supplementation campaigns began at the end of the 1980s, including: salt iodization and iron, zinc and vitamin A. These campaigns, sponsored by UN agencies and managed through government ministries, targeted children and, thus, required mothers in the Global South (including Tanzania) to passively agree to administer these new supplements. As Kimura (2013: 17) notes, "concern for the welfare of children in the developing world often resulted in blaming mothers as ignorant, but it rarely translated into commitment to mothers' welfare and improvement in their overall conditions." These initial campaigns operated in isolation of other health interventions and maintained a narrowed focus of reducing mortality rates and contributed to a narrowed view of nutrition, and what constituted a good diet. Nutrition interventions slowly seeped into agricultural development programs, through biofortification initiatives and partnerships

between research institutes and international non-governmental organizations, initially with rice and maize production. As shown below, earlier engagement with nutrition established agricultural science and development as a potential avenue for curtailing the 'problem' of nutrient deficiency.

Golden Rice and Biofortification

Earlier research into biofortification included quality protein maize (QPM) beginning in the 1970s and, more significantly, rice biofortification later in the 1990s. Scientists from the International Rice Research Centre based in Philippines backed by the Rockefeller Foundation and eventually the Bill and Melinda Gates Foundation examined the possibility of genetically modifying the rice seeds to include more beta carotene (a pre-cursor to vitamin A), resulting in 'golden rice'. [15] As Brooks (2011: 68) noted "developments in rice biofortification within the CGIAR, between 1995 and 2005 were situated within imperatives of the Green Revolution and in a revived interest in silver bullet solutions to complex global problems". Golden rice, and in particular vitamin A-enriched rice, broadened the perception of biofortification from being seen merely as a technology to include three key elements: "a range of *technologies* designed to alter the nutrient levels in selected crop; a development *intervention* combining goals of improved public health and poverty alleviation; and an *idea* linking agriculture, nutrition and health in new ways"(Brooks and Johnson-Beebout, 2012: 86; emphasis in original). This broadening of the concept of biofortification enabled scientists working in the

[15] Research and scientific programs at IRRI also included iron rice, but I highlight vitamin A enhanced golden rice for obvious reasons.

CGIAR and, in particular, Harvest-Plus, a program set up specifically to focus on biofortification to extend its mandate and to include more crops such as wheat, beans, cassava and sweet potato. This widening application of the technology and the extension of biofortification from its initial experiments with golden rice to other crops also furthered the hype surrounding vitamin A and that eventually led to the development of the charismatic crop, OFSP. Biofortification, in relation to golden rice, was "promoted as cost-effective and sustainable, benefiting from a 'multiplier effect' once biofortified varieties are integrated into seed systems, as compared with other large-scale micronutrient interventions such as industrial fortification of processes foods or supplementation" (Brooks, 2013: 3). Sweet potato, seen as a 'pro-poor' crop appealed to a similar trait of cost-efficiency, in that cultivating the crop was already in place, and required little additional investment to continue production.

In addition to its potential for cost-effective solutions to widespread accounts of malnutrition, rice biofortification was the first global development initiative to link nutrient health with agricultural production. For international nutritional science advocates and Green Revolution supporters alike, it was constructed as a "potent symbol of what transgenic technologies could –if not for burdensome regulations and irrational opposition – contribute to the alleviation of poverty and disease in the developing world" (Brooks, 2013: 5). While Brooks' extensive critiques of rice biofortification point to the technological and universalized approach to alleviating malnutrition, the gendered conditions around cultivation and provision of food at varying levels were not fully considered. Kimura (2013: 46)

recognized the inherent demands on women's livelihoods, with respect to interventions involving biofortification. To her, biofortification exposed the "relationship between experts (nutrition and agriculture) and mothers, in that experts were there to give guidance to mothers because mothers might otherwise fail to breastfeed or cook nutritious meals, thus jeopardizing the future of the nation." Yet, for Kimura, there was little difference between the production of biofortified rice and non-biofortified rice and the prominent labour investments by women in the process remained consistent. For OFSP, as I will show in the proceeding chapters, labour in production, consumption and sales indirectly shaped how OFSP was perceived by farmers, scientists, NGO staff and prospective buyers.

Summary of this Section

The purpose of the above section was to describe the historical context behind nutritionism in international development that led to the American scientist 'discovering' the orange variety in the farmer fields. It demonstrated how studies, meetings to discuss the studies, presentations and published articles on biofortification's efficacy contributed to the myths surrounding charismatic nutrients and the scientific focus of nutrition. Global discourse surrounding malnutrition focused on the universal and technological perceptions of nutritional health, the most efficient ways to administer the missing nutrients, while also attempting to develop a new market for high protein products. The case of golden rice as preceding the focus on biofortified sweet potato represents "a reductive focus on particular nutrients, food components, or biomarkers and abstracted out the context of foods, diets and bodily processes" (Scrinis, 2008: 40).

The evolution of nutritional science discourse also sheds light on the historical absence of any gendered analysis of growing food and of nutritional health. The emphasis on biofortification also formed the basis of a new financial and institutional network configuration that could invest in the distribution of planting materials along with accompanying nutrition information (through training and public education initiatives) to support the technological innovation. This also reinforced a certain prescription to dietary health that unintentionally subscribed to a certain gender framing as shown below.

Increasing Financial and Institutional Support for OFSP

The discovery of orange sweet potatoes by the American scientist marked the moment that orange sweet potato became OFSP. In a recent article summarizing the rise of OFSP as a solution to malnutrition (Low et al., 2017), three main 'phases' were identified leading up to the perceived success of OFSP that stemmed from the initial discovery: From 1991-2000 the focus on OFSP research was on 'recognizing the potential'; from 2000-2009 the focus was on testing and further advocating for support, and creating a national breeding program; and from 2010-2016 large investments evolved into large-scale multi-country initiatives that expanded the research and development in many different directions, including seed distribution, marketing, and nutritional content after processing.

The first independent study, based in South Africa, collected data from children who consumed orange varieties, and a control group of those that did not, over the same period of time. The study measured serum retinol levels in the blood as a proxy for vitamin A intake. After seeing higher levels in the children consuming

orange varieties, researchers concluded that consumption of orange sweet potato reduced vitamin A deficiency in children (VansJarfeld, 2005). However, findings from the blood samples used in the initial study did not account for the meat sources of retinol that could have been present in the blood, and therefore the study was found to be methodologically flawed. Further research into vitamin A corrected the methodology by testing for both pro-retinol and retinol ester. A follow-up study correctly tested for both meat and vegetable sourced retinol levels. This study demonstrated a 15 % decline in Vitamin A deficiency in children who consumed OFSP regularly compared with children who did not. The findings from this study resulted in a publication in the *Journal of Nutrition* in 2007 solidifying the evidence-backed support needed for further investments in orange sweet potato. These initial studies were the first of its kind, proving that biofortified subsistence crops can reduce nutrient deficiency (Salztman, 2017). These studies also coincided with growing interest in food-based sources of nutrients where OFSP was one of the few crops that showed a strong evidence base (Low et al., 2017; Ruel et al., 2013). These initial studies with the exception of one study in Kenya (Hageninmana et al. 1999), also continued to focus solely on the crop, the adoption of the crop and the direct evidence showing lowered rates of vitamin A deficiency. Nutritional health, even though shifting to food-based studies, continued to study effects in isolation of the social, economic and gendered conditions in which food was cultivated, shared, culturally valued and historically significant in the places dependent on the crop.

Harvest Plus, the CGIAR program focused on biofortification (golden rice at the time), and the International Potato Centre (CIP), also a CGIAR network centre

collaborated on the next major study which took place in Mozambique and Uganda in 2003-2005. This initiative involved three strategies of promotion: dissemination of roots to female farmers who cultivated sweet potato; increasing access to nutritional information on vitamin A; and marketing the crop for sales.

Initial interventions

The CIP/Harvest Plus initiative distributed vines (planting material or seed) free-of-charge to female farmers with young children in particular areas that were already sweet potato growing regions of the country. Women in selected regions in Uganda and Mozambique were also given opportunities to learn cultivation techniques and approaches to dealing with pests and diseases. Marketing of crops was also supported through setting up orange-painted kiosks in local markets (Low et al., 2013). A number of radio programs reinforced key messages around nutrition, and the marketing of nutritious crops was presented through the CIP/Harvest Plus initiative. Research from this initiative produced evidence that dissemination of nutritional information with sweet potato vines increased sweet potato production in general (Low et al., 2007). It also demonstrated the potential for OFSP production and consumption at a larger scale and across two countries. CIP's work showed that through campaigns targeting selected communities with information and free planting material, OFSP decreased vitamin A deficiency. However, these strategies were seen as expensive, at a cost of US$ 79 per beneficiary. Harvest Plus conducted a follow-up study in Mozambique and Uganda, which aimed to improve cost-effectiveness through the utilization of existing groups rather than engaging in group formation (Low et al., 2013). Results showed high

rates of OFSP adoption (65 per cent) in project households (compared to 4 per cent in control communities) and an increase in land investment for OFSP production (Harvest Plus, 2012). These projects reduced food-consumption costs to US$ 52 per beneficiary in Mozambique and US $56 in Uganda (ibid). The study also demonstrated that the emphasis on the implementation of the intervention in its various forms overshadowed the actual impact of integrating OFSP into existing cropping systems, how they were grown, who grew them and other livelihood strategies that farmers were currently using to manage their produce to contribute to dietary health.

These early programs imported sweet potato varieties from Latin America. Program reports highlighted the interest in the crop and the potential for large-scale adoption. However, actual outcomes from production and yields remained low. These varieties were highly susceptible to pests and diseases and could not withstand the dry climate, and high temperatures in the environments where the project took place. Scientists at CIP then focused their attention on developing national breeding programs in several SSA countries. The aim was to crossbreed naturally occurring orange varieties (similar to the one discovered in the fields of the farmer in Uganda) with other varieties, to produce new types with the preferred characteristics and with added levels of beta carotene.

Largely funded by the Bill and Melinda Gates Foundation, the multi-country CIP/Harvest Plus initiative developed tools, procedures, systems, and human resource training for the national breeding programs. It worked closely with government research agencies to ensure that sweet potato breeding remained a

priority for national breeding plans. In 2009, a five-year project, with a budget of $22.5 million, working across 12 SSA countries including Tanzania ensured that new varieties of OFSP were available in the sweet potato producing countries in Tanzania. This, according to CIP scientists, guaranteed a long-term and constant supply of the orange varieties that would eventually integrate into existing cropping systems. By the time the breeding programs were implemented, OFSP had already been in Mwasongwe for a few years through several short terms projects facilitated by international NGOs. Between 2006 and 2010 orange varieties came from neighbouring countries that had already established new varieties. *Kabode*, *ijumla* and *kakamega* were varieties from Uganda and Kenya introduced into Tanzania. Borrowing varieties from neighbouring countries points to the differing institutional and political backing that supported biofortification in the region. It also alluded to possible shortcomings from the national agricultural research institutes in Tanzania. These new initiatives coincided with growing policy development around nutrition as shown below.

National Policies that Address Nutrition

In the last few years the Tanzanian government has made greater commitments to nutrition goals, particularly through the Global Scaling Up Nutrition (SUN) initiative (mentioned in Chapter 1), and through the recruitment of nutrition officers at the district and regional levels (Save the Children Tanzania et al., 2012). In 2014, the first Public Expenditure Review of the nutrition sector was conducted, as well as an official review of the implementation of the first three years of the National Nutrition Strategy. Between 2010 and 2014, stunting levels for children

under five decreased from 42% to 35% (URT, 2014). However, government efforts continued to heavily rely on the Ministry of Health (rather than multi-stakeholder initiatives). Government disbursement for nutrition activities alone are limited, and OFSP does not appear in government policies and programmes. Biofortification is only briefly mentioned in the National Nutritional Strategy (URT, 2011). Moreover, as indicated by Mbabu et al. (2015: 17), "all the decisions on OFSP would be made in the Ministry of Agriculture", pointing to the challenge of coordination across ministries.

The limited capacities of the extension services also continue to play a role in how biofortification enters into food systems in Tanzania. Due to the high farmer-to-extension worker ratio, "60%-75% of households in Tanzania are estimated to have no contact with research and extension services" (HKI, 2012: 19) and women farmers are particularly unlikely to receive extension advice (URT, 2006). Despite the high visibility of OFSP internationally, the government of Tanzania has not systematically integrated it in its agronomic plans and activities, even in the regions where sweet potato is a staple crop (Waziri, 2013). As is common in most other countries (Sumberg et al., 2012a) the state no longer plays an overarching role in coordinating agricultural development efforts. As a result, approaches to OFSP promotion are diverse and sometimes contradictory. Efforts to address malnutrition in Tanzania are heavily influenced by global thinking and regional initiatives. Over the past decade, there has been much emphasis on the creation of stronger linkages between agriculture and nutrition, as evidenced by the L'Aquila Joint Statement on Global Food Security, for example, which calls for a 'cross-cutting' approach to

agriculture, food security and nutrition (G8, 2009). Several national policy and development frameworks mention and address nutrition at varying degrees, including: Tanzania Development Vision (TDV2025) – five year phases; Food Security Development Plan (TAFSIP); National Multi-sectoral Nutrition Action Plan (NMNAP), District Agricultural Development Plan (DADPs); and Land Tenure Support Programme (LTSP).

Summary of this Section

This section described the historical background to orange sweet potato's growth into a multi-million dollar, multi-country initiative to address malnutrition. Various research and financial institutional networks and collaborations, spearheaded and supported by scientists' research, showed evidence of its efficacy of OFSP as a means to reduce vitamin A deficiency. This combined support provided the foundation from which to launch large-scale promotional campaigns and create the charismatic crop out of orange sweet potato. The emphasis on characteristic qualities of a crop, grown by the 'poor' that could improve nutritional health of the 'poor' formed the basis for continued focus on the crop, while dismissing the contextual meaning of its overall implementation in places like Mwasongwe.

Below, I describe Mwasongwe village and the specific social landscape in which biofortified sweet potato was introduced. Through individual farmer accounts, I show how farmers introduced to the crop initially perceived OFSP.

Remoteness of Mwasongwe village

Mwasongwe is one of 78 villages in the Misungwi district in the Mwanza region (see figure 1). It is situated along the southern shore of Lake Victoria and south of the main road between Mwanza and Shinyanga (see Figure 1). Thirty kilometres west of Mwanza, along the main road, is the main marketplace for residents of Mwasongwe village. The front of the market is lined with a number of *mama lishes*[16], or small, informal food venders selling freshly made meals of rice and beans, *ugali* (maize meal porridge), leafy green vegetables, and *chapatis*, to market goers and travelers awaiting their next bus, *dala dala* (minibus taxi) or piki piki (bicycle taxi). A brief excerpt from my fieldnotes helps to illustrate this market setting.

> Every morning on my way to Mwasongwe village from my guesthouse, Anna (my research partner) and I would meet at one of the corners of Buhongwa market, next to the bus stop. The market consisted of small laneways, lined with produce sellers, set up on the ground, and often in front of more formal businesses and shops. The majority of sellers were women, and most arrived at the market with relatively small quantities of goods, often restricted to the amount they were able to carry themselves. A long laneway of stalls dedicated to the vast variety of leafy green vegetables was also a favourite spot for Anna. She often commented on the quality of the produce there. "These ones are from yesterday. You can see that the leaves are a bit dry and wilted". Anna always took her time selecting her greens from the array of choices in the market. There were different types of spinach, kale, cabbage, and other leafy greens I didn't recognize but was introduced to on those visits: mchicha (greens of the amaranth plant), sun hemp, cassava leaves, sweet potato leaves, and evening night shade. One bundle of

[16] Mama Lishe is a term commonly used to describe an informal restaurant, operated by women. Lishe, is a Swahili term for nourishment or feeding.

> leafy greens cost 200 shillings (CAD$0.10). There were the same quantities every day of the week and all year round. The market serviced nearby villages in the Misungwi district, including Mwasongwe. Anna and I noticed that the vegetables were not available every day in the village. Every two or three days, certain residents from Mwasongwe who rented a small stall in the commercial centre, purchased produce from Buhongwa to sell to their neighbours.

The market visits provided an insight into the accessibility of foods. For those with cash on hand, Buhongwa market contained a variety of foods and services. The constant supply of leafy green vegetables in the market was a reminder to Anna and me of the availability of nutritious food, but only for those with cash. The market was not so far away that residents of Mwasongwe were unable to access it. However, other factors, such as cash flow, and transportation limitations hindered regular usage of this, the nearest market, for most residents in Mwasongwe. A reliance on subsistence farming as a main source of food is evident in the village. With Mwasongwe village located close to the shores of Lake Victoria, fishing was the main livelihood for many residents. However, competing commercial fishing operations based in Mwanza city limited access for residents, and many resorted to farming as a source for food and income.

Farming Landscapes

Farming systems in Mwasongwe and in the Mwanza region are characterized by mixed maize and beans systems, including roots crops, sweet potatoes, regular potatoes, and cassava. Closer to the lake, many residents of Mwasongwe also cultivate rice paddy and a variety of leafy green vegetables mostly for sale in the market in Buhongwa. One-acre (0.4 Ha) plots along the lake are prepared into ridges

with 24 cm in between the ridges for weeding. The ridges allow more space for the root crops to mature underneath the soil. These ridges are intermixed with a range of roots (sweet potato and cassava), maize, beans and green gram (a type of lentil). Other market value crops in the region include tomatoes, leafy green vegetables and okra, all of which are planted close to the lake, and are sold in the markets or used in household meal preparation.

Getting to Mwasongwe involved various modes of transportation and timeframes depending on the time of year and the season. From the south entrance of Buhongwa market, Mwasongwe is another 3 kilometres or a 40-minute walk. During the rainy season, (which occurred between October and November in 2015 and then again in March and April in 2016), the road behind Buhongwa market became impassable. A small creek flooded, blocking the narrow dirt path. I observed cyclists walking their bikes through the flooded creek to pass. The motorcycle taxis or piki pikis were unable to do the same and were forced to return back to the main road. The alternative route took the piki pikis along the main road, passing through Buhongwa market to the east to Usagara, the next town. From Usagara, a further three kilometres towards the lake along the highway was a smaller dirt road from the village next to Mwasongwe, called Bukumbi. The piki pikis would pass through Bukumbi and arrive in Mwasongwe from the east side of the village. The journey could take as long as forty minutes.

During the dry season, Between May and September and again in January and March in 2016, piki pikis would take the dirt road behind the market. The road cut through the fields leading to the lake and the village, and turned into a narrow

foot path, eventually approaching Mwasongwe's commercial area. This would take approximately ten minutes and cost 3000 tsh or 6000 tsh return ($1.70-$3.40 CAD).[17] The location of Mwasongwe in relation to the main transport road, foot paths and access to the main market posed limitations to mobility of goods and services in and out of the village and nearby villages. Villagers selling goods in Buhongwa had to hire transportation. Piki pikis usually charged an additional 5000 tsh for transporting goods. The remote location of Mwasongwe also inadvertently made private investment in agriculture and in infrastructure less likely since it was difficult to maintain year-round access. Most external resources for farmers in the area, entered the village through public institutional support, or through aid-driven non-governmental organization engagement.

OFSP's Gateway to Mwasongwe

I initially learned about the role of OFSP in Mwanza through my interactions with local and international NGOS in Tanzania and in the region. Through these organizations, I was introduced to farmers in Mwasongwe who had first been exposed to the new crop in 2006. The Tanzanian Home Economics Association (TAHEA) is based in Buhongwa and was established in 1980 with initial funding from European donors, including Norwegian Agency for Development Cooperation (NORAD). TAHEA was the main organization in charge of facilitating development projects in the Misungwi district and in particular in Mwasongwe village. The

[17] National average incomes in Tanzania 2015 were 353589 TZS/Month (https://tradingeconomics.com/tanzania/wages)

husband of TAHEA's executive director was born in Mwasongwe. A small community hall located at the end of the commercial road in the village is dedicated to him. During the early stages of my fieldwork in June 2015, the executive director of TAHEA explained to me how the organization initiated projects in Mwasongwe and how OFSP was first introduced:

> Misungwi was often the last district to receive food aid during the 1990s when we experienced food shortages. We needed to encourage more residents to grow healthy foods. So we started with vegetables, like spinach and traditional varieties of sweet potato. In the first project, we competed for funding from CARE international. There were over 200 proposals and we were one of the 22 selected for funding in 1999. We organized farmers into groups to help with distribution of materials and training. In 2006, Ukiriguru institute received new vines (sweet potato seed) for orange varieties. We worked with them to distribute the vines and assist farmers in planting the new varieties. The first year we did not produce very much. After the harvest, World Vision International purchased a large quantity of roots from the farmer groups. From then on we had many different organizations, Catholic Relief Services, McNight Foundation, and Helen Keller International all initiate projects to promote viazi lishe and work with us.

TAHEA served as a gateway into Mwasongwe and brought with them opportunities for free seeds and planting materials in a village where residents seemed to have few other options at the time. TAHEA was well-placed to act as an intermediary with the larger international development organizations, facilitating their nutrition interventions with farmers and food producers. Rossi (2003: 34) describes how certain interventionist approaches function "to regulate social life not by overt control or repression, but by a productive form of power that enrolls and empowers supporters, and that operates in multiple and unpredictable ways to builds its 'orders'." I first heard about farmers' success through TAHEA staff:

> There was one farmer who went from renting a room in the village to building her own home. She even travelled by plane for the first time to

> Dar es Salaam to be interviewed in the radio. There were other farmers who were even more successful: those who worked closely with their husbands were able to build a strong business from *viazi lishe*.

The staff member's telling of the farmer's rags to riches success revealed the underlying hierarchical status of women with husbands as higher than women with absent husbands and women with no husband at all. The woman she described as going from renting a room to having the means to build her own house illustrates the potential economic value of growing OFSP, which is framed as having more than nutritional value alone. It also offered an opportunity for women without husbands to create a new socio-economic status through their association with OFSP. Latour (1996: 194-195) reminds us "that all actors produce interpretation, and powerful actors offer scripts in which others can be recruited for a period. They prove themselves by transforming the world in conformity with a certain perspective on the world." In this case, descriptions of OFSP by TAHEA staff reproduces an emphasis on monetary value of food over the nutritional value.

TAHEA offered a new pathway for planting material, resources, and markets that existed beyond Buhongwa. Through OFSP, TAHEA was able to secure a buyer and incentivize OFSP production by presenting it as a potentially economically valuable crop for farmers to invest in, for a better future. The initial sales led to further projects that promoted OFSP for TAHEA, which also meant more materials and resources for selected farmers in Mwasongwe. TAHEA frequently visited Mwasongwe and worked with a particular group of farmers over the years who, through the various projects, marketing campaigns and media coverage had become known to greatly benefit from OFSP. TAHEA's role in promoting OFSP's heightened

economic and nutritional value was specifically targeted at female sweet potato farmers and through events and interactions with farmers were "tied together by translation of one kind or another into the material and conceptual order of a successful project" (Latour, 2000 cited in Mosse 2005:9). Further insight into the socio-cultural aspects of motherhood in Mwasongwe and TAHEA's involvement with them provides the gender relations context within which OFSP was introduced.

Mothers in Mwasongwe

One farmer mentioned by the TAHEA staff member was Mama Nane. On one of my first visits to Mwasongwe, Anna made arrangements for us to meet her. I met Mama Nane for the first time in June 2015. Her house was situated along the main road entering Mwasongwe from Buhongwa market. A narrow path leads to the front door of her square-shaped cement home. We walked towards the back of her house, and found chairs arranged for us under a young, flowering tree. Mama Nane hung her washing as we entered her yard. To the left of the tree was her small, enclosed kitchen where steam flowed out of the entrance from a pot of boiling water. She just returned from collecting water that morning, an hour earlier, carrying four yellow jerry cans of water. Her youngest daughter, Joy, followed behind her carrying two cans. She explained, "I go every two or three days. I'll do the washing and then save enough to prepare *ugali* and *viazi lishe* today and tomorrow. In the dry season, I will have to leave the house at 3am, because the water comes out of the tap very slowly."

The uncertain and inconsistent water access in Mwasongwe at different times of the year also sheds like on the gendered conditions of everyday life in which cultivating and prepared food is dependent. Even though Mwasongwe is

situated by the lake, the lake water is contaminated with parasitic flatworm, or schistosomes. These flatworms cause infections in the intestines and urinary tract that that can lead to further health complications. Some residents in Mwasongwe managed to drill their own boreholes close to their homes, in order to avoid the long walks or line ups at the water source.[18] Mama Nane had expressed interest in doing the same someday, when she has the means to do so.

She prepared tea from dried hibiscus flowers for us. Behind the outdoor kitchen was a small washing area. A shower, situated under a tree, was constructed out of pieces of old tarp and burlap sacks and connected by wood stakes planted in the dirt ground. A bucket was perched on a low branch of the tree. The L-shaped house at the time showed a blend of older and new construction. The back of the house parallel to the kitchen was of mud-brick construction. It appeared to be in need of structural repair, judging by the crumbling bricks along the entrance. The side of the house facing the main road was of cement construction. The outside finish remained incomplete, and the construction appeared more durable than the commonly used mud-brick construction in the village and at the back of her house.

The interior of the house was sparsely furnished. There were three rooms: a main sitting room in the front, and two bedrooms. In the front room was a small plastic table with two chairs. On the chairs and tables were white laced doilies, commonly seen in the front rooms of houses in the village, as perhaps as a way to

[18] Water sources in the Mwanza region consisted of communal pumps located with a 3 km radius. See (Government of Tanzania, 2012).

welcome guests. There was one bed in one of the rooms. The floor was unfinished but even.

Mama Nane has five children, four daughters and one son. She looks after 4 out of her six grandchildren. She was in her mid-40's when we met her. When she was 17, she married a man from a neighbouring village and together, they moved to Buhongwa. Her husband was a truck driver and made frequent trips to Dar es Salaam, across the country. He gradually spent more and more time on the road, until he eventually stayed in Dar es Salaam. She then decided to move back to Mwasongwe to be near her mother. She rented a room for herself, and sent two of her three children to live with her husband who was now based in Dar until she was more economically stable. They returned some years later.

Her eldest daughter, Lucy, left Mwasongwe after she completed Form 3 (equivalent to grade 11 in Canada) to go work in Tabora, in the Southern region, as a 'house girl' or housekeeper. Mama Nane relayed the story of her daughters to Anna and me that day:

> Lucy became pregnant with twins, but unfortunately miscarried while she was in Tabora. She became pregnant again soon after, and returned to Mwasongwe when she started to show physical signs of her pregnancy. She feared that she would lose her job if her employer found out. She delivered the baby in the nearby hospital in Buhongwa, and went back to Tabora to work shortly after, leaving me her baby to care for. She returned again to Mwasongwe pregnant a year later and returned months later to Tabora, leaving her second baby with me. I was very upset about this and told her that she needed to stop having babies. Lucy did not like to hear that, and she left. I haven't spoken to her for over a year now. My second oldest daughter, Eva, left my home at a young age, after she finished standard 7 (grade 8 in Canada). Eva lives near me in Mwasongwe. She used to live close to the lake in a modest house with her husband, but the house burned down in a tragic fire. Rumours floated around the village that the fire was caused by a former girlfriend or mistress of her husband. We built another house for her and her children and they are there now.

The daughter returned to her mother's house for some time, before she was able to build another home. She now has three children and when I met her in 2015, she was pregnant with her fourth and living in another mud house close to the commercial centre of the village.

Mama Nane played a key role in the financial and material needs of her children and grandchildren. She ensured that the four children who currently live with her attend school and are regularly fed. Her account of her and her children's experiences explained the importance of familial caregiving and motherhood as an integral role of many of the women living in Mwasongwe. Lovett (1996) suggested that the labour migration led by villagization and economic policies through *Ujamaa* reinstated a certain household role-sharing that positioned females as caregivers and males as economic agents. Lovett (1996) and Mbilinyi (2016) also pointed out that many women left behind in the villages worked together to sustain themselves, both as caregivers and income earners, working to both feed their families and earn cash from other labour investments. For Mama Nane, providing for her children and grandchildren necessitated investment in seeking and gaining opportunities to earn more income while also maintaining the everyday needs for herself and her dependents.

Women's identity as mothers in Mwasongwe established a certain status in the village. According to both Anna and Mama Nane, upon finishing Standard seven (or when reaching the age 15), many young girls prepare to marry and soon become mothers. The social status as a mother "hinges on the achievements of motherhood symbolized by the fact that an adult woman assumes a name of a child or her own

name, preceded by Mama" (Bryceson, 1995: 46). Motherhood held a strong sense of power and identity in the women I spoke to and met in Mwasongwe village. When I met Mama Nane's daughter, Mary (who was 29 at the time) she assumed that I was much younger than she was, because I was there alone, and without my children. As Anna and I explained my situation, Mary argued that since I had only two children, that I must have been younger than her, since she had three and was about to have a fourth. Her emphasis on age seemed to represent a hierarchical view of motherhood, in that the more children a woman cared for, the more respected a woman earned.

Bryceson (1995:46), asserts that "[living in] a predominantly rural society based on labor-intensive forms of production, Tanzanian women exist in an ideological milieu which places heavy emphasis on the importance of motherhood." At the same time, Chung (2017:104) suggests, "agrarian households are hardly natural, isomorphic or altruistic units". Rather, power relations are negotiated, challenged and adapted by various members of the family and households, including daughters, wives, sons and grandmothers (Guyer and Peters, 1987). Farganis (1989:9, cited in Lovett, 1996: 63) suggests that varying gender roles and identities must be acknowledged as one product of "the historical constellations of social and political power extant in any society. As such, they have the capacity both to reflect and to perpetuate existing networks of social control." The ways in which varying gender roles, including motherhood, intersect with nutritionism embedded in OFSP promotion, exposes the responsibilization of dietary practices towards female household members, and in the case of Mwasongwe, female food producers. For

OFSP, female household members were seen as responsible for this inadequacy and for subsequently attempting to rectify it. As I will show in the following chapters this framing dismisses the diversity in the food-related labour investments made by women as exemplified in Mwasongwe village.

Summary of this Section

In describing the setting of Mwasongwe village and its proximity to Buhongwa market, I made a number of observations that reveal the specific context in which food production and provision are negotiated. Its remote location and seasonal access to the market indicate that a variety of nutrient rich foods are available, but primarily for those with cash, and the means to access transportation. A blend of subsistence farming and small-scale commercial farming was the main source of livelihoods in the village. TAHEA provided the pathway for residents in Mwasongwe to access assets outside of the village, including OFSP. The organization introduced it to selected farmers and organized farmer groups in order to distribute planting materials efficiently. Farmers like Mama Nane were well positioned to take part in the promotion as an opportunity to diversify her income earnings. Further to this, as Kimura notes, "while attention to children in nutrition interventions brought mothers into the expert discussion, experts tended to see the importance of mothers as a pathway to their children's bodies" (2013: 27). In addition to this, the initial subtle targeting of OFSP towards mothers and caregivers of children points to the gendered conditions in which OFSP is situated and how, the experiences of female farmers (e.g. as described by the TAHEA staff member) are used to market the crop as economically beneficial to them.

Growing OFSP represented a new possible future that aligned with the values of being a good mother in terms of investing in cultivating and providing nutrient-rich food for themselves and their families. Yet, in order for OFSP to be realized as a solution, a problem had to be established. The overarching narrative around malnutrition inscribed mothers, or caregivers as responsible for the daily diets that are deplete from nutrient-rich foods. In this next section, I will show the tension between the nutritionism discourse surrounding OFSP and the actual realities of health services in Mwasongwe village.

Health Dispensary in Mwasongwe

In Mwasongwe village, the vitamin A supplement campaign took place twice a year (since 1987) at the health dispensary, located just west of the commercial centre. The campaigns specifically targeted young infants and pregnant and lactating mothers as part of maternal and newborn health initiatives. These health dispensaries are government-run centers and are present in every ward (cluster of villages) in Tanzania. Anna and I visited the dispensary on several occasions and spoke with Paul, the nurse practitioner in charge of the dispensary. Paul worked at Mwasongwe dispensary for over 14 years. He lives in the nearby village of Buhongwa. He explained some of his day-to-day activities at the dispensary, "the dispensary services Mwasongwe and Myorwa villages and administers vaccines for: diphtheria, tuberculosis, and pneumococcal disease".

Mwasongwe village includes 524 households and Myorwa village another 248 households, with an average number of household members of seven. The dispensary was only equipped to manage non-emergency health issues. In addition

to managing the supplements, as Mr. West mentioned, the dispensary hosts various health interventions, trainings and awareness raising events. Aside from its service as a health centre, it is also a space for public health education. Mr. West mentioned that he is able to treat small wounds or minor sicknesses. Low-risk pregnancies and births could be managed there, but many residents we spoke with preferred the hospital in Buhongwa for their deliveries. Mr. West also talked about the very few cases of poor eye health in Mwasongwe. The biggest health concern for him, one that he frequently treats, is malaria. Marie Stopes International hosts regular training programs for the villages at the dispensary. A notice on the bulletin included a hand-written number of cases documented to be currently on anti-retro viral medication or medication to treat complications related to HIV/AIDS. At the time of the meeting (July 2015), there were 124 people undergoing treatment, almost 10% of the population of Mwasongwe. Competing development interests and investments in Mwasongwe, such as an emphasis on malaria prevention or the reoccurring supplementation campaigns that are supported by NGOs nutritional health could also appear to overshadow other health and social issues such as the continued prevalence of HIV/AIDS in the region.

In Tanzania, as in the case of other countries in the region, Helen Keller International, an international NGO headquartered in the United States administered the vitamin A supplements and the biannual campaign. During one of our initial visits to the dispensary, Anna and I were particularly interested in the vitamin A supplements that were available there. Mr. West showed us a sample of the product, and packaging in which the vitamins came. The white, plain, generic

looking medicine bottle with black font label, also contained an old Canadian International Development Agency (CIDA) logo, showing that the supplements' origins traced back to the Canadian government's CIDA, and the previous iteration of Global Affairs Canada[19]. The pill form of vitamin A at the dispensary revealed the underlying dependence on development funding to acquire the pills. Even though the dispensaries are present in every village and managed through the Ministry of Health, the contents and services at the dispensary are dependent on external resources. Development agencies, such as the former CIDA, partnered with the Ministry of Health and Helen Keller International to ensure that the supplements were available and distributed. These institutional networks of economic investments behind the provision of vitamin A supplementation remained somewhat behind the scenes, in that the financial and political support established the distribution of pills through national dispensaries.

In Mwasongwe, there was a disconnect between vitamin A supplementation and the distribution of vitamins as a response to poor nutrition and holistic, long-term strategies for dietary health of children and their mothers. Mothers were made to be passive recipients of supplements in that they were not required to invest anything more than the time needed to visit the dispensary and administer the supplements to their children and themselves. The supplements campaigns were meant to specifically lower risks of infant deaths especially in places at risk of

[19] In 2013, the Conservative government combined the two agencies, the Department of Foreign Affairs and International Trade with the Canadian International Development Agency and renamed it the Department of Foreign Affairs, Trade and Development. Following the federal election in 2015, newly elected Prime Minister Trudeau renamed the government agency Global Affairs Canada (GAC).

dietary health lacking in micronutrients such as Mwasongwe. Women received the supplements in isolation of other necessary pre-natal care that might help them to maintain healthy infants and toddlers, and during their pregnancies and early post-natal periods.

While supplementation campaigns were seen as the major breakthrough for nutrition interventions, further critiques suggested that supplementation did not result in improved growth of infants (Semba, 2016; Kimura, 2013). Access to the supplements varied and coverage could not guarantee reaching the most marginalized people in targeted populations (Burchi et al., 2011). These concerns initiated discussions around food-based sources of micronutrients, and ways in which dietary sources could provide a more sustainable approach to including more nutrients in diets dependent on a few staple, nutrient-poor crops. The emphasis on the desire to improve nutritional health formed the basis for continued focus on the crop while dismissing the contextual meaning of its overall implementation in places like Mwasongwe. In this section that follows, I show how OFSP was introduced and how farmers like Mama Nane actually perceived the crop as it was introduced to her.

Mama Nane's Introduction to OFSP

Mama Nane explained to Anna and me how she initially became involved in growing and promoting OFSP.

> I was making *gongo* [locally brewed alcohol made from dried cassava]. I was not making much money and I used to regularly get caught by the police selling *gongo* illegally. *Gongo* could not pay my rent and my landlady was very unhappy with me. I was not even getting enough to get food so I decided to open up a small

> restaurant. That didn't do well and I closed it. Then, I was selected to be part of the OFSP training. The project was about food security in Mwasongwe. We were 10 women in a group; we started with farming vegetables and fruits and then later on we were given different varieties of orange sweet potato such as 'jewel' and also *'ijumla'*. That first season we sold most of our harvest to World Vision. It was then that I put more of my effort in producing the orange sweet potato vines.

The nutritional value of the crop and its identity as a biofortified crop seemed secondary to the economic value that the crop acquired through TAHEA's engagement and brokering role with World Vision. TAHEA initially approached female caregivers in the village, since they were the ones growing sweet potato for their family. Thus the role of caregivers and in particular mothers or grandmothers in the household played an integral role in implementing OFSP promotion. The role of mothers as providers of nutritious food became a mainstay theme for OFSP, even though, in reality, producers of OFSP had diverse roles in the family and the household, and were not solely the caregivers.

Jacob's View of Sweet Potato

When Anna and I first met Jacob, he was wearing a bright, clean-pressed orange t-shirt. On the back, it said "health for prosperity" in Swahili. It was a shirt given to him by an NGO as part of a recent OFSP project in the area. Jacob has seven children and lives slightly further away from the lake in Bukumbi village, a neighbouring village to Mwasongwe. Jacob shifted his focus from fishing to growing orange sweet potato a few years ago, as the urban-based fishery companies took over fishing along Lake Victoria on the outskirts of Mwanza city. He was motivated

by the stories of farmers in Mwasongwe prospering from growing and selling OFSP. Jacob explained to us how he became involved in sweet potato production:

> We heard that farmers were earning an income from selling sweet potato. There were stories on the radio and there were events through TAHEA and others taking place in Mwasongwe. There were a lot of visitors. But sweet potato is a woman's crop so was it just women making profit? No. Men can also produce and sell sweet potato.

Jacob showed me one of his farm plots that he rented along the edges of Lake Victoria. It was prime location for cultivating sweet potato due to its soil quality and proximity to the lake. He grew several different varieties of sweet potato, including white and yellow varieties such as *polista* and orange varieties, including *kabode* and *ijumla* across his 2 acres (0.8 Ha) of land. He was concerned about the markets, and who he would sell the harvest to that year, since his plot will produce far more than what his family will need or use. But he was hopeful that he'd find buyers.

Anna and I met Jacob several times over the course of my fieldwork in the Mwanza region. During one of our visits to the health dispensary, he was there attending a training session for 'officers' to conduct meetings that distributed and set up mosquito nets. Malaria, he said was a big health challenge, and some families were still not comfortable with the nets as a preventative measure. His job was to visit homes in the village and help them to set up nets over their beds or mattresses. Jacob also attended a meeting hosted by Farm Radio International in Mwanza town in November 2015 in which I also participated. The meeting was meant to collect the overall results from a two-year project developing and broadcasting radio programs on OFSP. In one of the breakout sessions, Jacob

reported on the barriers to markets farmers were facing and mentioned this shift around the idea that OFSP was a 'women's crop'.

> In the past, we used to say that *viazi lishe* was only for women and children. But now it is changed. How are men supposed to change from women's crop to a men's crop, because is it only men who consider it for food and for income? We were a sixteen-member group, all men. We were only fishermen. And then the group evolved, but there are still only men. So now there are women- only groups, men- only groups, and groups with both men and women. We all grow *viazi lishe.*

Jacob viewed OFSP as an opportunity for economic growth. It was an opportunity to build income and social networks (through NGOs, researchers and international visitors). He also challenged the labeling of OFSP as a women's crop. Even though the intention of OFSP was to boost the nutritional health of women and young children, and to indirectly support female sweet potato farmers, other male farmers were also interested in OFSP, but for different reasons. Lewis and Mosse (2006: 4) contend that indirect impacts of certain interventions are overlooked in instances where "the collaboration and complicity (or duplicity) of marginal actors/institutions in development, such as the 'consumer practices'… of 'beneficiaries' who understand and manipulate the rhetoric, rules, and rewards of aid delivery." OFSP promoters insisted on maintaining OFSP's association with women and particularly highlighted the nutritional value of OFSP, and vitamin A. Jacob, however, perceived OFPS as a potential commercial crop and less so as a crop grown for its nutrient content. At the same time, Jacob's engagement with malaria prevention through the dispensary showed his interest in pursuing other opportunities, in addition to OFSP and in particular opportunities that were supported by international NGOs. For both Mama Nane and Jacob, pursuit of income

earning opportunities superseded the need to 'improve' their nutritional health, as OFSP proponents expected. In their own ways, Mama Nane and Jacob contested the overarching emphasis on nutritional health associated with OFSP, and focused more on their own immediate and pressing financial priorities.

Conclusion

This chapter analyzed the introduction of OFSP in the context of dominant global nutrition agricultural development discourses and emphasis on the technological and marketed-oriented solutions to malnutrition. The interaction between the farmer and the scientist highlighted in the vignette introduced a new version of orange-sweet potato that enabled nutritionism to seep into agricultural development through biofortification. It brought to the forefront the overarching and long-standing relational dynamics between scientists and peasants, but more importantly, introduced a new layer of engagement involving the diets and health of peasants as also embedded in this dynamic. The discovery illustrated the significance of the universal narrative around malnutrition, and that nutritional health is embedded in science discourse that discounts the relational and social contexts of food systems in particular places. It also showed how the launch of a charismatic crop evolved over time as a result of the gradual integration of nutritional science into agricultural development in the Sub-Saharan Africa region.

Absent in this initial integration of nutrition in agricultural development discourses are gender considerations of food-related labour in terms of both production and provision. In Mwasongwe, OFSP was seen as more of an economic asset, rather than for nutritional health purposes. At the same time, global

nutritional health and OFSP promotional narratives' gradual and subtle emphasis on mothers, first as passive recipients of supplements, and then as potential cultivators of nutrient-rich foods, instrumentalized their identities in compartmentalizable tasks, as part of the input/outputs of 'good nutrition'. What distinguished OFSP and biofortification interventions from other nutrition-related interventions was the varying labour investments in the cultivation, consumption and marketing of biofortified foods. The following chapters focus on these particular aspects of farming livelihoods in Mwasongwe that followed the movement of the charismatic crop, OFSP.

Chapter 3: Cultivating OFSP

Introduction

OFSP at the G8

By the time I arrived in Mwasongwe in 2015, *viazi lishe or* (OFSP) had been in circulation for ten years, and it was near the end of a long string of consecutive projects promoting the crop. Between 2006 and 2015, a total of 11 projects in Tanzania involved OFSP, totalling over twenty million US dollars in project funds, and where six of these projects involved farmers in Mwasongwe village. OFSP had already been seen as a success story in international discussions around nutrition.

For example, in 2013, the first 'Nutrition for Growth' meeting took place as a side event during the G8 meetings in London, England.[20] The meeting, organized by the governments of UK, Brazil and Japan aimed to raise global awareness of the loss of human and economic potential from global malnutrition in children under five. David Cameron, the former Prime Minister of Great Britain mentioned Mama Nane, from Mwasongwe in his speech to encourage investments in nutrition initiatives.

> Take the story of Mama Nane, a mother and farmer in Tanzania, who for years struggled to grow enough even to feed her family. When she began to farm the new orange sweet potato, her life was transformed. Today she is not just providing nutritious food for her own family...but selling it to others, educating her community and lifting herself out of poverty. She has managed to send her children to school and used the proceeds of her farming to build a brick house for her family. And Mama Nane is not alone. Programs like this have helped local farmers to increase their incomes by up to 400 per cent.

[20] This speech was posted on the UK government's website after learning about the speech mentioning Mama Nane in the radio program. Retrieved: February, 2017 at https://www.gov.uk/government/speeches/pm-speech-at-g8-nutrition-for-growth-event

Through David Cameron's vignette, Mama Nane, exemplified the 'hero' in the quest for 'nutrition for growth'. As told by the Prime Minister, her own experience showed the extent to which women's experience of growing food was a central feature of the OFSP story, and one that indirectly contributed to shaping current gendered notions of food production. His description of orange sweet potato highlighted the crop's perceived elevated status, and its embedded power to change women's livelihoods. Mama Nane's success is framed by her relationship to OFSP and to the broader 'nutrition for growth' story. As part of Cameron's speech, it personified broader themes embedded in current global nutrition discourses, where neoliberal solutions to improving nutritional health are prioritized. His description of Mama Nane's ability to 'pull herself out of poverty' implied that it was her responsibility to improve her own livelihood, while also improving the lives of those around her – by cultivating OFSP.

This idea that OFSP production could lead to prosperity, as depicted in Mama Nane's story of pulling herself out of poverty, is dependent on abstracting sweet potato out of its social and historical context. Mama Nane once struggled to feed her children, but with OFSP, she now has the means to feed her and family while also earning an income from the market created around it.

This chapter examines the discursive and material networks specifically surrounding the cultivation of OFSP. I show that farmer experiences and perception of cultivating OFSP in Mwasongwe unintentionally challenged and reinforced the cultivation of the success narrative for biofortification. The chapter traces the dual network pathways of the growing discourse of charismatic sweet potato, and

material aspects of cultivating food in Mwasongwe village. I analyze the changing livelihood conditions and actual experience that underpin promotion of OFSP cultivation. Masked by the OFSP success narrative, these conditions are inherently gendered. The promotion of OFSP is dependent on a normative depiction of female farmers in Tanzania to market its heightened value as a nutritional and economically viable food crop without necessarily in consultation with them.

Theoretical Underpinnings

Nutritionism and Charismatic Crop Production

As mentioned in Chapter 1, nutritionism is the "convergence and interaction of different motivations and calculations by science, market and the state that produces nutrition as a particular kind of project" (Kimura, 2014: 39). It is intimately linked to what international development discourse calls 'nutrition through growth' where the success of a nutrition-based project is also partially measured by profits and economic gains (Moseley et al., 2015).

Kimura described the concept of 'charismatic nutrient' as the product of complex social relations and as an instrument of governance that fuels the nutritionism agenda. She suggests that the 'charisma' of nutrients is not fully captured by their 'scientific value', but rather depends on sociopolitical networks built around them (Kimura, 2013: 234). Institutions supporting the cultivation of orange sweet potato include public, private, international, and regional institutions. Her reference to vitamin A in the development of biofortified golden rice in Indonesia showed how the scientization of food depoliticized the hunger problem, and privileged technical 'know-how' over cultural and ecological perspectives. Yet,

Kimura's emphasis on the nutrient itself discounts the relation to crop production (mainly by women in Mwasongwe) and how farming livelihoods are implicated in the proliferation of the charismatic qualities of the nutrient, and subsequently of the crop itself. Programs and projects promoting Orange Fleshed Sweet Potato (OFSP) are fueled by the actions and discourses of a complex network of international development and science actors. Positioning OFSP as a charismatic crop broadens the distance between scientific descriptions of nutritional health (such as micronutrients), and the social conditions of rural livelihoods by disregarding the gendered access and assets associated with production, consumption, and sales (Bold et al., 2013; Gilligan et al., 2014; Guyer and Peters, 1987). In doing so, OFSP as a charismatic crop produces a revitalized variation of a commonly grown, subsistence crop; and through a nutritionism discourse it potentially further dismisses the diversity of roles, opportunities and pursuits associated with everyday rural livelihoods (Lovett, 1996; Medard, 1996; Mbilinyi, 1996; Patel et al., 2014).

The relational dynamics between women's everyday experiences with food production and the influence of charismatic crops are embedded within nutritionism discourse. Descriptions of charismatic crops tend to celebrate women's role in providing optimum nutrition. Orange sweet potato is the main feature in the narrative, while women's livelihoods are the apparatus through which the charismatic crop is cultivated. OFSP is presented as the driver of livelihood changes in women who grow it. Yet, limited attention is paid to their actual livelihood practices, and ways in which women navigate both their on- and off-farm activities. I

begin this chapter by providing a historical context around farming in the Mwanza region and the changing overarching political dynamics that shaped the gendered and economic associations with food production and provision. Based on the historical context, the production of OFSP success narratives through NGO engagement revealed the political attempts at controlling land use and social ordering during colonial and post-independence in the region. Contrary to the production of the success narrative, I then describe the actual practice of OFPS cultivation, the surrounding institutional organization and as it inevitably produced aspects of exclusion and inclusion in Mwasongwe. Finally, a focus on the supply of OFSP seeds, through national agriculture centres, revealed the unanticipated shortcomings of attempts to transform a sweet potato crop, originally perceived and utilized by farmers as a subsistence crop, to one with the potential to generate substantive income for farmers.

Changes in Livelihood Practices in Sukumaland

The Mwanza region (see Figure 1) was previously known as Sukumaland in pre-independence Tanganyika and the early years of post-independent Tanzania. The region covered what is now considered Shinyanga and Mwanza regions and largely consisted of agro-pastoral systems, a majority of them associated with those ethnically identified as Sukuma people. British colonial authorities between (1919-1961) imposed policies that influenced migration, labour and land use changes at the time. Beginning in the 1940s, colonial staff based in the region reported prevalent food shortages in peasant populations in the region. In addition to the food shortages, officials feared that the continual rise of human and livestock

numbers in the central districts of Sukumaland would lead to overcrowding and soil degradation (Bryceson, 1992: 49) The reports prompted the gradual development of a new land use scheme. The Sukumaland Development Scheme was launched in 1947. "Modeled from other similar colonial schemes taking place in the region it was the second largest, next to the Groundnut Scheme in colonial Tanganyika. The most systematic attempt to introduce a rational grazing program was the 'Sukumaland development scheme'"*(*Ross, 2017: 93). The Sukumaland Scheme was an attempt by the British authorities to reduce soil degradation through enforcing zero grazing in some places, and by introducing more systemic agricultural systems in others, that included crop rotations, contour ridging and compost manure application. The plan covered 52 000 square kilometres of territory south of Lake Victoria, including Misungwi district. The overall goal of the scheme was to create an orderly settlement of people and livestock on the land at reasonable densities determined by a calculation called the Sukumaland equation. The equation determined the ideal population distribution to be 112 people and 384 livestock per square mile (2.6km squared) – or 16 homesteads per square mile (using an average of 7 people per household) where each homestead comprising of 40 acres of land, (16 Ha) where 8 acres (2 Ha) are used for arable crops and 32 acres (12 Ha) as pastures. This could, according to the Sukumaland equation, ultimately support an average of 14 cattle and 10 smaller livestock per homestead (Ibid: 94). The Sukuma equation was based on observation, and information gathered by authorities themselves, rather than any actual consultation.

Implementation of the Sukumaland Scheme lasted ten years and resulted in fewer food shortages; however, it did not achieve what was intended. In the context of other colonial efforts to control and manage land use systems, it was the "epitome of high modernist planning, [but] like so many projects of this kind, its modeling did not adequately capture socio-ecological complexities on the ground" (Ross, 2017: 95). Farmers complained about restrictions around soil management (high labour investments) and limits to land allocation for cash crops. Low staffing could not enforce the regulations of "what began as a scientific attempt to protect lands and raise living standards" but which "ended up undermining colonial rules among the very people it sought to help" (Ibid: 96). Current and ongoing controversies surrounding rangeland conservation stemmed in part from the ambiguity of overgrazing (Leach and Mearns, 1996). Misjudgment of social ecologies and a lack of meaningful input by local people often corroded the perceived legitimacy of the very institutions that implemented them. The majority of pastoral communities moved south and further away from the lake and towards declining population densities. Those closer to the lake resorted to more agricultural practices, with zero to minimal grazing practices to accommodate the more densely populated villages like Mwasongwe. The scheme, like others in the region,[21] demonstrated the colonial interests in controlling agricultural development at the time, with little to no consultation with Sukuma people on their existing practices and perceptions of soil health, grazing and alternative uses of land. This kind of

[21] See Rizzo (2006) and Scott (1998) for additional details and analysis on the failed Groundnut scheme which took place between 1946-1952. Also see Fiona Mackenzie's (1991) work on gender and colonial conservation projects in Kenya in this period.

monitoring in attempts to order farming and food production practices continued in post-independence and the onset of *Ujamaa* ('familyhood') policies implemented by Julius Nyerere, as discussed below.

Ujamaa

Post-independent policies further exacerbated imposed land use provisions (also without consultations with local populations), through *Ujamaa* between 1962 and 1985. Scott (1998) and others (e.g., Jennings, 2008; Green, 2010) analyzed *Ujamaa* as "Tanzanian government's attempt to reorganize human communities in order to make them better objects of political control" (Scott, 1998: 224). Lal (2010: 2) further critiques national policies at the time of independence stating that, "*Ujamaa* emphasized an understanding of security that alternately referred to the political stability of its leadership and to the material well-being of its rural citizens." This meant that, an emphasis on subsistence and agricultural production leading to self-sufficiency paralleled the integration of cash crop production (such as cotton in the Mwanza region) in order to fulfill national economic interests. Cotton production played a prominent role during colonial rule and in post independent Tanzania. Barker (1974: 444) suggested that restructuring the regional cash crop production during *Ujamaa* resulted in both spatial and class-based inequalities. For example, spatial inequalities grew out of regional allocation of cash crops: parts of Kilimanjaro, Arusha, West Lake and Mbeya region were reallocated with coffee, parts of Iringa, Mbeya and Tanga regions with tea; parts of Mwanza region with cotton; parts of Tanga and Morogoro regions with sisal; parts of Iringa region with maize; and, parts of Arusha region with wheat. Such uneven

allocations created opportunities for a disproportionate advantage from the marketing opportunities based on their proximity to urban centres, crop-specific resources and inputs required, and access to adequate road infrastructure (Ibid, 444). In spite of these spatial allocations of cash cropping, *Ujamaa* maintained an ideology around food provision driven by the need for national self-sufficiency and created a further distinction between cash crop and subsistence cultivation practices.

Lal's analysis identifies self-reliance as a central feature of *Ujamaa*, "a focus on the dialectical movement, between centralization and modernization and a kind of radical anti-modernism, between planning and improvisation and between a narrow parochialism and an expansive embrace of community" (2015: 214). The internal contradictions of self-reliance within a structure of state-imposed central planning embodies the tension between national and individual interests. More specifically, this categorization of subsistence and cash crop farming unintentionally resulted in further unequal regional and gendered divisions of resources and labour, such as further burden of household food production on female household members, resulting from male labour migration and specific crop production allocation to certain regions and establishing the production of commercial crops in certain areas and not in others. *Ujamaa* was widely considered a failed social experiment causing internal displacement of people, increasing instances of food scarcity and dysfunctional and overstaffed public bureaucracy (Scott, 1998; Rizzo, 2006). Despite its failures, an ongoing emphasis on *Ujamaa*'s self-reliance filtered through to the formation of liberalization policies proceeding from *Ujamaa* that

focused on individualization and private business development as a means to future development (Green, 2015). Current policies are seen to reflect this new public and private sector engagement, where ongoing influence of private development investors shaped the proliferation of national civil society and international organizations involved in agricultural development. Farmers in the Mwanza region depend on both public services through the Ministry of Agriculture's regional agricultural research institutes, as well as project-based programs through NGOs' funding by both private and public foreign money. As described below, limitations to these current offerings further the individualization and self-reliance imposed on rural livelihoods dependent on farming.

NGO and Public Services for Farmers

Extension staff are government staff that are assigned to particular regions in the country to provide face to face support for farmers, offering information on agronomy, planting materials and opportunities for trainings on particular practices. The gradual decline in funding to such services and resource provision, since the country gained independence, resulted in an under-resourced agricultural extension system. For example, Mwasongwe (with 524 households) and the neighbouring village of Mayola (with 248 households) are serviced by one agricultural extension officer. During my fieldwork (2015-2016), I met with the extension officer twice. The extension officer facilitates both the services of the national agricultural institute as well as project-based initiatives that are funded through regionally-based NGOs.

The majority of farmers in Mwasongwe village and in other villages in the district focused their production on food crops, and mainly for subsistence. Major crops grown for both subsistence and some small-scale commercial sales in the district vary according to location in relation to the lake. Further away from the lake, millet and sorghum are more prominent. Closer to the lake, and in Mwasongwe, rice, maize, sweet potato, cassava and chickpeas are the most commonly grown food crops. Tomatoes, okra and leafy green vegetables were introduced more recently in the 1990s and are grown mostly for both subsistence and sale. As mentioned earlier, TAHEA introduced vegetable production in Mwasongwe as both a food to boost overall dietary health needs as well as an attempt to increase earning potential for (mostly female) producers. NGOs support farmers in growing particular crops depending on their own project needs and thus influence what farmers choose to grow from season to season. Direct, face-to-face farmer engagement between government services through extension and farmers is limited and poorly resourced and thus contribute to farmers' dependence on project involvement through organizations such as TAHEA to support them.

Summary of this Section

The colonial and post-colonial governance on land use in Sukumaland (and later the Mwanza region) showed the historical and political context of how food crop production and cash crop production had been regionally allocated and institutionally supported. The Sukumaland Scheme imposed by the British exemplified the "rendering technical" (Li, 2007) of complex food access and production challenges. *Ujamaa* established a more prominent distinction between

subsistence and commercial farming through regional allocation of cash crops, and resulted in uneven access to certain institutional, and environmental assets. Liberalization policies since the 1990s and post-*Ujamaa* opened markets and funding streams that increasingly relied on global international development agendas and foreign economic interests, which reflects how agricultural development continues to take place in the country today. Current configurations of farmer services include project-based initiatives funded through regional and international NGOs, and to a lesser extent funding allocation towards regional national agricultural institutes. Green (2010: 27) suggests "the somewhat mechanistic understanding of the role of the social in bringing about change resulted in an orientation toward institutional form rather than content." For OFSP, funneling funds and resources through institutions were necessary in establishing the crop in the region. The importance of institutional engagement, in the supply and distribution of seeds as well as in assurance of market sources, as I will show below, legitimized OFSP's significance. This next section will delve further into the production of success narrative around sweet potato in Tanzania, and show how the introduction of orange varieties coincided with the introduction of certain institutional, environmental and gender relational dynamics.

Producing Success

Since my entry point into OFSP promotion grew out of my experience with NGOs working in the East Africa region, farmers initially assumed that my interest relied on hearing more about the success of OFSP. In the early stages of my

fieldwork in June, 2015, Anna introduced me to the farmers known by NGOs to have benefited from growing OFSP. This included meeting several members of *Imala Gihabu*. Having an affiliation with an NGO, I was aware that farmers' initial accounts might align with what promoters of OFSP expected to hear. Nevertheless, hearing the experiences of how OFSP impacted farmers' lives revealed unintended consequences of their engagement. Mama Nane recalled a moment she decided she needed to make big changes in her life, once the OFSP sales began to attract more foreign visitors to Mwasongwe:

> I only planted half an acre in the first season. But when we sold most of what we harvested, it was enough to invest more land to growing more OFSP for the next season. I was renting a room in the village centre for me and my four children at the time. Many *mzungus* [white foreigners] would come by in their white pick-up trucks to talk to me about my OFSP production. My landlord got jealous and told me to go back to my parents' house, if there were going to be so many visitors all the time. I felt down and embarrassed. I worked hard to get my own plot and my own house with every project TAHEA brought to us. So I was happy when I was able to afford to buy my first plot of land and build a small house. Now I can't believe I have my own house!

Her landlord expressed hostility towards her due to the recognition of her success by foreigners and also showed how little others in Mwasongwe were aware of OFSP as a crop widely available. Mama Nane purchased land and built a house, something she was unable to do, according to her, without the opportunities that growing OFSP offered. At first, she used her family's land to grow OFSP, and by the time I met her, she had access to 3 acres (1.2 Ha) of land in different areas of the village. Her moment of realization pointed to the broader perception of the OFSP project in Mwasongwe, and her landlord's resentment towards the *mzungus* visiting

only her. For Mama Nane OFSP is also the source of her success, and of her new house. Other group members shared a similar sentiment.

Edith's house was the most striking home along the main road towards the lake in Mwasongwe village and 200 metres away from Mama Nane's. Her house was set 50 metres away from the road on a slight incline providing a heightened view of neighours and road activities. Two large white pillars frame the oversized front porch. During harvest, neatly organized and weeded rows of maize, sweet potato and beans lined both sides of the walkway up to the steps to her front door. Flowering bushes decorated the front steps on the porch. As we walked in, Edith's daughter, Lisa, formally greeted us with a '*shikomoo*' (a greeting saved for elders) and led us to the sitting area in the front room. The chairs and tables were covered in white lace. Curtains on the two front windows were a peach colour. The concrete floors were smooth and recently swept. Edith then took a seat beside me on the couch. Edith has four children, and her eldest is in college. She said that her husband helps her with the farm, when he is there, but he was travelling when we met. She proudly claimed that she was able to build her house as a result of growing OFSP in 2006.

> We didn't have many options back then, and there was not a lot of food available. So when we were introduced to *viazi lishe* [OFSP], through TAHEA, we were happy. We were able to invest our earnings, pay school fees, and build our homes.

Mama Edith, like Mama Nane, grew food close to her home in addition to two other plots further away – one close to the lake and one upland. The plot close to her home included maize, sweet potato (both orange and white and yellow varieties), cassava, and green gram (mung beans). Over regular visits between 2015 and 2016,

similar to Mama Nane, Mama Edith attributed her ability to build a home and expand her farming production to her engagement with TAHEA and with OFSP production.

Frederick is a friend of Mama Nane. He dropped in on Mama Nane while Anna and I visited in June 2015. He wore a shirt given to him from one of the projects – an orange-coloured shirt with a slogan on the back, that read, "*Viazi – Lishe: Kwa Afya na Kipato*", which translates into "Nourishing Potatoes: For Health and Income," Frederick was eager to join the discussion, to be interviewed and share his success. "Through OFSP, I was able to buy many things such as a TV, a decoder, DSTV, and a big radio. I was also able to buy four plots of land around the village. At the moment, I am building a commercial building near the commercial centre. When it is finished I will rent out the shops."

Frederick mentioned he was in the process of building a larger house for his family; "if the weather was better and there was less rain, the roof would be on and it would be closer to being finished". Frederick seemed to have prospered more from his production of OFSP than other members based on his description of his purchases. As the bookkeeper, Frederick also became a spokesperson for OFSP and facilitated other meetings and visits.

The economic gains from OFSP were also seen in myths or legends that followed projects in Tanzania. When I first arrived in Tanzania, I met with Robert Smith, Director of a large-scale multi-million dollar nutrition and agriculture project taking place in the central and southern regions of the country. There was a small component that included distributing OFSP vines and facilitating marketing

campaigns around growing and consuming the crop. Robert Smith relayed a story I had also heard from a staff member of a NGO around the same time.

> We heard about a man, Peter Kamau, from the coastal region in Tanzania who became rich after exporting large quantities of OFPS vines to the Middle East. He had also established a contract with national prisons where he supposedly delivered six tons of vines a day per prison. His story of success and his business venture was seen as what other farmers could aspire to. He created networks of buyers and arranged logistics, etc. He grew enough to manage the large orders. He became rich and famous by investing in OFSP. He was invited to meetings to talk about his success and to share his knowledge on building an international and domestic business from OFSP.

Based on a review of the news sources covering OFSP at the time, no one had heard about the story about the prisons. Regardless of whether or not Peter Kamau had in fact prospered from large-scale OFSP production, the retelling of a story of success by a farmer was aimed at encouraging investors and farmers alike to aspire to similar kinds of economic success.

Success as 'Viazi Dawa' (potato medicine)

Even though vitamin A and OFSP had been presented as the more nutritious version of sweet potato, perceptions of what this actually meant varied by those exposed to the promotional activities to those that guided them. For example, the nurse practitioner based at the health dispensary mentioned that he had been aware of the OFSP activities, and attended project launch events in the centre of the village. Vitamin A to him, remained a key indicator of eyesight health, and not overall health outcomes as some promotional narratives describe. He also mentioned that challenges with eyesight were not as prevalent as issues around contracting malaria or cases of HIV/AIDS. In one of my earlier visits with both Mama

Nane and Mama Edith in July 2015, they explained that they both perceived OFSP as a remedy for the prevalence of malaria in Mwanza. Mama Nane commented on the change she noticed in her children's' health. "There are less admissions into the hospital due to malaria.[22] There were noticeable changes, such as fewer stretches and splits in children's' skin, and their hair was not dry and brittle." These symptoms are signs of acute protein malnutrition and could be associated with vitamin A deficiency, but without testing for deficiencies through blood samples, there would be no way of confirming.

TAHEA staff relayed stories of OFSP's impact on improving eyesight and for improving overall health. During one particular meeting in April 2015, the Director described two particular accounts where OFSP production led to an improvement in a person's eyesight and in their overall health conditions. On another TAHEA related field visit in Mwasongwe in July 2015, we heard her tell the story about a man who suffered for years with poor eyesight.

> When *viazi lishe* was introduced in the village, the man heard that it was good for his eyes. He began to eat it daily, and after a few months, his eyes started to improve. He continued to eat *viazi lishe* regularly, and years later, now when we meet him, he no longer needs glasses.

More broadly, the Director re-told this story on two occasions (once during a regional meeting in April 2015, and second, during a meeting in her office in July, 2015) regarding a hospital patient in Buhongwa who had experienced a boost in his overall health from consuming OFSP.

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[22] Malaria is often used to describe illnesses (particularly those that result in fevers), that might not be diagnosed as malaria, but require medical attention.

> There was a man dying from AIDS at the local hospital in Buhongwa. He wasn't eating because he was too weak. A relative fed him cooked *viazi lishe*. He then started to eat a little each day. He slowly regained his strength and feel better. He eventually left the hospital and is now living his life. He still eats OFSP to keep his strength up. That's why we often call *viazi lishe 'viazi dawa.'*

Mama K refers to OFSP as *viazi lishe* or nourishing potatoes, but she replaces lishe with dawa, which in Kiswahili means medicine. In changing the name, OFSP is described as a medicinal food. This reference, however, is detached from its highly potent nutritious value here. These stories feed into the heightened health value of OFSP and as a strategy to encourage investment by farmers and donors, NGOs and other development actors into increasing crop production, while deterring production of the older varieties of crops. Further to the disconnect between older varieties is the implication that modern technology, biofortification, forms the basis of the healing dawa. The context in which these stories are relayed present OFSP as more valuable than it may actually be, where the high valuation is marketed to encourage investment and production.

Summary of this section

Stories of success through material gain, accounts of acquiring homes, and building

businesses contributed to OFSP from a crop only grown for subsistence to a crop associated with economic growth. There was little mention of the nutritional benefits during my initial discussions with farmers and their descriptions of success through OFSP. A comparison of the health benefits attributed to OFSP by people in

Misungwi with the documented health benefits reveals that they are imagined or exaggerated, but only for the purpose of promoting production towards market growth. Moseley et al., (2015) suggest this kind of development agronomy and an emphasis on food production (in anticipation of increasing market value for surplus) risks only increasing yields without addressing household food insecurity. McMichael (2013) argues that furthering farmers' reach to marketing, selling and processing their surplus could lead to debt and higher risks of food shortages. This points to the influence of the broader nutritionism discourse that emphasized the market-oriented solutions to malnutrition. In the following section, I reveal the prevalence of such a narrative in regional meetings with agricultural scientists conducting research around sweet potato.

Nutrition for Economic Growth

Framing Success Through Institutional Networks

These kinds of stories described in the previous section resulted from the broader institutional and financial networks surrounding the charismatic OFSP. Investments by the International Potato Centre[23] in research and development projects centered on cultivating and consuming OFSP at a large-multi-country scale, also formed the basis for discourses that emphasized the economic and nutritional value as mutually beneficial. Sweet potato Action for Security and Health (SASHA), a five-year project, commenced in 2009 with a budget of 22.5 million, and worked across 12 Sub-Sahara African countries including Tanzania. Funded by the Bill and

[23] Largely funded by the Bill and Melinda Gates Foundation (previously funded by USAID and Rockefeller)

Melinda Gates Foundation, the project developed tools, procedures, systems, and human resource training for the national breeding programs for new biofortified varieties of sweet potato. Breeding new varieties, from the start of the process to its final release and distribution, could take up to five years or eight to ten planting seasons. Once these breeding programs developed new varieties, government-led agricultural research institutes led the majority of the breeding activities, and ensured that sweet potatoes remained on national breeding plans. Several projects grew out of these initial funds within SASHA, including those with TAHEA, and focused on the distribution of the new varieties to sweet potato growing areas. This meant that many of the projects initially targeted women farmers, as an effort to boost nutritional benefits from growing a more nutritious variety of sweet potato, while also building direct connections to markets for women. Workshops, international and national regional meetings for SASHA also shaped the marketing of OFSP as a charismatic crop.

I attended one such meeting in Nairobi, Kenya in April 2015. The meeting focused on marketing and processing of OFSP as a means to boost production levels, and increase the supply in circulation. The meeting took place in a conference facility attached to a hotel just outside of the city centre. There were many shades of orange in the room. Orange-African design printed tablecloths lined the display tables, participants dressed in bright orange-pattern African print shirts, some with orange sweet potato roots prints, others with vine prints. The orange meeting binders with the meeting agenda were placed in front of chairs around the round tables set up in the conference room. There was a mix of nationalities, African,

European and American participants, most of them based in the region, and most of them dressed in orange. This kind of staged promotion through orange paraphernalia distinguished the new orange varieties, which were the focus of the conference against the paler, white, yellow traditional varieties more commonly grown in the SSA region. The majority of the meeting sessions focused on improving the quality and quantity of orange varieties during cultivation and on post-harvest processes and storage options. Many of these strategies had not yet reached Mwasongwe village.

A regional coordinator for the project led a panel discussion on the policy implications of building up production of orange varieties. The discussion was meant to offer insights into how to solicit government support. The coordinator made a statement regarding this, which shed light on the overall theme of the project and its alignment with the 'nutrition for growth' agenda.

> Governments are not interested in nutrition, unless there is an economic incentive. Getting governments involved requires them to be interested in the potential growth in an OFSP industry. Once that is established then talking about nutrition will be easier to convince government officials to invest in the crop.

The panel discussant suggested that governments would see the value of supporting the large-scale production and adoption of the crop in the region if there was evidence of revenues from production through sales or through product development. A nutritious crop could only attract government support if it is seen as an economically valuable one. However, this perspective appeared distant from the realities of producers and narrowly focused on moving the OFSP forward through research on processing techniques, improving the quality of roots and generating

market demands towards economic growth. At the same time, farmers in Mwasongwe mentioned their attendance and interactions with these kinds of meetings as part of their success. As shown below, these experiences contributed to the overall benefits of cultivating OFSP.

Unintended Consequences of Nutritionism on Farmers in Mwasongwe

Many of the women I interviewed in both Mwasongwe village and in Bukonyo village described their experiences of travelling as a benefit to growing OFSP. Earlier projects that involved farmer-to-farmer learning took place in 2007-2009 (Hellin and Dixon, 2008; Franzel et al., 2014). Some sweet potato growers travelled on learning tours to see how farmers in neighboring Uganda and Kenya grow, process and benefit from biofortified orange sweet potato. Others attended international meetings on orange sweet potato, where farmers were invited to share their 'testimonials' on how OFSP improved their lives. A farmer in Bukonyo talked about her 2006 'study tour' of OFSP production in Kenya and Uganda where she travelled by bus to Kenya and in Uganda. Projects in Uganda and Kenya had taken place prior to OFSP' s introduction in Uganda, and CIP arranged for farmers in Tanzania to meet other OFSP producers who had already been in operation for a few more seasons. The woman recalled her experience on the trip and remembered meeting Mama Nane and Mama Edith, from Mwasongwe.

> There were a few of us from Ukerewe [an island in Lake Victoria] and from Mwasongwe district who travelled by bus through Uganda and Kenya to learn more about OFSP. We met farmers who were growing *viazi lishe* and then making crisps and chapatti [a flat bread] out of flour. We also saw that their fields were filled with more *viazi lishe* vines than we were growing so they were able to

> make more flour and sell more. Both Edith and Mama Nane and others shared stories and we were able to enjoy our time together.

Even though this study tour took place over ten years ago, women who participated in this trip frequently relayed their experience to Anna and me because, for some, it was the only time they ever left their district and, for others, it was the farthest they ever travelled.

Mama Edith also shared her experience of travelling by bus all the way to Nairobi from Mwasongwe for the first (and only) time to attend a workshop on OFSP hosted by the International Potato Centre (CIP). Mama Nane had also travelled by bus to Arusha to share her experience of OFSP success at an international conference hosted by the Consultative Group for International Agricultural Research (CGIAR). Both of these meetings involved international scientists and were held primarily in English. Mama Edith and Mama Nane's ability to understand the conversation and communication outside of the meeting sessions were limited, even though there was some translation for the meetings. Therefore, language barriers limited their interaction with others present at the meetings. Mama Edith and Mama Nane described their experience as attending the meeting, but only in a particular way, that reduced their participation to presenting their own experience with OFSP, rather than potentially contributing to broader conversations at the meetings that shaped future agendas on nutritional health, food production and women's livelihoods.

In her retelling of the conference experience, which took place in 2007, Mama Nane remembered the hotel room and the clean, white sheets and the thick mattress. She also talked about the food at the conference, the tables of buffet-

style choices, of meat, vegetable side dishes, and very large dessert table. She mentioned the alcohol at the cocktail party by the pool and about the good time she had 'dancing with a mzungu'. Her conference experience exposed her to unfamiliar tastes, experiences and people. It was a setting that was foreign to her, and that was made possible through her OFSP production and led to personal gains for her.

Seven years later, in 2014, Mama Nane travelled to Dar es Salaam by plane for the first time, paid for by Farm Radio International. The organization sponsored Radio Maria to produce episodes for their program, called *Kilima Chetu* ("Our Farmer") to focus on orange sweet potato. The idea was to provide information on how to grow sweet potato and to also present the nutritional benefits of vitamin A contained in the orange varieties. Mama Nane was invited to share her story on the radio as way to inspire other farmers to grow it, and to encourage listeners to source vines (sweet potato seeds) to start growing it. Mama Nane described her experience of travelling to Dar es Salaam to Anna and me: "I'd never seen the other side of the sky before." The radio broadcast extended the scale of where her story reached; through the radio program, her story reached listeners in places in Tanzania she had never been. In one particular episode, broadcasted in September 2014, the program host asked about the speech by the then Prime Minister of Great Britain and whether she had heard about it:

> *Radio Host*: Mama Maria tell us how have you felt when David Cameroon from England mentioned your name when he was giving speech to big Meetings in Europe, how did you feel?
>
> *Mama Nane:* I received the news on the Internet. It was in English, I could not read it so I looked for someone to read it. I was very happy

> though I wish I could have gone to school and be able to read myself. But I was very inspired to see my name was mentioned I felt like I too can even fly to Germany one day, if my African voice was heard in Europe.

The story of Mama Nane in David Cameron's speech is far removed from Mama Nane's view and experience of growing *viazi lishe* in Mwasongwe. She acknowledged the disjuncture between her everyday realities of actually growing and consuming biofortified crops, and how it was told - through the internet which she has no access to and using a language (English) she does not know.

Her story on the radio garnered many listeners. Radio Maria covers 80% of the country and is one of the most popular radio stations for Catholic and Christian populations in the country. In addition to the meetings, radio shows and speeches, Mama Nane's profile was also described on many NGO flyers and documents. A YouTube video produced by an international organization profiled her small garden at the back of her house (HKI, 2012).

Projects supporting OFSP presented farmers with opportunities and experiences in other places outside of the Mwanza region. Growing OFSP offered more than just better health and additional income, such as an entrance into spaces with scientists and other farmers involved in OFSP. Yet these spaces appeared structured to present particular versions of women's stories, without actually modifying or enhancing their lives outside of the OFSP narrative construction. These kinds of fragmented narratives that describe women's experience of growing OFSP contributes to OFSP's charismatic attraction and "creating a particular visibility for women – but not necessarily in a way that reduces their oppression and marginality" (Kimura, 2013: 235). The complexity of their roles as caregivers

and the inherent gendered dynamics in small-scale farming households in Mwasongwe are absent in these stories, framing the nutrition problem as solvable by women growing OFSP. The potential for female sweet potato producers is often dependent on their access to the resources needed for cultivation, including land, planting materials and access to markets (as discussed in Chapter 5). This next section draws attention to the processes involved in growing sweet potato and how cultivating OFSP produced new forms of organized labour through the new framing of sweet potato.

Cultivating Sweet Potato in Mwasongwe

How Sweet Potato is Grown

Sweet potato is often mis-categorized as a sweeter version of the common potato. Regular potatoes, popularly known as Irish potatoes in Sub-Saharan Africa (Low 2009), are tubers or thickened stems, unlike the root of the sweet potato crop. Sweet potatoes are part of the *Convolvulaceae* or morning glory family, whereas potatoes are part of the *solanum tuberosum* or nightshade family (as are tomatoes and eggplant). Yams, often mistaken for sweet potato, also differ in that they are also tubers and grow considerably larger in size and are less sweet. There are known species of yams that are indigenous to the West Africa region, as well as South America, whereas sweet potatoes only originated from Peru. Sweet potatoes grow out of the stem of the root, where only one root forms from each node. Tuberous crops are grown at multiple eyes developed on the tuber.

In root crops, a single root is grown out of a node in the vine. Vines can only

be stored by burying them under the soil. Once the vines are uprooted, rotting or wilting can occur after 1-2 days. Thus vines characteristically can only be planted close to where they are supplied, and cannot be transported very far or stored for long periods of time out of the ground. These traits necessitate specific distribution strategies to accommodate the storage limitations.

Sweet potato had been considered a food security crop in Tanzania because of its short cultivation period and its ability to withstand episodes of drought over a few seasons (Kapinga, 1991; Bryceson, 1992). Table 1 below shows a typical planting schedule for the 2015-2016 season. Sweet potato is planted just before the short rains and typically grows from October to March.

Table 1: Cropping systems and availability of food throughout the year, Mwanza Region

Crop & growing period	**Planting**	**Harvesting**
Maize 4-6 months	February, November	June/July
Cassava 7-8 months	October/November	April/May and throughout the year
Sweet potato 4 months	October – March (June – September)	Feb – June (October – January)
Beans – 3 months	January/February	Ongoing
Okra	January/February	July
Source: adapted from Dr. Kido – NARS (National Agricultural Research Centre)[24]		

Sweet potato leaves are consumed regularly and can be found in the markets along with other leafy greens. Leaves are harvested throughout the year as the vines are stored, whereas roots are harvested once, and occasionally twice over the year. The majority of vines were supplied to farmers, through the extension officer and

[24] Dr. Kido contributed significantly to the advancement of OFSP breeding and vine distribution in Tanzania and was (in 2015) managing a large-scale, Bill and Melinda Gates Foundation Project in the Mwanza region.

Ukiriguru Institute the regional agricultural research centre in the Mwanza region. In general, planting techniques remained the same between older sweet potato and biofortified varieties. Vines are planted in mounds or ridges. Roots sprout out of the nodes on the vines approximately 4-6 weeks after planting. Vines require moist soil to grow without wilting or drying out, which is why most vines are planted close to the lake in Mwasongwe. Sweet potato farmers multiply vines by cutting them close to the nodes and then replanting the new cutting. These multiplied vines, as well as the original vines, could last up to four to five planting seasons. However, vines tend to gradually decline in quality with each season - they weaken and become more susceptible to viruses and diseases. Once the vines are ready to be cultivated into roots, farmers in Mwasongwe transplant them upland, farther away from the lake, to another plot of land closer to their homestead. This is usually completed at the start of the rains, when ideally it is easier to clear the land and prepare the plots for the seeds. Once the roots are harvested, some of the vines are left in the ground for the next season. This kind of seed saving for all varieties of sweet potato requires low labour investment and no resources in terms on other inputs or fertilizers.

Farmers in Misungwi and Ukerewe districts typically grew sweet potato close to their homestead and also in other farm plots close to the lake or upland. Prior to OFSP initiatives, national agricultural institutes were the only source of new vines. Mama Nane grew several rows behind her house. Mama Edith also maintained a small collection of sweet potato close to her home. The location of sweet potato production and the small portions of vines showed how sweet potato remained a subsistence, household crop, that did not necessarily require further resources

(such as land or water resources) and that the ease of planting close to where food is prepared for meals required less labour, transportation and time to harvest.

Shortly after the short rains arrived late in October, 2015, we made our regular early morning visit with Mama Nane. We spotted a pile of sweet potato vines to be planted. These vines were recently taken out of the ground from her plot close to the lake, and she was planning to transplant them to her garden to cultivate the roots. Anna and I helped Mama Nane plant this new batch of vines in the plot behind her house. The type of vines in the pile varied, according to Mama Nane. White and orange varieties of vines have similar characteristics, but differ in the size and shape of the leaves. The bed was only two by ten feet with four ridges approximately five inches apart. Mama Nane was busy with her washing and I offered to help her prepare the bed for planting, while we chatted. Using a small hoe, we cleared all the remaining weeds and grass left along the bed. Then, we formed the ridges with the existing soil. With her guidance, I planted the vines into the ridges and completed the half the rows, while Mama Nane completed the rest. After she finished hanging the washing, she came over to the plot and finished clearing the bed of debris, making sure that the roots of grass and other invasive roots would not come up again. She also replanted a few vines that I had planted but had not been set deep enough into the soil. For her household garden, Mama Nane did not distinguish between white and yellow varieties or nutritious and non-nutritious ones. She cultivated all the vines she transplanted in the same way.

This plot was just her small garden but she also uses land close to the lake as well as another plot. Mama Nane explained to us how she prepares her fields at this

time. She mentioned another plot she purchased a few years ago that is approximately 200 m from her home. While she used this garden plot for preparing meals, she used the other plot to grow her OFSP and other crops that she might sell. She and her neighbours arranged to help each other prepare these ones.

> We have a small group of ladies who work together to prepare each other's fields. Tomorrow, we will go to Helena's [her neighbour] to help her prepare her paddy [for rice]. Then we will prepare my field for planting more sweet potato, beans, and cassava.

Mama Nane's engagement with a labour sharing group and the ways she prepared her garden bed sheds light into how farmers in Mwasongwe cultivate sweet potato and their other subsistence food crops. In her own garden plot, she made little distinction between the older white and yellow varieties and the new orange biofortified varieties. Her informal agreement with neighbours allowed them to cultivate more land than they would be able to do on their own. This kind of informal arrangement appeared in stark contrast to how farmers organized around OFSP production. The introduction of OFSP into Mwasongwe, coincided with the Tanzania Home Economics Association 's (TAHEA) efforts into organizing farmer groups - some of which had already existed for other projects - through OFSP grew in membership. This next section describes how cultivating OFSP also cultivated new forms of farmer group dynamics and gendered labour divisions.

Gendered Sweet Potato Production with OFSP

One of the intended benefits of growing OFSP was the advantages that female farmers could have in the knowledge around cultivating and preparing the crop for the household. For example, in one promotional pamphlet, benefits to female

farmers were described as the 'win-win' solution, where "OFSP provides women as producers who also play a key role in making decisions about child feeding and household nutrition, women can grow surplus OFSP and sell both roots and processed products and can make significant profits from selling sweet potato products," (CIP, 2012). An emphasis on the economic benefits associated with better nutrition attracted male household members, such as Frederick and Jacob, who eventually became active in *Imala Gihabu*.

Friends and neighbours of Mama Nane also shared their stories of how they became involved. John and his wife, Summer, lived down the main village lane from Mama Nane. In 2015, when I first met them, they had five children together. Their rectangular concrete home sat a few metres from the road and beside a small square livestock enclosure, used to keep cattle through zero grazing practices. A few goats and a cow rested in there when I visited. John and Summer cultivated several different crops, including rice, maize, white and yellow and orange sweet potato, and leafy green vegetables. John is a tall, thin man and soft spoken. He was born in Mwasongwe and his parents live in a nearby village. Summer began growing orange sweet potato in 2004, while, at the time, John focused on the crops meant more for sale in the local markets, such as maize and rice. John shared his story of when he first learned about OFSP in 2006.

> It was just after harvest time, and I was feeling 'tired' from a bad harvest. I did not earn enough to cover the school fees for my children. Summer came to ask me what was wrong and I had to tell her. She said that she earned 120 000tsh ($72 CAD) that season from her OFSP production. I was surprised to hear this. We used these earnings to pay the fees that year. Ever since then, I've been helping her grow sweet potato.

John was unaware of Summer's revenues from production and followed the common assumption that sweet potatoes, known strictly as a food crop, and not for sale, could not generate income. Summer was not in the position to generate a substantial income from her sweet potato production before she began growing OFSP. John only became interested once he learned about the amount of his wife's profit for the orange varieties. This husband and wife engagement with OFSP reinforces the emphasis of OFSP's economic value over its nutrient content. The initial earnings from Summer, and eventual earnings from John, are described as success in terms of their monetary gains. OFSP was not only meant to improve the nutritional health of their children, but rather to improve their overall profits from the production. The financial gains from Summer motivated her husband to share in the labour production. At the same time, cultivating success stemmed from producing profits as opposed to producing healthy children. Overall, economic, rather than nutritional interests, may have prompted changed labour dynamics for OFSP production in Summer and John's household.

Imala Gihabu Farmer Group Formation

Farmers in Mwasongwe village, with whom I initially spoke grew traditional white and yellow varieties prior to growing OFSP and also took part in other initiatives to boost vegetable production. Organized groups formed around other farming initiatives prior to OFSP, some initiated by the Tanzanian Home Economics Association (TAHEA), some by other institutions. With OFSP, farmer group formation strengthened the interactions between TAHEA and Ukiriguru (the regional agricultural research institute) with particular farmers in the village. The

gendered dimensions of membership, and organizational and discursive framings in farmer groups shaped farmers' experiences with OFSP. Many of the residents I interviewed in Mwasongwe were members of a farmer group, but not everyone in Mwasongwe farmed, and not everyone was a group member. Mama Edith, a neighbour of Mama Nane, spoke to me at length about their farmer group over several visits. It was, to both of them, a significant aspect of their experience of growing biofortified sweet potato.

> We were first organized into groups to sell vegetables and cassava in 2003 and TAHEA worked with us then. At the time, the group was called, *Gembe Nsabo* or 'Unity is Wealth'. A few years later, the group name changed to *Imalu Gihabu*, or 'Out of Poverty'. This was around the time that TAHEA brought in *viazi lishe* into Mwasongwe and we started to grow and sell that. It was because there was a growing awareness that this was about poverty. We need to get out of poverty before we can be wealthy. With TAHEA, we saw how *viazi lishe* could help us to build a better life for our children. The name change reflected that.

There were six small groups of eight to ten farmers at first. The popularity of the group and according to TAHEA staff members, many farmers in the region formed their own group under the same affiliated name, *Imala Gihabu*, in order to maintain a central affiliation and identity to TAHEA. The groups were formed on the basis of location in the village, familial connections, and other social networks among members. Mama Edith explained the differences between her group and the other sub-groups that formed*:*

> We became well known by our involvement with *viazi lishe*. After selling our roots and vines to World Vision and then to other farmers through the radio, we were able to work together to secure large orders. Other groups were unable to do that. Some did not meet regularly. One group did not produce enough together. We worked hard, and we were all able to continue to sell our harvest every year until last year.

Edith and Mama Nane's farmer group managed to succeed due to their own individual economic status as well as other assets they had already acquired. Overall, farmers required certain assets to become an active member of the group. Membership required monthly dues of 2000 Tanzanian Shillings (CAD$). It also required time to meet and coordinate certain activities. Frederick joined the group in 2009, shortly after *viazi lishe* was introduced and soon became the bookkeeper and accountant. Mama Nane organized the memberships of the groups. Edith and another member, John, also played prominent roles and worked closely with visitors, or potential donors who were interested in seeing their OFSP production. Male members, like Frederick and John joined the group only after realizing the potential economic benefits and the close relationship with TAHEA and other institutions outside of Mwasongwe and the Mwanza region.

The demographic characteristics of the group revealed certain criteria required to maintain membership. There were 22 members in the core *Imala Gihabu* group, of which five were male and the rest female. TAHEA initially prioritized women's groups and ways for them to earn additional income, but group members eventually decided that men could also join, to help with the running of the group. Frederick commented on a shift that occurred with the formation of this group prior to its focus on *viazi lishe* that resulted in including male members. "In the early 1990s men were left out of the farmer groups, but now we are part of them." Most women struggled to find time to contribute to the group's administration. Members' ages ranged from 35-60 years old, and each with 3-7 children. Many were grandparents, and primary caregivers of their

grandchildren. There were no youth (defined as persons under 35 years old in Tanzania) in the group. So, even though the original purpose for growing OFSP was for mothers to feed their young infant children, members were caregivers, but not necessarily the mothers of infants at the time. Landholdings ranged between 1-4 acres (0.4-1.6 Ha), with each household typically controlling different plots, both located near the lake and upland closer to their homestead. Meeting the membership criteria might have discouraged younger persons in Mwasongwe from joining, if they initially lacked certain assets, such as land or access to financial assets to meet the monthly dues. These asset requirements inadvertently created a more exclusive access to OFSP, while deterring some from joining.

Many of the farmers in the group also performed other non-farm related work that complemented their income from farming. Edith taught primary school children at the school next to her house. Frederick and his wife owned a small restaurant (known as a Mama Lishe) in the village centre close to the lake. During major sporting events such as the Africa Cup for soccer, Frederick set up a television, connected to a diesel-fueled generator. He charged interested soccer fans to view the matches. Mama Nane, John and his wife Summer and Edith maintained close connections with NGOs such as TAHEA working with OFSP. They were given compensation for arranging logistics and organizing tours for NGO staff, for funders who visited projects and for prospective buyers of sweet potato. Payments in cash were minimal, but rewards often come in other forms, including opportunities to travel, other resources and building social networks within and outside the village.

Frederick's Planting Style

Prior to OFSP, sweet potato cultivation did not follow particular planting guidelines such as spacing or measuring depth of ridges. OFSP projects introduced ways in which to increase the efficacy of land used to grow the crop, and to maximize the potential yield. TAHEA facilitated demonstration sessions for farmer groups in Mwasongwe on how to grow the crop. These demonstrations took place when the crop was developed, and involved government extension officers assigned to the village, technical officers from Ukiriguru research institute and staff from TAHEA. The training demonstrated step-by-step approaches to preparing ridges for the vines, planting the vines (which are considered the seeds for sweet potato), weeding, managing vines, transferring vines to other beds and cultivating roots. Frederick was also one of the early adopters of OFSP, when it first arrived in Mwasongwe in 2006. Anna and I visited Frederick at his small plot near the lake while he prepared ridges to plant his vines. Frederick explained the precise spacing of vines he learned at the training that he still uses to cultivate his OFSP:

> I don't let anyone else plant the roots. There is a very particular way of establishing the roots on the ridges, how deep into the soil to plant them [2 inches or 6 cm], how far apart [2ft or 60 cm], and how often and how much to irrigate them. I don't trust anyone to do this, so I end up doing it myself. I was shown how to plant *viazi lishe* when it was first introduced by TAHEA and when they organized demonstrations.

Both Edith and Mama Nane took part in similar activities that introduced more technical guidelines for planting and growing sweet potato. A more technical description of the planting and cultivation process of OFSP furthered the distinction between the new orange biofortified varieties and the older yellow and white

varieties. Associations with OFSP with group members also highlighted the distinction between farmers who maintained membership in a group and those who did not. The technical framing of cultivating sweet potato reinforced notions of nutritionism, in that a science-based perspective of nutrition coupled with a more technical approach to planting contributed to OFSP's charisma and its new identity as a potential cash crop. This rang true through hearing of experiences of Mwasongwe residents who were not members of *Imala Gihabu* group and those who had not heard of OFSP.

Outside the Farmer Group Formation

Anna and I met with others living in Mwasongwe and surrounding villages who were not part of any farmer group. We met with both men and women who lived and worked close to the centre of the village, where many of the *Imala Gihabu* farmers lived. In September 2015, Anna and I were on our way to the lakeside of the village to meet some of the farmers working on their plots. Along the main road towards the lake, we met three residents who were preparing a piece of land along the road for planting. Anna introduced herself and struck up a conversation by mentioning the upcoming election. This often sparked interest and enthusiasm for a discussion but this time, under our time constraints, she left the few exchanges and disagreements and moved the conversation onto farming. A young woman carried a baby on her back, wrapped in a kanga. An elderly man worked beside her in the field and used a hoe. Together they were preparing rows of ridges for planting. Two small houses were seen from the road and situated just behind the fields. The elderly man told us:

> I was living in Bukumbi (a village not far from Mwasongwe) and started to not feel well at all. My wife and my children also sensed it and they decided to leave and move away. I was unable to work. Sophia gave us a place to stay in exchange for labour in cultivating the fields. We are growing maize, sweet potato and beans.

Sophia, as Anna confirmed to me through residents in Mwasongwe was known as a traditional healer. The woman and her baby and the elderly man stayed in the one of the guest houses behind the field while seeking treatment from her. Neither of them had heard of the *viazi lishe* when Anna asked them, she explained my interest and purpose for being in Mwasongwe. One of the farmers responded, "Well, if we haven't heard about it, and they are growing it here, then they [the farmers growing it] must be selfish to not share their good news with us." Even though they were situated along one of the main roads in Mwasongwe, close to Edith's house, and others growing OFSP, they were unaware of the OFSP crop.

This interaction showed that traditional healers, and those that seek the services of traditional healers were unaware of OFSP and of its subsequent nutritional qualities. Historical and anthropological studies have shown how traditional healers in Tanzania heavily influence perceptions of health and health care, and their relationship to their land and resources (Langwick, 2011; Jangu, 2012; Bessire, 1999). This brief interaction points to the exclusion of traditional healer practices in OFSP's marketing since they were not associated with the health dispensary or development networks.

Others living in Mwasongwe perceived *Imala Gihabu* as maintaining territorial ownership over OFSP production. The husband of a former member pointed to the distinct reputation the farmer group had developed in the village.

> My wife and I shared half of the work in OFSP production in previous seasons, but we are no longer part of the group. Members seem to know each other

> very well, and do not involve others who are not part of the group. There was a time where the group attended seminars on growing OFSP outside of Mwasongwe, and returned to the village without sharing what they learned. That's when I left. So I am not part of the group 'singing' for OFSP. I grow tomatoes. That is my crop.

The group member's husband shared his view of OFSP's influence on crop production in Mwasongwe and alluded to the exclusiveness offered to group members and their 'claim' to OFSP as their crop. By staking his crop as tomatoes, the husband showed how OFSP did not offer opportunities to grow the crop for other farmers living in Mwasongwe, who were not group members.

Summary of this Section

Sweet potato cultivation took on another form of farmer interactions and organization with OFSP. Without TAHEA's engagement, sweet potato production was often informal, where orange varieties are intermixed with white and yellow ones. It is planted in gardens close to home, for convenience, and in smaller quantities, since it is not stored or sold in large quantities. Mama Nane grew her sweet potato close to her home. She and her neighbours shared their time and labour informally to manage their farm production. These kinds of structures are in direct contrast with the institutional connections and formations surrounding the introduction of OFSP in Mwasongwe. Frederick's description of how he planted his OFSP vines adopted new, more precise and technical standards that prevented other family members from assisting him, and dislocating sweet potato's identity as a women's or subsistence crop. Yet, Mama Nane continued grow the crop as

subsistence as well as a potential cash crop through her engagement with Imala Gihabu and her informal farm labour group.

Green (2010: 27) suggests that this formal institutionalization of farming and of civil society in general is a result of decentralization of governance structures in the post-Ujamaa era and an emphasis on efficient use of resources to maximize yields and economic growth. The formalization of farmer groups initiated by TAHEA is also what Mosse and Lewis (2006:16) describe as 'brokerage' , where there is a "co-existence of different rationalities, interests and meaning, so as to produce order, legitimacy, and success and to maintain fund flows… [w]here brokers (as consultants, NGO staff, researchers) read the meaning of a project [in this case nutrition] into the different institutional languages of its stakeholders supporters, constantly creating interest and making real." Meeting residents in Mwasongwe who were not *Imala Gihabu* members revealed the unintended exclusionary nature of the crop's production and two specific aspects of the OFSP story in Mwasongwe. First, it revealed that OFSP was only shared and exposed to those associated with *Imala Gihabu* groups and not the Mwasongwe village at large. Second, the interaction showed OFSP's affiliation as a more exclusive, new, and perhaps, modern crop as opposed to a commonly grown crop, older, 'traditional' subsistence crop.

The ways in which OFSP was grown and its surrounding institutional networks contributed to how it was also presented as a successful example of biofortification by farmers cultivating it in Mwasongwe.

The next section offers the perspective of the supply side of sweet potato seeds in the form of vines, and how institutional engagement in the Mwanza region

shaped the distribution and circulation of vines in and around Misungwi district. I explore processes of farmer exclusion based on location of land ownership and access, and the limitations and opportunities to public and private institutional agricultural research networks.

Supplying Vines

In Tanzania, five regional publically-funded agricultural research institutes coordinate the research, breeding, testing and release of seeds and planting material to farmers. In Mwanza, Ukiriguru Research Institute services the region and has had a long-term relationship with other advocates of OFSP including TAHEA, a local NGO based in the outskirts of Mwanza, the International Potato Centre and other international research institutes. In November, 2016, I accompanied a research team from the institute as they tested new varieties of sweet potato in selected farmer's fields in the Misungwi district surrounding Mwasongwe village. This testing process is the last and final stage of breeding new varieties before they are sent to the national seed board for approval and released for sale and distribution.

Linda, the Ukiriguru Research Institute's technical specialist working with sweet potato for the last 10 years explained how farmers are chosen for this final testing.

> We consult with local extension officers and then we need farms that are fairly close to the main road and with enough land and labour to accommodate at least 13 rows of 20 metre lengths of sweet potato vines. They need to have prepared the land and be ready for this day. The extension officer chose three farms.

Male representatives in the household managed two of three testing sites in the district. For the third, there was a shared arrangement between the male and

female members of the household. Farm size was on the larger end of what is described as 'small-scale', between two and three acres (0.8-1.2 Ha). In turn, many of the members of *Imala Gihabu* owned a total of three acres (1.2 Ha), which were dispersed across various locations in and around Mwasongwe village. Owning land beside a road, as Giller et al., (2016) suggest, increases the chances for farmers to partner with research or development organizations, and as a result offers access to planting material. Even though Mama Nane, Mama Edith and Frederick all live in close proximately to a main road in Mwasongwe, the village is located 1-2 km from the main road.

There were 13 varieties of vines in the study, of which only two were orange varieties. According to Linda, there were several factors around the lower quantity of biofortified vines available.

> Farmers prefer varieties that produce larger, drier roots, and these are also not as high in beta carotene content. There are a number of new white varieties that are the most popular. It takes a long time for new varieties to be approved and released here in Ukiriguru compared to other regions in the country. So since 2009, we only carried two new varieties and only occasionally distributed to farmers, or when there is a special request for a development project. Other orange varieties come from Uganda and from Kenya. We (Tanzania) have an agreement with the government of these countries to share new variety of crops.

Demand from the farmers for certain varieties then informed the choices of varieties for testing through Ukiriguru. These preferences were not based on nutrient content, but rather on taste, texture and durability of the root. Linda's comments validated other discussions I had with producers in Mwasongwe and with market stall attendees in Buhongwa. Farmers still preferred planting the white varieties despite the awareness of the added nutritional value of the other orange varieties.

"Farmers we talk to say that there is no market for the orange ones. They prefer the larger white varieties, like *polista*. They are hearty, they grow well and they feed many household members." *Kabode*, which is pale orange-pink, is the most commonly grown orange variety. *Ijumla* produce small roots, and contain more beta carotene, but carry more water, making them more susceptible to pests after harvest, and less desirable to farmers. Within the orange varieties that are available, preferences for the paler fleshed or less orange varieties, reveal only partial acceptance of the new varieties by farmers. Ukiriguru had been working in improving these new varieties to accommodate the dryer texture, but they still remain less in demand than the white and yellow varieties in general.

Richard, the lead technician in the testing process explained to me why the breeding processes took much more time at Ukiriguru than at the other regional agricultural institutes.

> It has to do the quality of our equipment and the lab facilities. We still depend on conventional breeding, which takes place in the fields and requires up to five harvests before a new variety is tested here. Once the testing goes through, then we apply for the new variety to be released to the seed board. This takes another 18 months. Kibaha, just outside of Dar es Salaam, and Morogoro Institute, close to Sokoine university [the national agricultural university] both have new labs and breeding techniques that reduce the process by two years. New varieties are released quicker to the farmers in those regions.

Vine supply is also dependent on the projects currently taking place in the region, the partnerships established and the locations where the projects are located (such as Mwasongwe). During the 2015-2016 season, the Gates Foundation-funded projects working with radio stations were coming to a close, and the vine distribution supplied through TAHEA (a partner in the project) ended. The Director from TAHEA said that she discussed partnering with Helen Keller International, but

she disagreed with the management on the need for TAHEA staff to be based in the field, rather than investing in vehicles to drive to the field sites from the TAHEA office outside of Mwanza. Therefore, HKI staff found another organization in Ukerewe, an island off the shores of Lake Victoria to implement their USD$15 million project, which also included an element of OFSP promotion. For farmers in Mwasongwe, and in particular *Imala Gihabu* members, projects provided new planting material in addition to opportunities to gain more resources, and social networks. The prospects of projects continuing seemed uncertain, and sporadic in nature, which reflected the nature of the vine supply.

Working with and talking with the technicians at the Ukiriguru Institute and with farmers in Mwasongwe about their plans for planting in 2016 confirmed that a major limitation to expanding OFSP production, sales and consumption is the limited supply of vines. Even though the orange varieties were expected to replace the white and yellow varieties by OFSP advocates, farmers regularly planted OFSP with white and yellow varieties. Moreover, the quality of vines decreased after each season the vines are stored in the ground, multiplied and re-planted to cultivate roots. This meant that vine supply was necessarily dependent on external sourcing such as Ukiriguru, yet Ukiriguru was not equipped to meet the demands of the numerous projects promoting OFSP production at the time. It became clearer that other institutions involved in breeding were also supplying vines to projects and partnering with NGOs (such as TAHEA) and research centres (such as CIP). These other institutions overcame the slow pace of conventional breeding through more advanced plant breeding facilities and equipment, to accommodate the timely

supply of vines needed for the growing demand of agriculture and nutrition projects.

I interviewed the technician at a private biotechnology company based outside of Arusha in June 2015, at the beginning of my fieldwork, and prior to learning about the supply situation in the Mwanza region. The company is headquartered on the outskirts of Arusha and along a dirt road off the main the road leading to the airport. Behind the main office is where the three six metre-long greenhouses were situated and alongside two smaller labs. I met the technician in charge of maintaining the greenhouses and he explained to me the layout of the greenhouses and system for breeding new varieties.

> Vines were becoming infected with viruses after only a few seasons. Farmers needed to have better quality vines and more of them if there was to be a high level of adoption. The average price for one vine is 300 TSH [25 cents CAD]. In eight weeks, there should be enough vines to plant half an acre, [0.2 Ha] and then, by returning another 300 back to the tunnels, there is a potential for producing 5 hectares worth of vines.

Following the discussions with Ukiriguru staff, it became apparent that this company supplied the majority of OFSP and other sweet potato vines to development projects funded by USAID, CIDA/GAC and the Bill and Melinda Gates Foundation. The company produced higher quantity of vines than Ukiriguru, in the newly built greenhouses and with breeding labs using equipment imported from the United States. Initially funded through a USAID grant, the private plant breeding company's director worked directly with NGOs, including TAHEA, to fill high volume orders for projects promoting OFSP. However, the introduction of vine supply provision through the private company illustrated a number of limiting factors in the actual large-scale success and adoption of OFSP as intended by

proponents of biofortification. Since the emphasis from 2009 onwards was on the expansion of OFSP as a potential commercial crop, the network of national agricultural research centres appeared to be in competition with private companies for partnership with large-scale agricultural development projects.

Summary of the Section

The limited institutional capacity of national organizations to accommodate the international push for biofortified crop production enabled private businesses to replace the supply of vines. Yet this supply did not go directly to farmers, but to organizations such as TAHEA that were involved in promoting the crop and facilitating farmer group engagement. Farmers with enough land holdings, land close to road access and with available labour for preparing the land for planting Ukiriguru-led initiatives benefited from their resource provision, and from the added institutional support. Other criteria, such as the assumed production led by female household members, or the emphasis on growing OFSP for the nutritional benefits to children did not factor into who were to receive the new batch of vines and access to the new projects. OFSP 's geographical expansion depended on national interest in breeding more nutritious crops. For Tanzania, efforts were largely led by non-state investments, which were unequally allocated to different national agricultural research institutions in the country.

Conclusion

Producing OFSP in Mwasongwe coincided with the production of' a certain kind of narrative around growing food embedded in neoliberal, economically driven

nutrition discourses. Former Prime Minister Cameron's 'Nutrition for Growth' speech illustrated the current narrative around nutrition as something valued only in association with examples of material gain, and widespread production. This production only utilized the role of female farmers as an effort to further the discursive power of the 'nutrition for economic growth' agenda, as relayed in the 2013 G8 meeting. Adoption of OFSP was relegated to farmers who were members of *Imala Gihabu*, with additional assets, and those who maintained certain institutional connections with TAHEA. TAHEA then served as the 'broker' for researchers and private businesses involved in the creation of OFSP. The re-telling of stories that signify the value of OFSP as a means to economic growth and alleged healing food or *viazi dawa* contributed to OFSP's charisma. OFSP success narrative centred on Mama Nane's engagement and her material gain with little emphasis on the nutritional benefits to her and her children. OFSP as a charismatic crop illuminated possibilities for sweet potato growers, for greater material wealth, and offered opportunities to experience new places and learn new techniques from other farmers and from NGOs. Even though initial framing of OFSP related to addressing malnutrition, actual OFSP programs focused on the economic potential of the crop instead. Cultivating OFSP coincided with cultivating a success narrative that focussed on the economic benefits rather than the nutritional benefits of biofortified crops. While production practices shifted from being solely led by women to include both men and women producing OFSP, preparing sweet potato for meals and benefiting from its nutrient content remained situated in normative gendered labour divisions.

The following chapter focuses on the consumption of OFSP and how nutritionism fed into the food provision systems in Mwasongwe.

Chapter 4: Consuming OFSP

Introduction

Mango Season

Mango season was in full swing in Mwasongwe in February 2016. This meant that ripe, sweet mangos were available in abundance for a few weeks. Mango trees were seen across the landscape in and around the village centre and close to the Lake. Some residents deliberately planted trees close to their homes, while other trees were found in open fields or close to the main commercial road. These might have grown naturally out of seedlings carried by birds or other animals. During my visits in February, there were obvious signs that mangos were in season. I watched children on their way home from school use a long stick to shake the branches, forcing the low hanging mangos to drop to the ground. They used their finger or the same stick to cut an opening in the skin and ate them, finishing them quickly before arriving back home. Mama Edith shared her mangos with me during our visits around that time. She handed me a sharp paring knife to cut and share slices as we chatted on her front porch. The small food stalls in the centre of the village sold mango slices for 200 tsh (20 CAD cents) each to patrons as an after-lunch dessert. The Buhongwa market sold mangos at a premium to me, at 2000tsh($2 CAD) (which could easily have been the '*mzungu*' or 'foreigner' price). In any case, most Mwasongwe inhabitants did not need to purchase them, since they were readily available in the village. Even though the season lasted only a few weeks, there were

more mangos available than could realistically be consumed in the season and before they became overripe, and inedible.

Around the same time, a new batch of locally brewed alcohol made from dried and fermented cassava became available at some of the *dukas* (shops). We came across a number of residents enjoying themselves with the new beverage. Anna and I faced one particular man coming out of one of the *dukas*, who looked at us mischievously, holding a mango in his right arm. He swayed back and forth, while motioning his arm as if he was ready to throw it at us. Behind us was a group of young men playing pool at an outdoor table. They were snickering, smiling and encouraging his threats. They found the situation entertaining, a man slightly inebriated, who was threatening me, the *mzungu* (a foreigner) and her companion with a mango. Anna looked at me with concern and told me to run. I followed her down the road and we came across an empty, partially built commercial concrete enclosure and we took cover there. As the man with the mango approached us, the shopkeeper next to us motioned the man to move away and to leave us alone. We heard laughter coming from the pool game as the man smiled and slowly backed away. Anna and I came out of the shop and walked in the opposite direction and towards the lake. Fortunately we did not get hit by mango, but Anna and I were at the very least, alarmed by the man and his fruit-turned-weapon.

During my fieldwork, mangos revealed various meanings, uses and identities of food in Mwasongwe. To borrow from Actor Network Theory (ANT), human and non-human entities are only defined in relation to other things, where each of the interconnections are defined by their relationship to all other associated parts in a

given 'actor network' (Latour, 1992; cited in Watts, 2015: 227). The re-interpretation of a new identity then is what ANT theorists call 'translation' (Watts, 2015: 227). Mangos[25] were a freely available, nutrient-rich fruit. To children on their way home from school, they were a quick, refreshing snack. For Mama Edith, it was a food to share with guests. To the inebriated gentleman holding the mango it was a weapon or a performance prop. Mangos were available to anyone, unassigned to a particular gender identity as other food crops, such as sweet potato tended to be. Mangos were also a source of vitamin A, and perhaps less known or less associated with micronutrients than OFSP was in Mwasongwe. Mangos represented the diversity of the food system in Mwasongwe containing a fluidity of labour, time and resources surrounding it. It also drew attention to questions around OFSP's legitimacy, the framing of nutrition and supposed dietary health problem it aimed to address.

Biltekoff et al. (2014: 39) identified this kind of framing, where a commonly cultivated staple food like sweet potato is transformed into a nutrient-rich crop as 'culturally appropriate nutrition.' Their analysis suggests that "nutritional interventions often work to tokenize and co-opt diversity in ways that outwardly appear to celebrate difference, while in reality perpetuating hegemonic [interpretation of] nutrition as a colonial project" (Biltekoff et al., 2013:39). Was vitamin A deficiency a widespread challenge related to poverty that required the production and mass consumption of OFSP? If mangos were available and in

[25] According to FAO, one mango provides the recommended daily Vitamin A intake for young children. See (Medina and Garcia, 2002). Similarly, CIP suggests one average sized sweet potato could also provide the same requirement.

abundance, but perhaps only seasonal, how does OFSP and its corresponding promotional discourse reframe dietary health while excluding other sources of vitamin A such as mango, or other possibilities for nourishment and dietary health?

This chapter examines the consumption of OFSP. I define consumption broadly and expand its meaning beyond simply ingesting food, to include the utilization of a resource, in this case, OFSP, and as a means to drive a particular framing of nutrition. OFSP is not just a biofortified root crop, but it is also a central feature of a network of institutional actors promoting a particular way of perceiving food, nutrition and health. More specifically, this chapter examines the underlying environmental and social aspects of food production and provision systems situated in Mwasongwe village that underpin OFSP's presence. My ethnographic fieldwork presented in this chapter highlights women's actual experiences of food preparation practices that exist in tension with OFSP promotion. I therefore argue that current framings of food systems, which are implicit or explicit within OFSP promotional materials, are too narrow in scope. These framings neglect broader socio-economic conditions embedded in food provision and production systems and the unintended and unaccountable effects on the health and everyday well-being of residents in Mwasongwe.

During our visits in Mwasongwe, Anna and I examined various forms of social, environmental and economic relationships residents shared with food beyond agricultural development and growing OFSP. In contrast, the OFSP narrative contained a narrowed, simplistic and technical view of growing and eating a nutrient-rich food that permeated its potential reach in the region. Promoters

depended on the crop's vitamin A association, and its potential for being transformed into a cash crop. Regularly consuming OFSP was integral to ensuring the success of biofortification as a technology that could alleviate micronutrient deficiencies and malnutrition. "Biofortification (through OFSP) provided a feasible means of reaching malnourished rural populations who may have limited access to diverse diets, supplements and commercially fortified foods" (Saltzman et al, 2013: 9).

Closely linked to consumption are the normative gender roles around food provision, such as female household members preparing daily meals for themselves and their families. Proponents of OFSP assumed that sweet potato producers (mostly female farmers in Mwasongwe) would inevitably prepare orange sweet potato as they would prepare white and yellow varieties, without altering their existing dependence on sweet potato. In doing so, women could integrate the more nutritious variety with little change to their daily diets. Evidence of OFSP's success around improving nutrient health often focused on consumption, where increasing consumption of OFSP lowered rates of vitamin A deficiency (CIP, 2012). Yet, this simplistic assumption that farmers would switch production from non-biofortified to biofortified varieties, hence increasing consumption of the latter, does not adequately take into account certain underlying factors. First, preferences regarding the taste and texture of OFSP vary as well as meal composition and variety in Mwasongwe, which may or may not include the regular preparation of orange varieties. Second, OFSP is marketed as a crop that could be grown all year round (CIP, 2012; Low et al., 2017; Saltzman, 2013). Mwasongwe's close proximity to the

lake offers what was assumed to be the potential for regular water access and was therefore considered a prime location for year-round production. However, increasing climatic uncertainty, along with unequal access to lakeside resources contributed to seasonal, inconsistent and changing access to food. Finally, the framing of the importance of consuming OFSP to reduce deficiency in vitamin A depended on the labour investments of female household members, since in Mwasongwe they were in charge of preparing meals for themselves and their families. Yet, this narrowed framing dismisses other aspects of food provision taking place in Mwasongwe which contribute to diversifying the meanings, uses and value of food, such as OFSP and mangos, in the everyday lives of Mwasongwe residents. The following section introduced the main theoretical lens in which this chapter is based.

Theoretical Underpinnings

A significant aspect of the OFSP success narrative was to demonstrate how farmers were also consuming orange varieties, while expanding the quantity in circulation for others to access through the local markets. Since, in Tanzania, female household members are involved in the majority of food provision activities, consuming OFSP is dependent on their involvement. Evidence supporting the claim that OFSP consumption reduces vitamin A deficiency (Hotz et al., 2012a; Low et al., 2007) furthers a nutritionism discourse in that it "judges food and diets by a single feature: nutrient content and associations with health and illness" (Dixon, 2016: 1114).

The marketing of OFSP consumption is largely founded upon broader technical, scientific nutrition discourses in agricultural development (Bezner-Kerr, 2014: 6). The technical characteristics of nutrition are prioritized through an emphasis on the crop, and the food, as OFSP, while political and social associations are muted. Feminist food studies scholars contest the examination of food systems through a gendered lens. For example, in the context of nutrition interventions, women's knowledge, cooking ability and feeding practices are often framed as a means to solving problems in health-related matters (Avakain and Haber, 2005; Kimura, 2011). Since OFSP is described as a possible solution to malnutrition, women are also responsible for guiding the success of OFSP's implementation. As a result, women who grow OFSP in Mwasongwe are seen as key actors in both the solution and the broader nutrition problem. Kimura reminds us that this aligns with the framing of gendered roles and shows that this is partially: "only because their inadequacy needs to be rectified. From governments' and experts' perspectives, women's food knowledge, cooking ability, feeding practices, and breast-feeding patterns are the means to solving the food problem, precisely because they are the origin of that problem," (Kimura, 2013: 7). Further to this, labour in food provision systems are under-examined and invisible in describing, defining and assigning roles to the food problem and solution. Rather, the presentation of women leading food systems is sufficient enough in reinforcing the nutritionism discourse. Unequal power relations between women and men within various institutional settings, and embedded in interventions involving state and non-state actors around nutrition,

remain under-acknowledged and perpetuate the assumptions around gendered roles and abilities to grow crops, harvest them and prepare them for meals.

Given Mwasongwe's proximity to the lake, examining the fish industry provides a historical perspective to the relationship between women's livelihoods, food production and businesses that is present alongside promoting biofortification. For OFSP advocates, women preparing and serving OFSP to their families is a main priority in ensuring that OFSP is widely consumed. Lewin (1943) claimed that this inherent feeding responsibility gives women power because they act as gatekeepers who control the flow of food into their households. Yet, feminists have since argued that "food work can re-inscribe women's subordination in the home as they put in long, unrecognized hours working for others" (Allen and Sachs, 2008: 3). At the same time, feminist political economy scholars remind us that these dynamics are embedded in broader narratives of economic 'progress', where commercialization and large-scale investments often override women's productive and reproductive contributions in favour of their male-counterparts and those with additional resources, such as labour and time (Mbilinyi, 2016; Rasavi, 2009). Unequal access to and ownership of assets such as land and water as well as access to extension services directly influence how women and men engage with food production and provision systems. These structural dynamics and the political economic context of food production is seen through a closer examination of the fish industry and how it impacted the residents of Mwasongwe. Studying food production and provision around OFSP production contributes to a contextual understanding of OFSP's limitations. This tension between the everyday realities of food provision and the

imagined role of women as providers of improved dietary health contributes to OFSP's charisma while overlooking the underlying structural dynamics that lead to malnutrition.

I first examine the broader features of food systems in villages along Lake Victoria and show how the changing fish industry impacted women's livelihood practices and investments. In particular, I highlight the gendered implications of introducing a new fish species into the region's food system. Secondly, a focus on women's food preparation practices, as they relate to the varying scales of food production reveals broader political, environmental and economic conditions in which OFSP promotion is embedded. Specific approaches taken in nutrition in agricultural development interventions are examined. These include cooking demonstrations and radio programs that profile women farmers in a particular way, furthering a technocratic discourse of OFSP's value that is dependent on a narrowed view of women's roles in growing and preparing food. Finally, a focus on labour investments in the provision food systems in Mwasongwe illuminates gendered relations to food that are neglected in the OFSP work.

Scaling Economies of Fish

Lakeside Fish Access

In November, 2015, at the start of the short rains, Anna (my research partner) and I walked towards the lake side of the village, passing through the commercial centre. We met Vera, an *Imala Gihabu* member who was on her way home from the centre of the village. She was carrying a plastic bag of *dagaa*, small, sardine-like fish

sourced from Lake Victoria. Anna introduced me, and we chatted briefly about my research and interest in OFSP and nutrition. I asked her about her bag of *dagaa*. She told me, "I paid 4000tsh [CAD $2.36] for this bag and it should last for at least three days. We are waiting to harvest our maize and sweet potato. So, for now, we buy *dagaa*."

Vera appeared visibly uncomfortable. Her left cheek looked partially swollen. She explained that she had a toothache and a headache so she was going to rest. We made arrangements with her to meet her later in the day, after she rested.

Vera's purchase of *dagaa* during the lean season or prior to harvest points to gradual changes in the diversity of food available in Mwasongwe village as a result of changes to the fishing industry. Over the course of my fieldwork, I had many discussions with farmers and local NGO staff on the declining access to fish from Lake Victoria. One NGO staff-member mentioned the difference between now and when he had lived in the region in the 1980s. "I remember growing up eating plenty of fish from the lake. There was a lot available, and we used to consume it regularly. Now it is very different. The larger fish are too expensive and [they are] automatically sold to traders who then take them to the markets in Buhongwa or Mwanza." Prior to the industrialization of the fishing industry in the 1970's, women played an integral role in fish processing along the lake. Small-scale businesses managed the sales of a variety of fish available in the lake until the gradual increase in commercial activities pushed many women involved into focusing on *dagaa* (Medard et al., 2012).

Is Small Beautiful?

Dagaa is the most affordable fish consumed in Mwasongwe village. It is the smallest of the edible fish found in the lake. It is generally dried on a tarpaulin or on the ground, which is considered a low-quality processing technique, and earns little in the market; but it is an affordable option for low-income households. A bag of *dagaa* could be purchased in the centre of the village and the quantity could cover meals for up to three days.

During one of our first visits to Mwasongwe in June, 2015, Anna and I visited with the fishermen and buyers based along the small opening to the lake in Mwasongwe. Rows of large, 10-15 lbs (4.5-6.8 kgs) fish lined on the ground at the edge of the shore, waiting for traders from the urban markets to arrive. The largest catch, Nile perch, was for sale at 9000tsh each ($5.33 CAD). One trader said the prices could go as high as 18 000tsh ($10.60 CAD), depending on weight of the fish. The smaller 5lb (2.3 kg) fish was valued at slightly less, at 6000tsh ($3.55 CAD) for Tilapia.[26] Unless it was for a special occasion, people in Mwasongwe did not purchase the larger species due to high costs and lack of storage. When I relayed the cost to Mama Nane and Vera they mentioned that they would spend that amount for a week's worth of food during the 'lean' months or when there is little harvested food left for household use.

The gradual introduction of Nile perch into Lake Victoria in the 1970s coincided with the transition from a small-scale fishery operations to large,

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[26] Average household monthly income in rural Mwanza region, Tanzania in 2010 is estimated at 3$USD or 5000TSH. See: Opendataforafrica.org

commercialized exports for the region (Gibbons, 1997; Medard, 1996; Jangu, 2012). Prior to the introduction of Nile perch, resources from Lake Victoria were not highly valued by outsiders, because the industry was "unsuitable for large-scale production" due to poor infrastructure (Jangu, 2012: 277). Nile perch represented a new and abundant source of protein. Small-scale processing operations, largely led by women living around the lake dominated the business (Medard, 2012). Overfishing of tilapia in Lake Victoria by small-scale fisheries and local residents brought down the fish prices in the 1970's. Around the same time, the Nile perch species population grew to levels that met export demand, and local fisherman "christened Nile perch as the 'saviour'" (Medard and Wilson, 1996:150). However, this only benefited most local fisherman in the short term, until more large-scale commercial operations set along the lake and dominated the fishing industry.

A gradual increase in the demand for fish from European markets in the 1980s and 1990s significantly boosted commercial fishing activities in and around the Mwanza region. These international commercial interests boosted the sales and development of processing plants along the lake's shores (Medard, 2012). Labour investments shifted from small scale ownership of fishing businesses to contracted small scale operations by larger companies, based in urban centres, such as Mwanza, Musoma and Bukoba. Fishermen increasingly sold to larger businesses in urban centres, as a result of competitive pricing, where larger companies kept fish prices low, while increasing the quantity of fish purchased from many fishermen. These businesses were mostly owned and operated by Tanzanians with the exception of two that were owned by Kenyan and Ugandan companies. Of the16

processing and exporting companies listed with the Ministry of Fisheries, six were based in the Mwanza region (Republic of Tanzania, 2016). Local and small-scale fishing businesses were gradually excluded from direct exports of Nile perch because of centralization tendencies in the sector (Medard and Wilson, 1996).

The introduction of Nile perch also resulted in a gradual decline in ecological diversity in the lake, as they fed on the smaller fish populations, causing unexpected new imbalances in the lake ecology. An estimated three hundred species of fish were lost since its introduction (Medard and Wilson, 1996). However, periods of overfishing, environmental changes to land use, and a growing mining industry along the lake could have also contributed to the decline in diversity (Jangu, 2012). Today, the three most popular and most commercially sourced fish species are: Nile perch, tilapia and *dagaa*.

Gender Dynamics in the Fish Industry

Several studies of how Nile perch impacted women's livelihoods recognized women's efforts to address the changes by mobilizing themselves and gaining what access they could (Gibbons, 1997; Medard and Wilson, 1996).

> Investors with large financial and material capital outpaced small-scale women traders. Fishermen who invested in larger boats, and sturdier nets ensured that those with higher capital, gained access to the few buyers. Those with less capital settled for the catch rejected by the bigger boats, which reduced the quality and thereby income from the sale. (Jangu, 2012: 277).

The implications of this were that most of the capital gains from the industry were largely male-driven as few women had access to sufficient capital to expand their operations. At one point, women worked directly with filet processing plants,

selling the discarded fish parts, such as heads and bones, to other businesses for animal feed. This industry grew rapidly in areas previously designated as sites for dumping fish waste. However, once this demand grew, businesses opened up additional processing options and took over the sales from women. In other fishing communities in the region, husband and wife teams shared the various roles in sales and fishing. In Mwanza, the situation differed in that women had carved out their own roles independent from their husbands who were fishermen. During the height of the Nile perch market in the 1980s, women remained involved in the smaller-scale, less remunerative processing of native species, while new technologies associated with the Nile perch were dominated by men (Medard, 1996: 155), a trend that has continued today. Processing operations have substantially reduced since 2012, resulting from tougher regulations on equipment and nets that allow less mature fish species to free themselves from the nets (Republic of Tanzania, 2016).

This gendered aspect of buying and selling fish had both economic and social repercussions for women. For example, Medard (1996: 288) found several reports of demands for sexual favours in exchange for fish income. The migration and mobility of fisherman and other petty traders created what is famously known as 'fish for sex' or *ngomom samkai*". Many studies point to an increase in rates of HIV/AIDS in the region resulting from this transaction (Fiorella et al., 2015). Others suggest that broader socio-economic conditions reinforce and normalize these transactions in the fish industry and in other examples of livelihood practices (Wamboyi, 2015). In 2015, I collected data from the Mwasongwe village dispensary

showing that there were 92 cases of HIV/AIDS out of 1002[27] households in the two villages, showing that HIV transmission remains an ongoing concern and a serious health challenge amongst the populations along the lakeside.

As certain roles in the fishing industry, such as processing for both Nile perch and *dagaa*, and salting were largely women-led small-scale enterprises, gradual imposition of larger operations based in the cities pushed women's smaller enterprises further into the margins of the market base. The government of Tanzania's latest report on the fisheries industry recognized this challenge emerging from women's displacement from the expansion of the processing industry (Republic of Tanzania, 2016: 2), but little effort has been made thus far to address this and other challenges related to women's engagement in the fish industry.

The gradual changes to women's engagement with Nile perch fish and fish parts processing, and eventually with *dagaa* in the rural villages along the lake remained small-scale, as larger, urban-based commercial businesses eventually took over the market. Nile perch, at one point, was accessible to lakeside residents for both home consumption and for sale when small-scale businesses were viable, but fresh *dagaa* is now the only affordable fish available to residents in Mwasongwe. The introduction and commercialization of Nile perch shows the relational dynamics between residents of villages along the lake, commercial interests and the gendered inequalities within these transformations. As Geheb et al. (2008: 96), assert, "women's status is much affected by control over resources, and this is just

[27] Sex disaggregated data was unavailable at the time.

as true for Lake Victoria's fisheries as it is for cash crops, land and agroforestry" (see also Meinzen-Dick et al., 1997, Mearns, 1997, von Bulow and Sørenson, 1993). OFSP promoter's aspiration that sweet potato will undergo a transformation from a subsistence to commercial food, and improve women's livelihoods, risks depicting women's potential economic success without fully addressing existing underlying and ongoing barriers to women gaining actual benefits from commercial production. As a result, such success narratives will continue to obscure the structural inequalities that women face in their everyday livelihood practices. Examining the influence of the fish industry in Mwasongwe offers further insight into varying class differences in access to fish (and other food options, for home consumption), as seen below, and how the changes in the industry also impacted the income generating opportunities for residents of Mwasongwe.

Wealth Signifiers

Consumption of larger fish species often signified a form of wealth. Mama Nane, one of my main farmer contacts in Mwasongwe, mentioned that she purchased Nile perch following a large-sale transaction of OFSP vines with *Imala Gihabu*. This purchase was not a regular occurance. In the group of farmers in Ukerewe, only one farmer, out of the 15 with whom I met regularly, consumed fish from the lake. This older farmer (in his 60's) mentioned his larger land holdings of 12 acres, and his large farming operations involving cotton, large-scale maize production and some sweet potato. An NGO fieldworker mentioned that when she visited Mwasongwe village to conduct activities for an OFSP project in the previous year (2014), she purchased Nile perch from the traders in the morning when she

arrived. She left it with Mama Nane to prepare and after she completed her work, she returned to Mama Nane's home to share the fish with her and her children. On the contrary, *dagaa* is generally considered by many in the region as a poor-quality fish source, because of its small, bony texture. It is known to be a main food item in prisons, educational and welfare institutions and in poorer households (Medard, 2012: 557). Wealthier households will consume *dagga* that is processed or salted. A bag of fresh dagaa such as the one purchased by Vera is the most common and widely available fish to residents of Mwasongwe. Dagaa is high in calcium and can provide some protein for meals, yet, it is under-recognized as a viable nutrient-rich source of food by nutrition advocates and scientists promoting biofortification.

The Growing Informal Fish Sector in Mwasongwe

In January, 2016, Anna and I met new residents of Mwasongwe village. Several of these new residents were not producing OFSP and had not heard of orange varieties. For example, a young couple recently moved to Mwasongwe village from Mwanza town. Jack was a piki piki (motocycle taxi) driver and his wife Sarah was a "house girl" (house cleaner/cook). Since they moved to the village, Jack sold his motorcycle, and now sells fish to traders. Regulations established in the 1980s required all traders to register and obtain annual permits. Those who can't afford the fees, work outside of the main markets and directly with fisherman willing to take the risk of working illegally or being fined. Jack could not afford the permits and licenses fees and took his chances when selling fish informally to traders in the Mwanza market. The couple depended on the fish he sells to buyers for their daily income. The day we visited, Jack had only been able to source one fish from the

fishermen that morning. He kept it for him and his wife to consume. He said it wasn't worth taking the fish to the market with all the transportation costs. Jack's wife mentioned that he often calls his contacts in the markets in Mwanza town before he travels to make sure that the permit officers were visiting the area. That day, his contacts said to not come, because they had heard that the officers were due for a visit.

Jack's situation revealed the nature of the current fishing business, where requirements for fees and processes for licensing and permits limited Jack to informal strategies. These requirements were an obstacle to working in the formal fishing business, and 'informal side businesses' are the only remaining option. Businesses from Mwanza with higher economic capital used the permits and licenses to gain access to the Lake, while those living along its shores faced higher risk in fines for fishing illegally. Another farmer whom I met regularly, Jacob, talked about why he and his fishermen group members shifted their focus from fish to OFSP. Jacob lives in nearby Bukumbi village. He also took part in the OFSP campaign in 2004. He explained how he became involved in the campaign, after the fish stocks declined and his fisherman group decreased their overall income.

> Our group met regularly and we used to earn a good living. But now, there are no fish and there are bigger companies who are in charge of fishing in the lake. We had to find something else to do. So we decided to invest in OFSP, since we heard about other farmers earning income from it.

Jacob has seven children and lives in a modest mud brick house close to the centre of Bukumbi. The day we visited, I borrowed a vehicle from a friend and we drove to the plot he rented along the shore of Lake Victoria. Two acres of sweet

potatoes of varying varieties were neatly labeled by row, and appeared carefully managed, with few visible weeds. He mentioned that he had a buyer for his large production, but that the quantity to be purchased wasn't always certain, so he was looking for buyers. Over the years, Jacob transferred his efforts from fishing to agriculture and eventually he increased his investment in OFSP when he had heard there was a market for it. His interest in OFSP stemmed more from its commercial interests than from its perceived nutritional importance.

Prior to the 1970s, fish was the mainstay of daily diets of residents in lakeside villages. One farmer in Ukerewe commented on the dependence on fish, during uncertain weather patterns, "if there was drought, there was fish." Anna (my research assistant) reflected on her previous work in the region and how the dependence on fish shaped perceptions of other food items. She explained that fish became the main and often only source of food. She explained that, "vegetables are seen to be only good for animals, not for people. Fish was considered 'real' food." The expansion of large-scale fish sales in Lake Victoria contributed to the shift in fish consumption from larger fish species to mostly *dagaa* among residents of lakeside villages.

The diets of residents of villages along the lake such as Mwasongwe, which had previously been dependent on fish sources, gradually shifted to agriculture-based food, out of necessity. Even though local fishermen initially applauded the introduction of the new species, over time, the commercialization excluded them from benefiting economically as well as nutritionally. *Dagaa* became the only type of fish regularly consumed by lakeside residents, while the larger fish species were

directly sold to traders and companies based in the urban centres. The widespread assumption is that commercialization of the fisheries and domination of Nile perch contributed to increased accounts of malnutrition, due to the reduction in access to fish. However, Gehab et al. (2008) argue that the marginalization of women's livelihoods contributed to the high malnutrition rate, more than the declining fish consumption in the villages surrounding the lake. In any case, women in households that previously engaged in fishing and switched to farming, bore the brunt of this livelihood shift. Delays in establishing farm plots and gaining inputs for planting, however, caused disruptions in food access and secured rations of daily household meals (Gehab et al., 2008).

Summary of this Section

By examining the fish industry in Mwanza, several insights can be drawn. First, the expansion of large-scale businesses resulted in the gradual marginalization of women's engagement, where they previously participated and benefited from small-scale businesses in terms of the fish trade. Most women who continued in the fish business maintained their associations with *dagaa*, but not Nile perch. Although the fish industry expanded, only those with access to larger amounts of capital, predominantly men from nearby towns, benefited from this growth.

Second, malnutrition rates remained high in the area. Some suggest that this was due to women's lack of control over income in the household, and reduced income allocation to food items for the family (Gehab et al, 2008; Leavens and Anderson, 2011). However, this assumed that women invest more in food with health benefits than men in the household. Yet, in Mwasongwe, *Imala Gihabu*

members pursued various economic opportunities while also managing the health and dietary needs of themselves and their families. Priorities or trade-offs between outside income needs and household care are dynamic, and are negotiated based on women's own household needs and opportunities. For example, introduction to new species or crops, and the gradual commercialization of food production, limited women's expansion into large scale operations due to their inability to secure the financial, human assets necessary to meet both supply and demand. Overall, the introduction of Nile perch into the food system resulted in long-term unintended consequences on women's everyday livelihood practices, which excluded them from certain economic opportunities, while opening up others. This account of the changing fish industry in Mwasongwe points to the unintended impact of introducing a new species into the food chain on women's livelihoods, in terms of: food production and provision; the way that various actors (in this case commercial actors) transform the market, and subsequently labour practices; and the ways that residents of Mwasongwe managed their daily dietary needs through various seasonal, environmental and economic transformations in their food systems. In this next section, a focus on food production and provision patterns will situate OFSP promotion in the existing and everyday realities of the residents in Mwasongwe.

Seasonal Food Production and Provision Patterns

Food Production Patterns in Mwasongwe

One of the advantages of conducting fieldwork over a 9-month period was the opportunity to observe changes in livelihood practices in relation to food

production and provision at various times of the planting season. The variability and seasonal rhythm in agricultural activities in the Mwanza region determined food availability and accessibility for their daily diets for households in Mwasongwe village. Farmers I worked with in Mwasongwe and in Ukerewe cultivated various combinations of the crops for both consumption and sale. These cropping schedules coincided with the variation in rainfall at different times of the year. In the Mwanza region, a long rainy season usually occurred between March and May, with a shorter season of rain between October and November. Between the two seasons, November to March, *Imala Gihabu* members and other farmers, remain actively attending to their fields preparing their land, or harvesting from their last planting. But after the final harvest in June, residents in Mwasongwe took a break from their farming and focused on other activities, such as visiting relatives, or performing in travelling choirs. Throughout dry and rainy seasons, Mama Nane grew a variety of crops. She grew maize, cassava, green gram, pigeon pea, and sweet potato, mostly for home consumption. She also grew okra and other vegetables for sale in the Buhongwa market.

Its close proximity to Lake Victoria and opportunities for irrigation characterized the Mwanza region as having the potential for two sweet potato harvests a year and availability of the root for home use all year round. For OFSP, this meant farmers could harvest twice a year due to the crop's four-month maturity rate. The period prior to harvest, and at the end of the longer dry season were considered 'lean times', or when household-level food stocks were low and the risk of acute

malnutrition is high. During the 2015 and 2016 season, these times fell in October, at the end of the long dry season, and again in March, just before the long rains.

From the beginning of 2015 through to the middle of the 2016 season, Mwasongwe village experienced a drier season than expected, with rains arriving late in April and for only a short time. This had direct implications on the sweet potato production of *Imala Gihabu* members. Farmers complained that the yields were considerably lower than the previous harvest. In July, 2015, Mama Edith, one of the residents of Mwasongwe with whom I regularly met, attributed the poor harvest to the growing uncertainty in weather patterns she experienced that season, and how overall, it contributed to the uncertainty of her harvests and profits. As she stated:

> Some years we are successful and we earn income from selling vines and roots. Other years, there is drought, like last harvest. The rains didn't come in time. Even though we planted more, we lost a lot of roots because of the lack of rain, and then we could not sell very much. The weather is changing quickly these days. There is more drought and more floods, and there is more risk of losing our harvest.

Dependence on rain-fed agriculture contributed to the challenge with adjusting to increasingly uncertain climatic conditions for the majority of farmers in Tanzania. In the Mwanza region, the proximity to the lake could offer some advantages for water access. However, these advantages seemed only partially available, to those with access to land close to the lake and to those with the means to set up a system for irrigation from the lake. Even though *Ujamaa* policies attempted to equalize land access between men and women (Lal, 2010; Mbilinyi, 2016), male farmers were able to secure and utilize more land close to the lake,

while female farmers used smaller plots and at a lower output capacity overall (Mbilinyi, 2016). Of the 16 *Imala Gihabu* members, the two male members and 12 female members used either a rented, or inherited plot close to the lake. Many of them used their plots to grow and harvest sweet potato vines for sale and for multiplying the vines to increase root production.

Some OFSP and nutrition advocates characterize OFSP as a food security crop (or a crop households are dependent on throughout the year) and with potential market value (Bouis et al., 2013; Waized et al., 2015). Yet, roots are only available for sale or for consumption for a few weeks after harvest before they begin to rot. Different varieties of OFSP contain different levels of moisture. Higher moisture content often corresponds with the higher levels of beta carotene (the pre-cursor to vitamin A) and also higher susceptibility to rotting and root viruses. OFSP varieties have higher moisture than the yellow and white varieties, making them more susceptible to pests and disease when stored fresh. *Ijumla* or *carrot D* vines produced small-sized roots that are bright orange in colour and with higher moisture content. The drier varieties, such as *kabode*, are paler in colour, but last slightly longer after harvest, and are favoured by farmers in Mwasongwe.

The growing uncertainties in weather patterns directly influenced the kinds of risks and investments farmers made on certain crops. OFSP characteristically offered little flexibility in terms of post-harvest options in Mwasongwe. In other regions in Tanzania, proponents of OFSP encouraged basic drying techniques in order to prolong the shelf life of the roots. However, in Mwanza these drying techniques are not widely practiced. This is partially due to the specific approaches

taken by NGOs that introduced the crop and the particular focus used to encourage production. For TAHEA, an emphasis on sale of the roots and cooking demonstrations, and its overall health benefits encouraged *Imala Gihabu* members to increase production (for both sale and consumption), while also diversifying cooking techniques to accommodate the different texture and tastes in the orange varieties.

If it is only consumed fresh, the nutritional impact is seasonal at best. Farmers' investment in OFSP varied from year to year, depending on vine availability, engagement of Ukiriguru and TAHEA and other NGOs, and other choices in crop investments planned. Even though OFSP aimed to address nutrition challenges and attempted to maintain an identity as a food security crop, underlying environmental and climatic conditions limited any kind of long-term, consistent impact.

Food Choices and Meal Preparation

During my fieldwork, mealtime quickly became an ongoing, and regularly shared activity with Anna and residents in Mwasongwe. It also became an entry-point into examining daily dietary practices, and how OFSP affected food habits. Based on discussions with residents in Mwasongwe, which included business owners and peasant farmer households, the number of meals a family prepared was often indicative of the kinds of economic and social capital available within a certain household and at any given time of year. For many of the residents I spoke with the main (or only) meal was taken between 1 and 3 pm, while a second meal was either in the evening or the morning. A third meal often meant a small snack, taken with tea in the morning, such as sweet potato

or a slice of bread or chapatti, if available (Ohna et al., 2012). The question around the number of meals consumed in the day, asked to the same farmers but at different times in the year, resulted in some variation during harvest, and when the abundance of food is at a peak. During harvest time, sweet potato was always taken in the morning with tea. At the end of the long dry season, some households dropped down to one meal per day. Few of the Mwasongwe residents consumed three meals a day at certain times of the year and even fewer households consistently consumed two. The composition of meals also varied, depending on the time of the year, and sources of income from various activities. Most households consumed a daily portion of *ugali,* often with a protein source and leafy green vegetable, at least once a day.

Part of the household-level meal planning in Mwasongwe is based on historical and cultural meanings of food available in the region. As with fish, food crops also implied certain class and social identities. As mentioned in Chapter 2, sweet potato was used as a crop that offset poor maize harvests caused by drought or pests during pre-independent colonial Tanganyika. This assertion that sweet potatoes were more drought resistant and accommodated instances of food shortages in the region contributed to its identity as a crop for rural and resource-poor households. During *Ujamaa* and post-independence in the Mwanza region, women took on more of the household labour burden, while men in the household migrated out to plantations or larger farming operations. Women depended on sweet potato to accommodate shortfalls in production of other crops. Lovett added that women based in the drier areas (south of Mwanza and further away from the lake) switched their production from finger millet to cassava since cassava required less labour

during harvest (Lovett, 1996: 64). Sweet potato's identity as a women's crop is shown to partially originate from the historical context of labour migration and its association as a 'go to' replacement food in times of shortages in the rural areas.

Colours, consistency and texture of food played a significant role in people's dietary choices and preferences in Mwasongwe. Karen Coen-Flinn's study (2005) demonstrated a tendency to prefer a clean, whiter colour in staple foods such as cereals and starches over other available beige or brown coloured options. Her study showed that most urban consumers preferred white *ugali* (thick porridge made from maize meal) over a beige-brown coloured *mtama* or porridge, which is made out of millet and sorghum. For *ugali,* there are two ways of processing maize. Kernels are soaked in water, dried, and processed into flour to produce *dona*, one type of ugali; for *sembe*, the flour is processed like *dona*, and then processed a second time to remove any impurities, leaving a much whiter consistency. The popular preference is for *sembe* over *dona*, mostly for the preferred cleaner, whiter colour, even though sembe loses more nutritional value through its extra processing. This could also be associated with a 'cleaner' food, in that one that is further processed posed low risk of contamination from pests, or poor storage facilities (Coen-Flinn, 2011; Ohna, 2013). Many sweet potato producers and consumers still preferred the white and yellow varieties of sweet potato over the orange ones because of the white, pale yellow colour, dryer texture, larger roots and reduced susceptibility to pests and diseases. While initial studies showed that the orange coloured roots were of no significance to the preferences (CIP, 2012), the use

of the orange colour in marketing OFSP is associated to the new varieties and heightened nutrient content.

Other foods, including fruits and vegetables seemed to play a secondary role to the centrality of the starchy white *ugali* in meal composition. Vegetables were often eaten in the form of a sauce, condiment or a small side dish. Leafy greens are sometimes served with *ugali* but not regularly (Meeterns et al., 1995). Tomatoes, carrots and onions are mixed to form a sauce used for fish or meat, but they are rarely served on their own. Certain vegetables are used in small quantities and as non-essential, but flavour-enhancing additions, rather than an integral part of a meal. Ohna et al., (2013) reveal in their study that without *ugali* on the table, or an alternative main starch, a meal was not considered a meal. Fruits such as mango are readily available, but not considered part of a meal. Children are often discouraged from over consuming mangoes as there is a common fear that they lead to higher instances of diarrhoea.

In November 2015, just after the national elections, Anna and I visited Mama Nane as she was preparing her fields for the next season. She explained how she planned her meals at the time, for herself, her children, and grandchildren:

> In the morning, I go to collect water. I prepare a small cup of tea when I return. Then, I go to the fields for planting or harvesting or weeding. When I return, I wash clothes and then prepare lunch. I make *ugali* and *sukumawiki* or *dagaa*. Then we all eat together. In the afternoon, I continue to the market or do other chores, or go to my church choir group. In the evening, we have a small snack from the food left at lunch time.

Mama Nane and her family typically took their main meal in the middle of the day. It consisted of two food items, with one usually *ugali*. The other item varied,

depending on what was available; *dagaa*, or duck, or just fried leafy green vegetables.

Activities promoting OFSP in Mwasongwe included a component on how to prepare the orange varieties. Since the consistency, colour and taste differed to that of the white and yellow varieties, TAHEA introduced new ways of cooking and preparing the root for meals. Mama Nane attended a training through various OFSP projects and heard similar messages, that vegetables were important for a balanced diet. Mama Nane's options for preparing and planning were such that she rationed the food that was available at certain times of the year. Even though the short rains just started in November, there were still limited supplies from her fields and, since there were fewer OFSP projects, there was a limited cash flow from sales or other NGO activities. She responded to Anna's comment with, "That's all we can do with what we have." Despite Mama Nane's awareness of the health benefits to vegetables, she wasn't able to integrate them into every meal, due to other limitations in her resources, time and other competing obligations. Allen and Sachs (2008) point to the competing reproductive and productive labour obligations that impede on resulting resources available for daily dietary practices and highlights that "foodwork is not merely physical but involved mental and caring labor-in planning meals, worrying about nutrition and preparing and serving meals (DeVault, 1991; from Allen and Sach, 2008: 9).

Anna and I shared many meals with the residents in Mwasongwe. It was during these meals that we were able to observe the underlying factors surrounding the types of foods that ended up on the plates and why, and the seasonal variability

in the configurations of meals. In June 2015 harvest time, Mama Nane served us a plate of sweet potatoes, a mix of orange, white and yellow varieties. Her grandchildren also fed on a plate of sweet potatoes with us. She fried sweet potato leaves with onions and served them on the side. We drank rosella (hibiscus) tea, made from dried rosella leaves and boiled water. A few months later, the meals differed. In October, and at the end of the dry season (a lean time, with high rates of food scarcity), Mama Nane served us boiled noodles, without vegetables or a source of protein. During that same month, Anna noticed the youngest grandchild of Mama Nane with swollen hands and feet, a sign of *kwashiorkor* or acute protein malnutrition. In February 2016, food shortages were also prevalent after the short rains, and we shared a plate of duck meat she prepared, with a small portion of *ugali*. According to Anna, this particular duck is widely considered a low-quality meat, because it is rarely kept in clean surroundings. In spite of Mama Nane's affiliation with OFSP work, she and her children remained vulnerable to food shortages and periods of malnutrition at different times of the year. OFSP for Mama Nane was only one option of many in terms of what to feed herself and her family. If it was available, she provided boiled roots to her children and grandchildren in the morning. When it was not available, *ugali,* made from either processed or purchased *sembe* flour was the more reliable option for her. This points to the disconnect between OFSP's introduction and framing of preferences of food and interpretation of nutrition associated with vitamin A and how everyday dietary practices reveal other aspects related to actual availability of food, the seasonal variability and personal preferences.

Summary of this Section

Observing dietary practices over the course of a full planting season revealed a number of critical factors affecting household food consumption patterns in a region targeted by OFSP promotion. The number and composition of daily meals consumed is largely dependent on seasonal weather variability and the availability of both economic and social capital. Nutrition, or the nutrient content of food, was not a factor. Food was not chosen to serve in meals according to its micronutrient content, but rather, based on the time of the year, what was harvested, what is stored, and who needs to be fed. Biltekoff et al. (2014: 25) view "nutrition as dietary bio-politics and enacted through institutional disciplinary practices". The use of quantification discourse furthers efforts to get individuals to 'eat right', and often draws on the ostensible 'simplicity' discourse" (ibid: 24). Based on Mama Nane's experiences and other residents in Mwasongwe, the changes in access to certain food (fish stocks in Lake Victoria) and the seasonal variability due to cropping seasons and increasing uncertainty in rainfall are more pressing factors in decisions around the number of meals, and composition of meals. Further to this, the use of metrics in the emphasis on vitamins and nutrients in nutritionism discourse renders the making problem of hunger technical (Li, 2007), thereby removing from sight the macro-structural causes of hunger and poverty (Ibid: 25). Emphasis on vitamin or micronutrient content of food by NGOs and agricultural scientists was only associated with the activities to introduce *viazi lishe*. At the same time, the composition of food in meals throughout the year varied, both in nutritional value and in quantity. Even though OFSP's value as described by researchers and NGOs

supporting the production and consumption of the crop emphasized its nutritional qualities and its contribution to alleviating micronutrient deficiencies, actual everyday food provision choices are based more on the availability and access to food and the resources available to reach them. OFSP's identity as an everyday, all year-round option for enhanced nutrition through discussions with farmers, is re-inscribed as a seasonal food source, and one that is dependent on favorable climatic conditions.

Seasonal variability produces a certain level of long-term uncertainty throughout the year and from year to year. This directly influences the ways in which women farmers plan what to grow, what to eat, and what to sell. Women farmers who grow OFSP integrate the roots and leaves into their diets, when it is available, but they depend on year round crops such as maize and cassava, due to their ability to be dried processed and stored for longer periods of time are the year-round crops that they depend on. Maize and cassava remain priority crops and crops that can feed their families, while also providing other 'added value' items, including alcohol[28] or post-harvest storage options. These kinds of seasonal variations in food directly implicates the domestic labour investments into food production and provision in Mwasongwe. Preparation of food for meals, is almost exclusively performed by the females in the household, including mothers, female youth and children in the household.

[28] Alcohol produced from fermented cassava contributes to household incomes and practices in Mwasongwe village. Another farmer who was known for her success with OFSP had also earned more income selling illegal alcohol from the back of her house.

OFSP was widely promoted in Mwasongwe village, but it was only eaten just after harvest during the 2015-2016 season. In spite of her ongoing exposure to OFSP and several consecutive NGO-run projects promoting nutrition and vitamin A benefits, Mama Nane remained vulnerable to food shortages and her children still faced periods of malnutrition. OFSP remains seasonally available and hence the nutritional benefits remain seasonal. Analyzing everyday food provision and production in Mwasongwe revealed the dependence on the labour and time of women in the household to manage these everyday food provision responsibilities. Examining times when women are unable to attend to the everyday food needs show how this kind of dependence leads to unintended consequences of emphasizing OFSP as a charismatic crop that contributes to overall better health. Meeting Vera that day in November 2015, discussing her food purchases and her challenges with attending to her toothache demonstrated the tension between health provision and food provision and the limitations to emphasizing nutrient rich diets as a means to managing overall health. In the next section, I show how the health conditions of Vera and her husband directly impacted the availability of labour to manage meal preparation and the farming activities for the household.

Unanticipated Disruptions in Food Production

Health-related challenges, and difficulties in receiving timely care and treatment often reduced the ability of women to consistently cultivate crops. In November 2015, when many farmers were preparing their land for their next cultivation and after the short rains, Mama Nane fell ill with an infection that left her unable to walk for two weeks. When she recovered, she enlisted the help of her

female farmer friend and fellow group member, Henrietta, to prepare one of two smaller plots to plant sweet potato, including some OFSP. She was only able to prepare the small plot situated close to the lake that she inherited from her family, which reduced her overall production for that season and limited potential sales from her harvest. Her other upland plot, closer to her house, remained fallow that season because she was too ill to prepare the beds for planting at the time. On another occasion, during the rainy reason, we met Henrietta with a large cloth bandage over her foot. She had cut her toe in the rice fields. Without any means to protect her wound from bacterial infection, and with pressing needs to plan her future food supplies, she continued to prepare her rice fields for planting and the cut soon became infected. She relied on her neighbours, including Mama Nane, to ensure that some of her planting was completed in time. Most farmers I met in the village, including Mama Nane, did not have the means to hire labour, but instead relied on family or informal labour-sharing agreements with friends and neighbours when certain physical health conditions unexpectedly prevented them from planting or preparing their land in time for the rains.

During our visit with Vera, Anna and I talked about how best to help her with her sore tooth. We asked her why she hasn't gone to the dentist. She said, "I don't have the funds. I am waiting to sell my vines." Her husband's injury (to his foot,) reduced the amount of household labour available to support farming activities, and the potential income for household expenses including her own unexpected health matter. The closest dental clinic was in Buhongwa, which would cost 12000 tsh ($6 CAD) for a ride on a motorcycle. The cost for the dental service was in addition to

the transportation costs. She would need to sell at least 3 bundles of vines (each with 300 vines) at 5000 tsh ($2.50 CAD) each to just pay for the ride. We offered to pay for her transportation to Buhongwa, where the nearest dental office is located, but she declined our offer. Vera realized that she needed to reduce her infection and swelling before the dentist could pull out the infected tooth or treat the problem. The health dispensary located 100 metres from the main commercial road in Mwasongwe, did not carry antibiotics needed to treat her tooth. A newly opened pharmacy in the centre of the village sold generic antibiotics over the counter. Anna and I purchased a package that would last Vera a week and, according to the young pharmacy attendant, last long enough for her infection to clear.

These and other ongoing health challenges faced by residents in Mwasongwe point to the larger structural inadequacies of health services Through the nutritionism discourse the OFSP narrative aims to resolve these inadequacies by guiding individuals, and in particular, women to develop healthier diets for themselves and Tanzanian citizens in order to lessen the need for such health services. OFSP is marketed as a viable solution to vitamin A deficiency, and, hence, it is directly associated with improved health. Thus the OFSP narrative reinforces food as a solution to illness prevention, rather than as socially relevant, and delineates broader health challenges perpetuated by political and economic factors. The health dispensary, as mentioned in chapter 2, services both Mwasongwe and nearby Myorwa, but with limited capacity. Residents in Mwasongwe, as in the case for Mama Nane, Henrietta and Vera approached health services as a 'last resort' option. The fees for health services discouraged them from using them, and instead, these

women attempted to manage their health on their own. As seen in chapter 3, some residents utilized traditional healers, which, according to Anna were less costly than health dispensary services, but provided inconsistent results (Jangu, 2012). For Vera, sweet potato vines were not the source of nutrient rich food for her family, but rather a source of household income through which expenses such as her health needs are met. In this next section, I show how the focus on OFSP's nutritional value is disconnected from the actual realities of food production and provisions in Mwasongwe village and reveal the tension between the discursive power of nutritionism embedded in OFSP promotion and the material realities of daily dietary practices. Rossi (2006: 17) shows that these kinds of development translations, in this case, a nutritious root crop re-defined as a means for cash income, is an example of how potential 'beneficiaries' 'consume' and transform externally introduced 'solution' towards their own ends.

Consuming Nutritionism

Biofortification, Vitamin A, and Orange Sweet Potatoes

A key message embedded in OFSP promotion was the need to integrate OFSP into the existing diets of sweet potato producers, in addition to the population at large. Promotional activities for OFSP evolved out of the broader discourses around vitamin A deficiency and the transition in nutrition discourses from protein and caloric intake to 'hidden hunger' (Brooks, 2012). As mentioned in Chapter 2, the concept of 'hidden hunger' emerged partly because of new scientific evidence that deficiencies of micronutrients, including vitamin A, iodine, zinc, iron and others, could be responsible for stunting and other biological developmental problems

(Haddad, 2013; Kimura, 2013; Brooks and Johnson-Beebout, 2012). The priority shift unintentionally impacted how female farmers were expected to invest in their farm production as a means to improve nutritional health for themselves and their families. This emphasis on micronutrient deficiency disregards underlying socio-economic drivers of malnutrition.

Before OFSP, vitamins or micronutrient deficiencies did not appear in agricultural development agendas in Tanzania. Nutrition was seen as a health issue, which complemented larger investments in public health (Roth-Allen, 2002). Partnerships between state-run health facilities (such as the health dispensary in Mwasongwe) and international organizations, and in particular, Helen Keller International, focused on vitamin supplementation since early 1980's. Maternal and newborn health programs in the 1990's focused on improving institutional support for pregnancies and pre and post-natal care (Allen, 2004). Supplementation campaigns conveniently complemented these kinds of initiatives, without having to consider other aspects of dietary practices that might have contributed to certain deficiencies in nutrients or further complications around mother and newborn health. Around the same time, crop breeders (mostly of American and European origin) conducting research through the Consultative Group for International Agricultural Research (CGIAR) first made the connection between nutrition and agriculture. As mentioned earlier, the development of both vitamin-A 'golden rice' and quality protein maize (QPM) paved the way for further investments in biofortification research and development, despite serious delays in dissemination of the materials and controversial and often inconsistent findings of nutritional

benefits from initial feeding trials (Brooks, 2012). Thus, the technology, biofortification, and the process of creating nutrient-rich staple crops (such as biofortified sweet potato) fit the technological criteria of dominant African Green Revolution agendas (Bezner-Kerr, 2014; Mosely et al., 2014). This kind of framing of nutrition seeped into the promotional activities around OFSP that took place in Tanzania and in the Mwanza region, such as radio programs and cooking demonstrations. OFSP campaigns narrowly defined nutrient health as a focus on vitamin A deficiency while unintentionally neglected other health-related issues.

Through these activities, nutritionism discourse appeared to be in tension with the material realities of managing dietary health and practices. Aspects of this tension included the uses in the nutritionism discourse of normative reproductive roles, and the ways in which women were expected to lead efforts to better the diets and health of themselves and their families. Below, I provide two examples of these activities, a radio program and a cooking demonstration, that show how through these activities, nutritionism discourse is put in tension with the material realities of managing dietary health.

Kilimo Chetu – Voice of nutritionism

Radio Maria is a national radio station in Tanzania funded through the Catholic Diocese. Headquartered in Dar es Salaam. Radio towers established in different regions allow the radio station to cover up to 80% of the national land area. In Mwanza, it is a popular station among Christian, particularly Catholic audiences. Radio Maria began working with Farm Radio International (FRI) in 2007 and continued to partner with the organization on various projects. The Bill and

Melinda Gates foundation, which worked with radio stations across sub-Saharan Africa to promote OFSP production and consumption, funded FRI to design a radio program on OFSP.

The radio program *Kilimo Chetu* (Our Farmer) is a weekly 30-minute program. As part of the 16-episode series, the radio program broadcasted three episodes on cooking OFSP and interviewed Mama Edith, an OFSP farmer often profiled by radio presenters as the expert 'chef'. Mama Edith talked about the best way to cook OFSP, and invited the audience to take a survey using an interactive mobile phone service:

> I welcome you to listen to the question of today and the question of today is as follows, is it possible to boil orange sweet potatoes with jackets? If the answer is YES beep number 0686010388 and if your answer is NO beep number 0686010389, I repeat the question is it possible to boil orange sweet potatoes with jackets? If the answer is YES beep number 0686010388 and if your answer is NO beep number 0686010389.

The poll designed for this program aimed to 'test' listener's awareness of cooking OFSP. When listeners call in to one of the numbers (for free) the caller numbers are automatically recorded and used to track program listenership. It focused on the technical considerations in cooking and how best to cook the root. The program continued with Mama Edith describing how best to cook sweet potatoes.

> Here, we are boiling potatoes, without removing the jackets because beneath the jacket there is vitamins A, B and C. If you remove the jackets, those vitamins disappear. The breakdown of vitamins in the body does well if there is mixture of fat, you either eat with vegetables cooked with oil or vegetable cooked with groundnuts or pour milk on it because all of them have some fat, or you can boil potatoes and when it is nearly ready pour a little oil on it. Therefore today we are boiling orange sweet potatoes and in order to break up the vitamins in a good way we will eat with vegetables cooked with oil in order to add nutrients.

The suggestion of oil use to prepare OFSP further distinguishes the newer variety of sweet potato from the older ones. White and yellow sweet potato are simply boiled and served with tea. The International Potato Centre (CIP) research determined that beta carotene in sweet potatoes are more 'efficiently' absorbed in the presence of a fat substance, such as oil. Fried OFSP can absorb more beta carotene or that is more 'bio accessible' than boiled or baked OFSP (Low et al., 2015: 566). Costs of oil, locally processed in Mwasongwe, can range between 100 and 300 tsh for a small 500 ml bottle. 'Cleaner' or better processed oils can cost up to 2000tsh or 1.50 CAD. A small sachet of groundnut paste, an alternative source of fat, is 200tsh ($0.30 CAD) at the Buhongwa market. Milk costs 400 tsh ($0.60 CAD) for a small bag and must be consumed immediately. Prices and procurement for additional sources of fat could be absorbed through existing household budget. However, using these additional ingredients also may deter others from adopting these kinds of cooking practices as it adds to the investment needed for including OFSP in the meal. Regular sweet potato does not demand the same kind of cooking preparation in Mwasongwe.

In this context, OFSP is presented as the 'healthier' and 'improved' variety of sweet potato, but one that requires more investments and resources to adopt. OFSP requires particular preparation methods and the purchase of other food items. In order to benefit from the nutrient content of OFSP, female food preparers in the household, and often times, mothers must invest both more time and income than is needed for yellow and while varieties, which is difficult for the most vulnerable households, that is, those at a greatest risk of malnutrition.

Promotion of OFSP integration into daily diets highlighted vitamin A as the 'added value' offered by orange varieties. In a radio clip, broadcasted in June, 2014 on Radio Maria's program *Kilemo Chetu* (our farmer), Mama Edith described the connection she made with the orange varieties and vitamin A during a live cooking show at the primary school in Mwasongwe village.

> Therefore, if you see carrot (orange in Kiswahili) color it is the sign of nutrients that is vitamin A, and we have come here together to learn about cooking orange sweet potatoes that are full of nutrients…Are we together? [do you understand?]

Even though many farmers and consumers still preferred non-biofortified sweet potato the emphasis on the orange colour creates the distinction between the white varieties, with little nutritional value, and the orange varieties with vitamin A and its remedy from nutrient deficiency. Even though carrots are sparingly consumed in a sauce or used for flavouring in the Mwanza region (Coen-Flynn, 2002), the emphasis on the orange colour marks the nutrient association (Waized et al., 2015: 16). This description reinforces the branding seen in flyers, cars, billboards, and posters for OFSP as a 'healthy crop'.

Mama Edith had gained a reputation for her culinary skills using OFSP. On this radio program, her role was to encourage listeners to seek out planting material (or seeds), and to grow it, as a means to stave off micronutrient deficiency. It highlighted the marketing of OFSP and the complementary information on nutrition and vitamin A. The radio program exemplified the way promotional activities profiled the characteristics of OFSP while utilizing the role of mothers, such as Mama Edith, in marketing the crop, and furthering the charismatic qualities of the

crop. This translation of nutrition shows the emphasis on the scientific characteristics of nutrition as indicators of good health.

In this second example, the emphasis on improving cooking techniques in promoting OFSP shows the dependence on mothers and caregivers on providing food-based sources of nutrients, such as sweet potato and that the inadequacies around cooking are imagined in order to justify the focus of the intervention.

Demonstrating Roles in Food Preparation

Research institutions and NGOs collaborated on projects that included cooking demonstrations as part of their awareness-raising activities for nutritional health. These activities were based on normative domestic labour roles where female household members are responsible for the quality of meals prepared, as defined in terms of nutrient content. For OFSP, its sweeter taste and higher moisture content required new ways of cooking. One such program called Enhance Homestead Food Production (EHFP), hosted by Helen Keller International (HKI) used this strategy. The goal of the project was to improve nutrient-intake of households at risk of malnutrition and in doing so, improve women's livelihood opportunities and practices. Building and maintaining vegetable gardens and hosting public awareness events for nutrition in general were amongst the main activities the project undertook in the Mwanza region. HKI hosted cooking demonstrations in the region to show how to prepare nutrient-rich dishes, using vegetables grown in home gardens. Ukerewe was one of the districts. I accompanied HKI regional staff to the demonstration in Namilembe village, in Ukerewe in October, 2015.

The HKI project promoted the production of vegetables, such as leafy greens, carrots, orange, white and yellow varieties of sweet potato, and beans in home gardens as a way to ensure that nutrient-rich foods are included in daily food preparation and as a potential income source for women. In October, 2015, project staff travelled from the main office in Mwanza to attend the event. The staff

nutritionist led the organization of the event and explained to me how they coordinated with the farmers in the village.

> We invited the women from the village to attend. Since it is the end of the dry season, we decided to purchase the produce at the market for the event. Women bring their own utensils, pots and oil.

HKI provided the food and organized the demonstration in the village and distributed information on the event. Participants were expected to provide other materials for the event. This kind of division of material ownership reflected broader notions of responsibility placed on mothers and individuals as part of a neoliberal approach to individual responsibility for managing health and 'eating healthily'. Biltekoff et al., (2014: 17) suggest this kind of performance shows "nutrition cloaked in moral reform". Mothers could display their commitment to cooking nutrient-rich meals, by investing their own resources for public use. In removing the materials away from the household and into public space in the centre of the village, the 'tools' (such as oil, utensils, salt) are associated with the individual, rather than the household, strengthening the role females are obligated to take on towards securing dietary health for their fellow citizens. International organizations and their foreign and national staff influence this kind of framing, and broker the nutrition discourse through this kind of normative motherhood lens.

The event took place in the centre of Namilembe village in Ukerewe, under a large baobab tree adjacent to the district office. HKI staff set up a few chairs for guests attending from outside the village. Attendees from nearby villages rested on the ground under the shade of the tree, while some rested on an old log used as a bench for village meetings. After a few minutes, women started to arrive with their

equipment: long wooden stirring spoons, large aluminum pots for *ugali*, and a 1 litre yellow container of sunflower oil. Their young children tagged along, carrying fuelwood for the cooking fire. Maria, the nutritionist from HKI, guided the demonstration, and helped to set up the stations to prepare different parts of the meal. Since it was the end of the dry season, sweet potatoes were not on the menu. For this meal, women prepared a large pot of *ugali* and *mboga* (vegetables) for the event.

One of the women slowly filled the large aluminum pot with hot water, covering the *sembe* (flour), while others took turns stirring the *sembe*, over the open wood fire. In another smaller pan, a woman mixed together diced onions, and finely chopped tomatoes with a little oil. One woman slowly added a handful of local leafy greens, commonly known as 'nightshade', while another stirred the mixture over the fire. Each of the attending ladies brought their own set of plates for guests to use. Women first served the children, handing them little bowls filled with a scoop of *ugali,* topped with the vegetable mixture. Next, women handed out plates of *ugali* and *mboga* to guests at the event including the NGO staff and myself. The women who cooked the meals served themselves last and sat together on the ground in a circle close to the cooking stations.

Close to the road, on the edge of the event space, HKI staff set up a narrow wooden table taken from the district office. The table was meant for the guests, dignitaries in attendance to have proper seating for the meal. Behind them was a long narrow bench where four men happened to be seated with their large plates of *ugali.* Two of them were from HKI, one was a teacher from the primary school and

the other from the district office. It was the only table available at the event. The rest of the attendees settled into chairs or on logs to take their plate of *ugali* and vegetables.

The seating arrangements and the serving order revealed the gendered social hierarchies. Women were in charge of and responsible for the materials, preparation, and for the actual cooking practices of the event. Women served themselves last after preparing the meal, while children ate first. Bryceson (1992) and Roth-Allen (2001) both describe Tanzanian customs that prioritize male members of the household first, then children, then women. This gendered division was seen as the male guests took the most comfortable seats at the back with chairs and a table. Most of the women remained huddled close to where the fire was set up and the food was prepared.

According to NGO staff, the event aimed to improve the efficiency and thus quality of cooking practices. The demonstration aimed to convey the importance of eating vegetables while highlighting the nutritional value of certain foods such as leafy greens, and *ugali* make from *dona* flour, rather than *sembe*.

The assumption was that women usually overcooked the vegetables. The nutritionist from HKI mentioned to me that women in the region fried their leafy green vegetables for too long. "It has to do with the intensity of the heat and the amount of time used to cook the vegetables. They are normally overcooked and depleted of nutrients." The demonstration affirmed the emphasis on the labour inadequacies of women's cooking skills, and the necessity for improving them through nutrition interventions. This kind of responsibilization reinforces the

discursive use of women's assumed roles in food (Rose, 1996). At the same time, the emphasis on the cooking techniques overshadowed and depoliticized underlying social inequities that contributed to the prevalence of malnutrition at varying scales.

Social Realities on Display

One of the little toddlers running around the HKI cooking demonstration had a distinctly round, protruding belly. Maria suggested that it was an obvious sign of kwashiorkor or acute protein malnourishment. Maria motioned to the little girl's mother to come over to us. She questioned the mother's awareness of her daughter's condition. "I took her to the doctor before. I gave her one round of medication, but it didn't seem to work. It would be difficult for me to go to town for another round of treatment." Maria continued the conversation and reiterated the visible signs of infection and expressed her concern over the health of the toddler. "I'll try to take her again." The mother turned around and walked back to the cooking station to continue serving the meal.

Once the mother had gone, Maria commented on the situation. "It's a challenge getting the money to take the child to the clinic since it is the women's responsibility. Yet the household funds are usually controlled by the men."

The interaction between the HKI staff and the mother offered a glimpse into the power dynamics produced by nutrition interventions in the Mwanza region. Maria recognized the inherent intra-household dynamics that limited the mother's options to attend to her child. The mother was also aware of her child's poor health but was unable to seek regular health services when needed. The complexity of the challenge remained beyond the scope of the NGO's intervention. The demonstration,

while presenting cooking practices, also publically revealed the social realities of young mothers caring for their children at home, and lack of adequate and accessible health care facilities; challenges that cannot be addressed by improving the diets and cooking practices in the village. The interaction illuminated the underlying structural challenges that lead to and perpetuate malnutrition or poor dietary health. Poor sanitation infrastructure, costs of health care, and intra-household financial asset control remain unaddressed at events meant to support better dietary health. Overall these interventions utilized normative gender roles to market a larger nutritionism agenda that emphasized nutrients and quantification of food's qualities, and the individual responsibility of citizens to manage their own health. Callon (1986: 6) suggests that this kind of problematization or framing of malnutrition is "determined by a set of actors, who define their identities in such a way as to establish themselves as an obligatory passage in the network of relationships they were building. This double movement renders the actors as indispensable". For HKI and advocates of biofortification, these interventions work to ensure the validity of their project, while projecting a particular kind of view of the world onto those they wish to 'improve' such as female household members in Ukerewe.

When framed as an agricultural challenge, nutrition delineates care work from women's everyday experiences by emphasizing consumption over other aspects of health. More so, it furthers divisions between NGO expectations of women's responsibilities and the limitations to interventionist responses to social and economic aspects of malnutrition. This framing reduces the relationship

between female household members and food production and provision to household or small-scale production. Food systems that include other ways of preparing, selling and receiving cooked meals are unseen in these kinds of framing. As shown below, a significant contribution to food provision systems in Mwasongwe is through informal kiosks that are located in the centre commercial road in Mwasongwe.

Lishe! Lishe!

During my days in Mwasongwe, my routine usually began with a large breakfast at the guesthouse where I stayed along the main road to Mwanza. I then would meet Anna at the market in Buhongwa, and we would take piki pikis (motorcycle taxis) down towards the lake into the centre of Mwasongwe village. By the time noon rolled around, we were both hungry. Occasionally, I brought snacks with me to share during my interviews and visits with Mwasongwe residents, but not always. More often, Anna and I settled into one of the many 'mama lishe' kiosks. *Mama lishe's* are small informal stalls, situated along the main road in the village of Mwasongwe. They are also found in and around market areas.

Lishe has multiple meanings in Swahili. It can mean nourishment, or it can also refer more broadly to food. Lishe is also used to distinguish orange sweet potatoes as *viazi lishe* from the white and yellow varieties, which are called *viazi vitamu* (which is a more literal translation of sweet potato). Regular potatoes are simply described as *viazi*. Thus *mama lishes* literally mean mamas or women who nourish. Anna explained the origins of *mama lishes.*

> In the past, there were women who used to prepare tea and mandazi (fried dough snacks) and station themselves along a roundabout for truck drivers to stop for a snack. The drivers would call out, "*Lishe! Lishe!"* or nourish me, nourish me!" From there, women started to establish more permanent spaces. They used bamboo to construct walls and wood benches for seating. Once they were able to establish enough capital they would move into other areas with more customers, like bus stalls, or market centres. Then they started to expand what they offered, from quick snacks to full meals, like rice and beans, or *ugali* and fish and chapatti. Now you will see them everywhere, in the urban centres, and in the villages like Mwasongwe.

In Mwasongwe, there were five active Mama Lishe stalls along a 100 metre path in the village centre. Angela ran one of our personal favourites. She was a 42 year old mother of eight children who recently moved to Mwasongwe village from Songea, a town, south of Misungwi district, towards the central region. She said there were challenges with drought and lack of water, and so they decided to move to Mwasongwe, closer to the lake. She and her husband are both business owners. She looks after the mama lishe stall and a small shop, and her husband manages other businesses she did not specify.

The food served in this business combines protein sources (beans, some fish) with a starch or carbohydrate, *chapatti*, *mandazi* or rice. Angela mixes up the choice of vegetables but always makes sure that they are on offer and there is usually one type of leafy green. Her and her husband are not farmers. They purchase all the food they prepare and serve, which includes daily purchases of 4 kg of rice, maize flour, wheat flour beans, leafy greens, fish (when it is available), and one type of fruit. They purchase what they can in the village centre and send a *piki piki* to Buhongwa for the rest. Her menu is simple. She serves white rice, beans in a thin sauce made

with tomatoes, carrot and onions, chapatti, *ugali* (maize meal porridge) and a fried/sautéed vegetable.

Angela didn't reveal the details of her profits, but alludes to the steady income it offers and the benefits of owning her own business. Anna and I met with the other mama lishes in Mwasongwe village centre. Their average daily profit ranged between 5000 – 15000 tsh ($3-$9CAD dollars). One stall only sells *mandazi* and another mama lishe uses a different kind of sauce for her beans, but overall, there is little variation in what they each offer.

These kiosks service the wider community beyond residents of Mwasongwe, such as those who are passing through the village, including casual labourers. Residents of Mwasongwe are also customers. When Mario and his wife Summer (members of *Imala Gihabu*) recently gave birth to their sixth child, he regularly ate at a mama lishe during the day since his wife was too busy with the baby to prepare regular meals for him. Another customer said that he took his morning tea there every morning with chapatti. Toward the lake is a smaller commercial centre where another mama lishe set up her shop. Known as Mama Chips, she was the first one to offer chips (French fries) at her kiosk. She eventually introduced other items customers requested including rice, beans, chapatis. The cost of meals range between 1000tsh (CAD$0.75) for a chapatti and tea to 2000tsh (CAD$1.50) for a plate of rice and beans.

The experiences of mama lishes demonstrated two aspects of women's roles that were overlooked in the OFSP work. First, the mama lishes offer relatively balanced meals, protein options, with other foods that provided that 'fuller' feeling

from starch and carbohydrates. Even though there were variations in how vegetables were included, leafy greens were regularly on offer. Fruits, including mangos, which are high in vitamin A, are also available as a small dessert. At the same time, access to this kind of food service is limited to those with available cash flow. The majority of customers we met with were occasional labourers working in the area and residents having a meal. Our interactions with mama lishe patrons at various times of year and in particular leading up to the election (in October 2015) generated lively discussions and interactions. Many patrons were regular and repeat customers building relationships with mama lishes. Mama lishe businesses offered additional social value. Communal seating arrangements indirectly offer a space for public discussions and debate, and at times, potentially reduced dependence on household labour for meals. There are nutritious foods available to those able to afford them. Second, promoters of OFSP overlooked mama lishes in the prescribed food systems they are attempting to 'improve'. Sweet potato dishes are not available at mama lishe kiosks. If there was to be further uptake within Mwasongwe village, OFSP projects might consider other aspects of food systems beyond farming for subsistence and sale at nearby markets.

Conclusion

Findings from my fieldwork draw on the interconnections between daily dietary practices and broader economic changes to food systems to uncover tensions between current framings of OFSP and nutritionism. In spite of the long-term exposure to OFSP promotion in Mwasongwe, integration into household food systems and daily diets remained minimal because of the seasonal availability and

climatic uncertainties around growing and consuming other foods. An overview of the gradual commercialization of Nile perch exposed the broader socioeconomic realities of introducing a new food source into regional food systems. For OFSP, meal preferences, along with seasonal variability influenced the variety, composition of meals throughout the year. The use of leaves and other leafy green vegetables in daily meal production is removed from nutritional health discussions around OFSP. Further to this, the financial implications on the requirement of oil as a means for better absorption in the body results in higher investments required for consuming OFSP than older varieties.

Women's representation in OFSP promotion and broader nutrition interventions remained narrowly defined, confined to household roles; women's roles in food systems are only partially revealed to fit the broader nutritionism discourse and as food producers and necessary providers of nutrient-rich meals. This narrow framing dismisses the diversity of opportunities and roles in which women engage in food systems, and other opportunities that may contribute to dietary health. OFSP promotion situates female farmers as the keepers of nutritional health, which is only defined by the nutrient intake of foods produced by them. Nutritionism, as revealed through cooking demonstrations, places the responsibility of good diets and nutrient-rich food cooking on female household members and in particular female care-givers. In a sense, their participation in OFSP promotion is "understood as a form of nation-building, creating healthy subjects to reduce costs in health care" (Biltekoff et al., 2013: 41). This framing of nutrient deficiencies associated with women's responsibility and care work further emphasizes the need

for women to 'fix' the problem for which they are supposedly responsible. Women are presented both as the source of problematic daily dietary and cooking practices and as simultaneously well-placed to solve the nutrition dilemma for themselves and the population at large. Mama lishes show alternative labour investments of women in Mwasongwe who are not food producers. Such small businesses allow women to generate their own profit, steadily, without dependence on environmental factors or institutional networks. Mama lishes also reveal possible sources of consistent nutrient-rich meals for those who can afford it, and a broader interpretation of nutrition and what it means to be nourished. It is an informal yet welcomed space for residents or visitors to enjoy a quick meal, while meeting others.

At the same time, regular inferences to health challenges (such as infections and viruses) by those whom I met during fieldwork also reveal inadequate state-level responses through poor infrastructure and limited access to health facilities. In spite of these challenges, proponents of nutritionism see OFSP promotion as a simple and scalable solution to vitamin A deficiency and malnutrition that outweigh these state-level inadequacies, thus furthering the assumption that women lead nutrition work for their own benefit of themselves and for the population at large.

Chapter 5: Selling OFSP

Introduction

Between 2005 and 2009, and the earlier phase of OFSP's introduction in Tanzania, organizations such as the International Potato Centre (CIP) and Helen Keller International (HKI) focused their attention on persuading both male and female sweet potato farmers to cultivate more of the biofortified varieties than the older varieties, and include these new varieties into their daily diets. Once this appeared to be established in certain sweet potato growing areas in East and Southern Africa (Low et al., 2007), promotional efforts gradually prioritized the prospect of OFSP becoming a large-scale, commercialized crop that could generate income and potentially contribute to industrial level processing. Marketing strategies included: raising awareness of its potential population level nutritional value (in particular as a key vitamin A source); demonstrating techniques for processing the roots of the crops into other products such as bread or crisps; and lastly, to create a commercialized and decentralized system of seed supply (Low et al., 2007). Prioritization of the charismatic crop, OFSP in this later stage, as a win-win solution to poor nutrition and poor farmers, led to a growing disconnect between the aspirations of OFSP (and its surrounding institutional networks) its coinciding success narrative, and the actual everyday social, economic realities of farmers.

This chapter examines the discursive and material network interactions around selling OFSP. It highlights the institutional and financial networks that underpin the emphasis on OFSP's potential as a commercial crop, against the backdrop of the experiences of farmers and residents in Mwasongwe, and their own interactions with generating incomes with and without biofortified sweet potato. Three main aspects of selling OFSP are discussed here. First, I examine the expansion of vitamin A discourse as selling a 'nutritional fix', and how women's experiences with nutritional health interventions reveal the unintentional actual and long-term impacts between supplementation campaigns and campaigns to commoditize OFSP. Secondly, unpacking the emphasis on processing OFSP roots for sale in the promotional discourse shows the disjuncture between the aspirations of

the economic potential of the orange sweet potato, and the actual realities of sweet potato producers. Lastly, attempts at commercializing seed systems for expanding local and national access resulted in unintended social and long-term consequences for residents in Mwasongwe. The following section illustrate the overarching tensions between selling OFSP, through processed products and the underlying social, economic and gender conditions dependent on its marketing.

Selling Roots of 'Success'

OFSP promoters emphasized the importance of nutritional health awareness and the benefits of vitamin A, as well as production and sales of both the roots (Mayanja et al., 2017) and the vines of the crop (Mcewan et al., 2015). The root of the sweet potato is the flesh of the crop, and a part of the plant regularly eaten and in addition to the leaves. As noted above, it is also the source of beta carotene, or pro-vitamin A, that which, when ingested, converts to retinol, or vitamin A in the body. Even though the leaves, as mentioned in chapter 5 were also regularly consumed they were not mentioned in most promotional narratives, since it did not include the beta carotene or orange colour. Roots grow out of small nodes in the vines that act as seeds for the crop. On average, depending on the variety of sweet potato, the growing conditions, soil quality and quality of the seed, as many as five roots can grow on each vine cutting (Andrade, 2009). Roots vary in their size, their texture (moisture levels) and colour, depending on the variety, and the biofortification process. The most common varieties grown in Mwasongwe were *kabode, ijumla* and *carrot D*. As mentioned in Chapter 3, *kabode*, a variety originally bred in Uganda, produced the largest-sized roots, but with lower levels of beta carotene compared to *ijumla* or

carrot D. Most farmers preferred *kabode* because of its size and the dryer texture that resembled the white and yellow varieties. Both *ijumla* and Carrot D produced roots higher in beta carotene, but were smaller in size and with a moist texture, which, according to farmers, made them more susceptible to rotting during post-harvest and therefore less suitable for storage or sales. For Mwasongwe farmers, kabode roots were the most preferred, and were also used in developing food items processed from roots.

In one of our initial visits in June, 2015, Mama Edith's daughter served us fresh crisps (chips) and fried noodles made from her recent biofortified sweet potato. She mentioned that her harvest this year was *kabode an*d with a few *Iljumla*, She used a new kitchen tool, a mandolin, she purchased from last year's agricultural fair. These products appeared a darker orange and thicker than the potato chips available in North America. The taste also unexpectedly differed. These were slightly sweeter, and lightly seasoned with salt but fresh and crispy to taste. Once I finished what was on my plate, she asked if I would like a few more packages of noodles or other products. I purchased a few sweet potato roots and two cups of noodles and crisps for my son and daughter. I mentioned to her that I met Mama K (the head of a local NGO who worked closely with *Imala Gihabu*, the main farmer group involved in OFSP promotion in Mwasongwe) in Arusha a few weeks ago and she smiled when she said, "I will always appreciate TAHEA (the organization). If Mama K asks me for a batch, I will do it. A few weeks ago, I even stayed up until 3 am to prepare a box full of crisps and noodles."

I remembered hearing this same account from Mama K a few weeks before meeting Mama Edith. I tried these products in Arusha, prior to beginning my fieldwork in April, 2015. A number of orange sweet potato 'specialists' from Tanzania, Uganda, Burkina Faso and Ghana came to the Farm Radio International office in Arusha to discuss how best to use radio to promote the crop and the consumption of the orange varieties. Mama K, the Director of the Tanzania Home Economics Association (TAHEA), travelled from Mwanza to Arusha for the meeting. She brought a small box full of small clear plastic cups filled with sweet potato crisps with her. There were no labels on them. Another box contained a second set of cups, with fried, dried noodles made from orange sweet potato puree. The meeting participants sampled these products throughout the day. The crisps gradually hardened, becoming stale and dry by the end of the meeting. Since there were no preservatives, these chips only remained crispy for a short period of time. The long full-day journey from the rural districts in Mwanza region to Arusha might have caused the slightly stale condition. Mama K presented these products at the meeting as a way to show the potential for OFSP, and how sweet potato growers are not just cultivating the crop but now TAHEA explored other methods for processing and developing the roots into other commodities. These chips and noodles were meant to offer a sense of possibility for OFSP's economic growth in the country, and beyond farmers simply growing and preparing the roots for their family. Yet, at the same time, and evident in the meeting with sweet potato breeders and NGO staff in Arusha, an emphasis on the economic possibility of the crop seemed to overshadow

the possibilities and experiences of the farmers cultivating the roots and creating these products.

Mama Edith acquired the reputation of 'OFSP chef' in the region. As the local organization often leading the OFSP work with the Mwasongwe village-based *Imala Gihabu* farmer group, TAHEA introduced new culinary techniques during the early stages of the promotion of OFSP through demonstrations that took place in the village centre. Mama Edith adopted these techniques and built a small business from the skills she acquired. TAHEA called on Edith to fill orders of processed foods for meetings like the one attended with Mama K in Arusha. Mama Edith's experience with producing these snacks showed her loyalty to TAHEA and how she would quickly respond to requests for the OSP snacks. TAHEA, in this way, depended on Mama Edith's labour to produce OFSP and then process her roots into products for marketing purposes. This resulted in assigning a portion of Mama Edith's production and post-harvest time and labour investments to TAHEA and marketing of OFSP as a commodified crop. The decline in freshness in the snacks that were brought to the meeting also pointed to the limitations farmers faced in processing OFSP themselves after they cultivated it. Mama Edith saw the possibility of selling these products as a means of a possible future income source. Yet, it was the final display of the products alone at the meetings that illustrated the marketing potential for the crop. Mama Edith did not travel with the products to the meeting to see how they might have changed, or to contribute to the discussions around its production and how the freshness could be maintained for future sales.

These products made by Mama Edith and the presentation by Mama K demonstrated the inherent tension between the imagined possibilities of OFSP, and the actual material possibilities towards economic growth for farmers. The presentation of products at the meeting in Arusha unintentionally revealed the limitations of expanding production to processed snack foods. Assuming these products were meant to exemplify the option of creating a food industry made from OFSP, further processing, additional preservatives, packaging, and marketing investments would be needed to meet retail standards. Increasing the supply of OFSP roots into the production would also require farmers like Mama Edith to increase their own production, while also recruiting more farmers to grow more orange varieties, such as ijumla, or *carrot D* and to a lesser extent *kabode*, than the white and yellow ones they were familiar with cultivating and consuming. A continued focus on the crop, and on OFSP as a marketable commodity, only utilizes the role of women in cultivating and processing it, while under-acknowledging the actual investment and structural constraints hindering women producers from actual benefiting. As I show in this chapter, a further emphasis of nutritionism discourses in the OFSP success narrative distinguishes women farmer's actual role between growing food for nutritional benefits and growing OFSP in order to create an industry of processed food items. This reflects the broader narrative around the charismatic crop, biofortified orange sweet potato as the main focus of success and economic growth, with a particular utility of women sweet potato grower's experiences surrounding OFSP.

This chapter argues that the later stages of OFSP promotion prioritized the crop and its potential economic possibilities while unintentionally overshadowed women's labour and time investments in production, cultivation and preparation. Through the promotional discourse on OFSP's expansion, an emphasis on the crop itself, its varying components and perceived health value, contributed to a disconnect between the OFSP promoters' perceptions of women growing biofortified sweet potato (backed by international research science institutes, international and national NGOs) and women's actual experiences of growing and selling food for themselves and their families. My analysis aims to uncover the actual economic and social conditions embedded in women's everyday livelihood practices that in some ways, intersect with the OFSP promotion work.

Theoretical Underpinnings

In her analysis on golden rice and biofortification in Indonesia, Kimura (2013: 11) describes 'nutritional fix', as "technical attempts to solve the Third World food problem." This kind of nutritional fix is also embedded in the production, consumption and selling of OFSP. The main difference, however in golden rice, labour investments between non-biofortified and biofortified rice is assumed to be the same. For OFSP, increasing expansion and focus on its economic potential implicates the costs of women's labour. The technical characteristics are highlighted by OFSP promoters, in terms of its beta carotene content (whereas the white and yellow varieties contain none) and cultivation techniques, which aim to increase the efficacy and yield of production, over the older, white and yellow varieties. This nutritional fix depoliticizes, decontextualizes and neutralizes the gendered conditions of dietary

practices and of growing and selling food. Information provided by biofortification advocates regarding the crop, reinforce these attributes, while simplifying the underlying structural inequalities, including land, resource and labour asset ownership and control. As mentioned in chapter 2 and 3, charismatic nutrients[29] such as vitamin A, according to Kimura (2013: 37), "conjure up scientific facts, ethical judgments, and the promise of solutions " and feed into the nutritional fix emphasis. OFSP's charismatic qualities extends beyond this label as a vitamin A source to include a modernized, global commodity, and indirectly dependent on women's labour. The use of the OFSP products as a marketing tool disconnects the labour, and material requirements behind the creation of other foods made from OFSP. The technical interventions prioritize the actual nutritional fix over social and political factors, where charismatic nutrients are delivered in a relatively simple manner (through a pill or through a staple crop) to women, and caregivers. As Kimura et al., (2014) contend, vitamin A is materialized in OFSP as rendering hunger technical (re: Li, 2007). An emphasis on selling OFSP as part of the solution to complex challenges of malnutrition is seen to be attainable by re-configuring the market supply and demand to accommodate new forms of OFSP foods and products.

O'Laughlin (2007) questions this 'market myth' and the neoliberal assumption associated with women's unequal access to resources as the cause of underlying inequality in agricultural development in Sub Saharan Africa settings. She suggests that the simplistic and largely economic analysis in such economic development

approaches (e.g., Udry, 1996) disregards other aspects of women's lives that are structurally determined. As a result, when productivity and resource allocation are prioritized, the underlying inequalities women navigate in their everyday lives remain only partially unaccounted for. Further to the market imperfection dilemma and women's unequal access to resources, Doss et al., (2017: 2) argue that this myth captures a misrepresentation of women's role in agriculture, and their everyday experiences with growing, preparing and selling food. The authors argue that generalized versions of women's relations to agricultural practices "promote stereotypes of women as either victims or savior; treat women as a monolithic group; ignore the role of men, communities and institutions, and provide a simplistic and even misleading basis for the design, implementation and evaluation of policies and program to promote food security and advance gender equality." For OFSP, marketing its charismatic qualities such as the value of vitamin A and the crop's potential for large-scale economic growth (for example, through the processed food industry) reinforces these kind of stereotypes, where women who grow OFSP are seen as both the causes of and the potential to be (but perhaps only partially) successful saviours of malnutrition in Tanzania (Cornwall et al., 2007).

This chapter uses these framings of a nutritional fix to analyze how women in Mwasongwe navigate their own perception of nutrition and OFSP, and their choices and opportunities to generate their own income that are situated within broader processes around how they grow, prepare, and sell food for themselves and their families. Below, I discuss how vitamin A seeped into discussions around nutrition in

Mwasongwe and how certain mothers and caregivers managed their associations with nutritional deficiencies and growing food.

Vitamin A in Mwasongwe

As mentioned in the previous chapters, one of the key activities accompanying the promotion of OFSP included "raising awareness of nutritional information" (CIP, 2012; USAID, 2014) and the framing of vitamin A's importance for overall good health. The presence of vitamin A in Mwasongwe village is seen in two material networks: through the national vitamin A supplementation program and through the promotion of bio-fortified sweet potato. These material networks reproduce the nutrient's charismatic qualities where women's association with vitamin A is mediated in diverging ways, as illustrated below.

Discovering Supplements in Mwasongwe

On one of the mornings Anna and I arrived in Mwasongwe in November, 2015, a small crowd of women carrying their babies seemed to be forming at the steps leading to the health dispensary, a small health centre situated just adjacent to the main commercial centre of the village. Anna explained to me that it was the day of the vitamin A supplement campaign. Health dispensaries offered free vitamin A supplements twice a year. Since 1987, the government-initiated campaign partnered with the international NGO Helen Keller International. The campaign is one of the mainstay funding streams for the international organization. It is funded by a number of international bilateral and private agencies, including United States Agency for International Development (USAID), and Global Affairs Canada (GAC)

(HKI, 2015). As mentioned in Chapter 2, this long-term investment in vitamin A supplements is a result of what Kimura (2013) describes as the creation of charismatic nutrients, and how over time vitamin A was transformed from a nutrient for healthy eyesight into a life-saving nutrient. For golden rice, the emphasis on vitamin A contained in the rice prioritized marketing strategies. OFSP's charisma extended beyond the crop and its orange flesh to include the network of institutional actors, the vines, the potential snack products and potential industrial products that motivate the large-scale financial investments. Both golden rice and OFSP research and development initiatives are the outcomes of the gradual legitimization of vitamin A as a priority nutrient in global nutrition interventions.

This transformation of vitamin A began after a 1983 study published in *The Lancet* medical journal presented evidence showing a decrease of 34% in child mortality in Aceh, Indonesia, after six-month intervals of vitamin A supplementation (Sommer, 1983). Previous links to vitamin A in the nutritional science and in the international development scene centered on eyesight and prevention of blindness, but this study conducted in Aceh by Alfred Sommer, then based at John Hopkins University and in collaboration with Helen Keller international (HKI) became widely cited for associating the lack of vitamin A with child mortality. Results from this study led to the World Health Organization (WHO) to issue worldwide recommendations for vitamin A supplementation in 1987 as a means to reduce child mortality rates in most developing countries. Vitamin A became the most readily available and easily administered nutrient, in the form of a pill. The international development community supported child mortality campaigns in several developing

countries in all regions of the world (Kimura, 2013). Kimura suggests that the re-packaging of vitamin A as a means to reduce child mortality, rather than simply to reduce risks of poor eye health, was a result of Sommer's study being used to gain political support and investments:

> It is useful to note, that until his (Sommer, 2008) Aceh study, vitamin A deficiency had been primarily considered an ophthalmological issue, due to the deficiency's clinical manifestation in *xerophthalmia* or dry eye syndrome. In contrast, vitamin A promoters in the 1980's linked it to 'child survival'. As Sommer told the New York Times, "When the main concern was night blindness, health ministers said, understandably, 'I feel terrible about that but I can't put my resources into it when half our children are dying before the age of 5'… but now ending the deficiency is starting to be viewed as a mainstream activity, not a peripheral one" (Eckholm, 1985, cited in Kimura, 2013: 37).

Sommer's study led to long-term engagement with UNICEF, the UN agency at the time focusing on the well–being of children. Through UNICEF, networks of nutritional scientists, international organization, UN agencies supporting such a claim, vitamin A became a 'go to' nutrient for malnutrition initiatives. Continued tracking of mortality rates reinforced its ongoing importance (Scrinis, 2008). According to WHO, infant mortality rates declined from 91/1000 births in 1991 to 43/1000 in 2015 in the Sub-Saharan Africa region (WHO, 2015). Thus Vitamin A was transformed from a nutrient required for good eye health into a live-saving micronutrient in discourses around malnutrition in international development.

Vitamin A in this form of a pill was a nutritional fix, and became the basis for the national campaigns to lower child mortality rates in young infants. Yet this emphasis on reducing mortality rates through vitamin A contributed to minimizing discussions on dietary health, and demonstrated how the 'nutritional fix' excluded

mothers and their children from these discussions. Instead, mothers were passive recipients of a pill meant to improve their health, and the health of their young children.

Anna and I sat with Monica, Jackie and Mary in front of the dispensary on the day of the vitamin A supplementation campaign was taking place in Mwasongwe. Mothers with their young children living in the area were waiting on the front porch of the dispensary to receive the supplements. A line had formed from the porch, to the inside waiting room. I briefly introduced myself to the three women, who seemed to have come together to meet with the nurse practitioner. The women's ages ranged between 30-45, all had 3-5 children, and each with an infant wrapped in a *kanga* (a traditional Tanzanian cloth), resting on their chest. I explained my interest in orange sweet potato. None of them had heard of it or had heard sweet potato described in terms of its nutritional value, or the difference between the white and yellow varieties from the orange ones. Anna briefly talked to them about bio-fortified varieties, that they were a source of vitamin A, and how there were farmers right in Mwasongwe who were growing and selling the roots and vines (seeds). Mary mentioned she had noticed orange varieties in her field but had not been aware of their vitamin A content. Even though the orange varieties were seen to be in short supply vines (seeds) seemed to be unknowingly circulating in the village without the associated awareness of the nutrients they contained.

The presence of the biannual supplementation campaign juxtaposed against the dominant OFSP campaign in Mwasongwe represented the material iterations of the charismatic nutrient, vitamin A. In this older, yet consistent delivery of a

nutritional fix, women are simply recipients of vitamin A for their children. The biannual vitamin A supplements campaign and the mothers who engage in the campaign seemed distinctly separate from those who engage with OFSP, and where the two sources of vitamin A do not converge in any way. As Biltekoff et al., (2014: 23) contend, "the nutritional fixes have almost always failed to address the fundamental structure of malnutrition because malnutrition and food security together are a complex sociopolitical problem, rather than a simple deficiency of a set of nutrients." At the same time, the fact that women waiting to see the nurse practitioner were unaware of food-based sources of vitamin A, point to the limitations of OFSP intended efforts of supporting women's livelihoods by offering improved nutritional health as well as opportunities for generating incomes. These opportunities only seemed available to certain farmers, and those with particular assets who could accommodate the intended economic growth driven by OFSP investments. Efforts to broaden the reach in OFSP and marketing of OFSP's potential health and economic benefits were seen in various promotional activities, including radio programs. Below, I provide a short example of how the framing of OFSP and its production implicates caregivers (who are, in this case, women farmers with children) as the culprits of poor nutrition as well as the potential entrepreneurs who have also improved theirs and their family's nutritional health.

Selling Vitamin A Through Sweet Potato

As discussed in Chapter 3, Radio Maria, broadcasted a six-month radio program on OFSP during the 2013-2014 planting the season. The program hosts phoned listeners and particular 'experts' on a topic. Experts would include a

nutrition officer assigned by the government, a scientist working with Helen Keller International or the International Potato Centre. The radio program regularly featured members of *Imala Gihabu* in their program, *Kilemo Chetu* (our farmer). The series of episodes, which lasted six months, and co-produced by Radio Maria and Farm Radio aimed to encourage farmers to grow orange sweet potato. For example, on this particular episode aired in October, 2014, the host, in a conversation with Mama Edith referred to an initiative where an NGO distributed sweet potato vines (the seed) to a local primary school. In an effort to encourage children to talk to their parents about vitamin A and orange sweet potatoes, the host engaged in conversation with the audience and with Mama Edith on the topic of vitamin A, and how to talk to parents about it.

> Potatoes have vitamin A and we know that vitamin A is important especially for your students because it can increase your thinking capacity. Children who have lack of vitamin A will have poor performance in their studies…. We want your parents to grow these potatoes, you can tell your parents to start growing potatoes in order to fight against deficiency of vitamin A.[30]

The use of radio as a tool for raising awareness of vitamin A is an example of 'rendering hunger technical' (Kimura, 2013; Li, 2007). Vitamin A is described as a nutritional fix for underlying social, economic causes of poverty. The radio program reinforced OFSP as a nutritional fix and associated its consumption with improved cognitive abilities. The reference to improving performances in school is reduced to the need for improved nutrient intake, rather than engaging in the more complex

[30] Edith Mana, Radio scripts, from Radio Maria Program, Kilemo Chetu transcribed and translated July 2015.

political challenges related to inequalities in access to education, the lack of resources available in schools and the lower rates of girls attending schools in the area (Joshi, 2015: Hedges, 2016). Discussions around dietary health are reduced to vitamin A intake and its representation as a solution to broader health challenges. The broader marketing and framing of OFSP as a solution to malnutrition shown in this radio program is expanded, where vitamin A is a key feature of the crop's uniqueness. This is also seen in coinciding promotional leaflets. In one promotional leaflet, OFSP is described as a vitamin A powerhouse. "It can be used as an entry point for changing behaviors that lead to larger increases in vitamin A among young children and mothers" (Ngaiza et al., 2012). For mothers or caregivers listening to the program, the message to them is that OFSP is needed for their children to succeed in school. Parents are required to invest in procuring seeds, clearing land for planting, and cultivating this new crop for the benefit of their children's future education.

Summary of this Section

These two examples of how vitamin A is presented in Mwasongwe show how women's interactions with nutrition interventions shifted; from receiving vitamin A supplements through an assemblage of international and national institutions supporting the logistical and financial requirements for the supplementation campaigns; to producing vitamin A sources through OFSP for themselves, their families and Tanzanian citizens. Supplementation campaigns offered young mothers vitamin A to their children. Supplements were supplied to them to simply help keep their children alive and eventually reduce national mortality rates. Biltekoff et al.

(2014) suggests that highlighting the quantifiable aspects of nutrition eliminates of the historical, political and gendered context in which nutrient deficiencies are situated. Supplementation campaigns narrowly addressed malnutrition through distribution of pills without disrupting existing structures around health provision for mothers or caregivers and their young children and infants. Women sweet potato growers in Mwasongwe on the other hand, were necessarily integral to OFSP's expansion, through their role as promoters of OFSP themselves through radio programs, and accentuating the value of vitamin A in order to increase its attractiveness to other potential producers and consumers. But this role was only instrumental in furthering the agenda of OFSP, with necessarily including them as beneficiaries in the expansion. In this next section, the specific emphasis on OFSP's potential for industrial level processing is described in part through Mama Edith's experience with processing her own OFSP harvest in Mwasongwe.

Transforming Sweet Potato from Subsistence to Sale

The efforts to scale-up OFSP evolved over several years. Creating a demand for OFSP beyond sweet potato growing areas served as one of the main strategies of OFSP promoters to boost production levels across the region. This involved the creation of a processed food industry from OFSP, for which farmers could supply vast amounts of roots to mill into flour or to make other products. Starting in 2009, OFSP initiatives shifted focus from production, consumption and sale at a small-scale in sweet potato growing areas, to large-scale initiatives covering other regions with varying cultivation systems. The International Potato Centre and funded by the Bill

and Melinda Gates Foundation encouraged this demand creation by researching and testing methods for processing OFSP in several counties in the Sub-Saharan Africa region, beginning with Uganda, Mozambique, and Kenya and eventually expanding its presence in the region, to include Tanzania. OFSP's expansion or scaling up was meant to see the crop reach population level impact on malnutrition.

Initials reports of increasing production levels and subsequent increase in vitamin A intake contributed to a growing evidence base of OFSP's potential economic and nutritional benefits (Low et al., 2007). This demand creation attracted investors to support a large-scale expansion of OFSP promotion and prioritize OFSP sales and processing. Stories of the potential growth of this strategy, and the possibility of OFSP production expanding across the country beyond the main sweet potato growing regions, attracted government and media attention.

For example, in 2017, a Tanzanian news article reported on the potential revenues from increasing the production of orange sweet potato (Gitabu, 2017). In the article, The Director General for the Commission for Science and Technology (COSTECH), [31] Dr. Hassan Mchinda, said that sweet potatoes could be used as an ingredient in baking to replace 20-60 % of wheat flour in baked products. The article reported that in 2013, Tanzania imported 793 000 tons of wheat, which amounted to USD $312 million (7000 billion tsh). Mchinda highlighted the potential of OFSP to replace just 30% of wheat imported for the baking sector. He was quoted in the

[31] Tanzania Commission for Science and Technology (COSTECH) is a parastatal organization with the responsibility of coordinating and promoting research and technology development activities in the country. It is the chief advisor to the Government on all matters pertaining to science and technology and their application to the socio-economic development of the country.

article as saying, "Just think of the savings if one-third of that could be replaced by a crop that any class of farmer in Tanzania can grow" (Gitabu, 2017). According to Mchinda, in all regions of the country, small-scale, farmers and large-scale commercial farmers could grow and provide sweet potato to the bread industry, and drastically reduce the country's investments in imported wheat. For Mchinda, investing in orange sweet potato seemed like a win-win for Tanzanian farmers and for Tanzanians at large. The Government could decrease their dependence on imported wheat, while farmers would see a new and guaranteed market for a crop that is seemingly easy to grow, and there would be an overall decrease in malnutrition from the added beta carotene in the biofortified orange varieties. Yet, the article made no mention of who was going to grow these larger quantities, who had access to the necessary assets, such as land, planting material and labour, who would mostly benefit. Continued emphasis on the crop itself rather than the livelihoods that are dependent on the crop enabled the development of large-scale and longer term research investments on the feasibility of such an expansion and scalability of the crop.

Financial Investments that Supported Large-scale OFSP sales

The news piece that focused on OFSP flour points to the market-oriented response to malnutrition (Bezner-Kerr et al., 2012; Patel et al., 2014; Moseley, 2017) that also coincided with a rise in financial investments. Starting in 2009, donor investments increased drastically. Between 2009 and 2016, The Gates Foundation funded a total of USD $69 million dollars in projects dedicated to OFSP in Sub-Saharan Africa, where 80% went directly to the International Potato Centre (CIP).

The Sweet Potato for Profit and Health (SPHI) project led by CIP established several projects across 17 countries with a USD$22 million grant from the Gates Foundation. Their overall goal of '10 by 2020', aimed to reach 10 million people and to "achieve widespread uptake of sweet potato, reducing malnutrition with new varieties of biofortified sweet potato" (CIP, 2012). The Gates Foundation also simultaneously invested close to USD$50 million in biofortification, extending to other staple crops such as maize, and cassava for vitamin A, and millet and bean for iron in 8 countries worldwide (Harvest Plus, 2015). In Tanzania, five projects totaling approximately USD$43 million took place between 2012 and 2016. A variety of funding sources, including Gates, USAID and GAC provided USD$20 million for various projects for the Mwanza region alone. This included: a USD$15 million project led by Helen Keller International, on Enhanced Homestead Garden Project (EHGP) production with a large component for growing and selling OFSP; three to five million dollars (USD) on the introduction to commercial sweet potato seeds systems, and a large-scale project on growing OFSP in primary schools. Emphasis on these investments remained on increasing crop production and expanding seed (vines) distribution to support higher levels of productivity, and a swift move away from a focus on encouraging household production and consumption of OFSP.

The later stages of OFSP promotion and its emphasis on the market potential and increased investments was based on the assumption that women who grow OFSP will benefit and that the market will accommodate them. This coincides with the neoliberal view of gender in development, where if given the resources and opportunities women could benefit from market-oriented development (Berik,

2017; Cornwall et al., 2007).. Women sweet potato farmers were seen to inevitably play a key role in increasing productivity. Dr. Low, a key scientist from the International Potato Centre, reiterated this point in an article summarizing OFSP's research and expansion since 2000.

> Women dominate in sweet potato production in Eastern, Central and Southern Africa. Hence, the use of OFSP to combat vitamin A deficiency makes sense because those most at risk are children in poor households, where women are the dominant food preparers and caregivers and farmers already know how to cultivate sweet potato. (Low et al., 2017: 24)

For OFSP promoters like CIP and partnering NGOs, women growing and preparing food for themselves and their families were well-placed to pursue these new economic pathways, such as flour production simply by increasing or expanding their existing efforts. This narrowed assumption of women's role and reinforcement of sweet potato's identity as a women's crop was seen in the OFSP narratives that appeared in the news, and the discussions in regional meetings with researchers and NGOs promoting OSP (as described in chapters 3 and 4) but did not reflect the actual experiences of sweet potato farmers. Nor did it take into consideration how women could be engaged through this process of expansion and market focus. A brief overview of existing flour products and possibilities for decentralized processing below, suggest that the industry is not meant to benefit female producers or cultivators.

Potential for Processed Flour from Sweet potato

A family-run grocery store in Mwanza town (a 45 minute bus ride from Mwasongwe village) stocked many products manufactured in Tanzania. These

included sunflower oil, yogurt, cashew nuts, coffee, and tea. One aisle contained various flour products including; millet, cassava, maize, whole wheat, sorghum, amaranth, lentil, rice and sweet potato. The impressive array of flour options available at the urban grocer appeared to be growing at the end of 2015 with the addition of a sweet potato flour product. The label on the flour packages showed that the manufacturers were largely based in Morogoro, in the southern region of the country. Seeing the flours at the grocer offered this sense of possibility for OFSP. Perhaps Mchinda's idea, backed by CIP and other strong proponents and investors could succeed in transforming the bread industry. Farmers like Mama Edith could be seen to benefit, since they are well placed to expand their existing labour investments from producing OFSP for their families, to utilizing initial training put on by TAHEA, for expanding the processing and selling products made from OFSP roots across the country.

The news article citing Mchinda's promotion of sweet potato flour was not the first I heard about sweet potato flour and the potential for large-scale production. During the early days of my fieldwork in April, 2015, an initial conversation about biofortified sweet potato in Tanzania with a staff member at an international NGO included a reference to sweet potato flour. The staff member mentioned that she had heard about a women's group milling sweet potato flour and selling the product locally in the Hai district near Mt. Kilimanjaro (in the central region) and in the Mwanza region.

The women's group only milled sweet potato for one season in 2014. By the time we visited the group in the Hai district, cassava flour was the only type of flour

produced. This prospect sounded promising, yet, in reality, very little OFSP was regularly milled in the region. This was in part due to the lack of demand, but mostly due to the limited production of OFSP to harvest enough to mill into flour and ongoing dependence on project-related distribution of planting material. Yet, stories highlighting OFSP's potential permeated NGO meetings and discussions and were reinforced in regional meetings with International Potato Centre and other research institutes investing in biofortified crops.

Summary from this Section

Producing sweet potato flour was meant to encourage more production of the biofortified varieties over the white and yellow varieties, since most sweet potato farmers continued to grow both rather than replacing older varieties with the more nutritious ones (Low, 2017; Waized et al., 2015). Pittore and Robinson (2015: 12) suggested that promoters attempted to increase market demand to encourage production through the new products (including juice, bread and flour). Yet this prospect for a market creation exposed the disconnect between an imagined supply and market chain for OFSP, and the realities of sweet potato producers. Below, Mama Edith's experience of creating new OFSP products illustrates this disconnect.

Mama Edith's Experience with Baking

The only farmer in Mwasongwe who milled her sweet potato roots into flour in the 2015-2016 season was Mama Edith. Once a year Mama Edith and others prepared for the annual agricultural fair, *Nane Nane*, an annual agricultural fair organized by the local government. where vendors sell equipment, produce, and livestock. The fair

attracted businesses, farmer groups like *Imala Gihabu*, large-scale commercial farmers, traders, and food industry vendors.

In 2014, Mama Edith prepared a large batch of baked products for the event, including biscuits, muffins and loaves of bread all made with sweet potato flour. Since there was no source of electricity or running water in the village, she constructed and used a traditional oven set up at the back of her home. She described her preparation to me during one of our visits in July, 2015:

> I use a traditional oven structure. First I dig a two feet deep pit. Fire is built outside of the kitchen; next heated charcoal is placed all around an iron pot. I place the dough for the bread inside the pot on a tray. The pot then sits on the smoldering fire for approximately 40 minutes for the bread to bake, with a cover. I can only make a few at a time, because it is a small pot, so it takes me a long time to make many.

TAHEA organized demonstrations in Mwasongwe on how to prepare baked foods out of sweet potato flour and purée, including noodles, crisps and chapatti. Even with the basic technology available, Mama Edith produced a large batch of muffins, cookies, and bread for the fair and invested the necessary time and labour needed to produce such large quantities. She travelled by bus to Arusha to attend the fair in August 2014. She stayed in Arusha for one week, while the agricultural fair took place. During one of our earlier visits with Mama Edith in June, 2015, she shared her experience with Anna and me:

> I was hoping that there would be further interest in development the products, perhaps attracting investors who could market the products and develop the packaging and branding. I was able to sell everything I brought with me and was able to purchase a new slicing tool from the profits I earned.

The production of these products was specifically used to generate income and not for household consumption. This was an example of how OFSP had transformed into a marketable crop, if only at a small-scale. These kinds of investments and return on investments, however, were only available sporadically, and based on annual events, like the annual Agricultural Fair, or based on the needs of organizations (like TAHEA) who requested them for marketing purposes. The limited availability of equipment and of the fuel and energy to run the equipment restricted Mama Edith from benefiting more than the annual fair and at times, when NGOs requested products.

Using Flour to Offset Uncertainties in Farming

Mama Edith milled sweet potato for other purposes other than selling products. She used the flour production as a way to manage the seasonal uncertainties in her agricultural production and ways to manage the needs of her family. The available quantity of roots for milling or other processing activities varied from season to season and depended on a number of factors. Mama Edith discussed these risks with Anna and me in October, 2015, at the end of the long dry season and one of the most 'lean times' when food availability was low and harvested crops were depleted from storage.

> Last year, we increased our production of viazi lishe in anticipation of buyers. But the weather affected the harvest. The rains did not come in time and we lost a lot of it due to drought. We were unable to fill the larger orders from interested buyers. Other seasons there is enough harvested, but there are not enough buyers. What do we do with the excess? We try to make crisps or cookies.

She mentioned the declining popularity of her baked products since 2014 as an example of the fluctuations in markets for OFSP. Through a Bill and Melinda Gates

Foundation project, TAHEA increased supply of planting material and resources for OFSP and there was an abundant supply of roots in 2014. Throughout the project which took place between 2012-2015, events were held in which Mama Edith could deliver, showcase and sell her products. The projects ended in 2015, and with none to take its place, she produced less, due to decreased amounts of seed available and less events planned for showcasing and selling her food. Rossi (2006: 17) sees the relation between this kind of discursively and materially driven interests in economic growth and the actual limitations in development-funded project as neoliberal development 'consumed' and transformed by people acting locally and turned toward their ends. Without the project funds and resources fueling the OFSP's expansion into processed products, Mama Edith's benefits are restricted and dependent on organizations like TAHEA, to secure future project funds to be situated in Mwasongwe.

The season following the 2014 decline in market opportunities for OFSP, Mama Edith processed a small bag of flour using the roots she didn't sell or use to feed her family. She travelled to Buhongwa where she paid the milling factory to process her dried roots into flour. There was just enough harvested to provide one 10 kg bag of dried roots. She used a plastic container to store it. She combined sweet potato flour with regular wheat flour to bake and fry sweet potato snacks. Her use of the sweet potato flour to create other products became a means to diversify her income sources, when other options fell through from loss of yields due to poor planting conditions and unpredictable weather patterns. Much of the success around the processed food made out of OFSP is dependent on the projects that support them,

and on the access to buyers through the project. Mosse and Lewis (2006) remind us that 'beneficiaries' like Mama Edith are not passive agents in processes of translation in developmentalism, but rather utilizes external translations as new forms of identities (in her case as an OFSP chef) and towards her own economic development and livelihood strategy. OFSP cultivation, like other rain-dependent systems of small-scale farming, is also increasingly impacted by uncertainty in weather patterns, delayed rains or flooding, or limited opportunities for irrigation. Mama Edith diversified her non-farm income options to offset these pressures on her farming. It was part of the many economic strategies Mama Edith pursued. These kinds of opportunities were not available to all other sweet potato producer or residents of Mwasongwe.

Mama Edith's non-OFSP Income Sources and Economic Strategies

Mama Edith's house rested at the top of laneway from the main road towards the lake in Mwasongwe. The recently constructed concrete home was painted a pale pink colour, surrounded by colorfully landscaped flowering plants, such as orange and fuchsia bougainvillea, and red flame trees. Anna commented on the difference between Mama Edith's garden and the field next to hers. Mama Edith's rows of maize and cow peas were weeded and in order. Her neighbour's field appeared neglected, ridges for planting maize, beans and sweet potato were undistinguishable from the walking paths as the weeds seemed to be gradually taking over. The main road leading up to the house was lined with a particular variety of cassava, exclusively grown for its tasty leaves and not the roots. The cassava plant gives an appearance a miniature ornamental tree, with broad-leafed leaves. Anna recognized the cassava, as

the same kind of leafy green vegetables sold in Buhongwa market. Since she didn't grow it herself, and it is not commonly grown, she immediately asked Mama Edith for a few clippings to take home with her. Anna also noticed a moringa[32] tree along the side of her house. She took clippings from this tree as well, in preparation for an upcoming nutritional health training event for women's groups, she was preparing to lead with TAHEA.

Mama Edith's yard showed signs of other income generating activities she pursued. Cassava root dried on a flat stone surface at the back of the house. Some farmers used cassava to brew alcohol, but most farmers will mill it to mix in with maize to make *semba* flour (to prepare *ugali*). She had chickens and two goats in the small pen in the back. There was no running water or power lines in the house. Mama Edith and her daughters, like other residents in Mwasongwe, travelled to the nearest water source within three kilometres. The government implemented a policy requiring all water sources to be situated within kilometres or less for every Tanzanian citizen (Republic of Tanzania, 2002). On average, according to Mama Edith, it takes 30 minutes to reach the water source. Even though there is no water source, the latrine is tiled, with a window looking out into the back of the house.

In the back of the house, to the left of where the chickens are housed, she showed me where she planned on building a permanent shower space, which was currently a large, recently dug out ditch. She explained that the space would include

[32] Moringa is increasingly seen in the West as a medicinal plant that is useful for many ailments, skin care and dietary needs. Even though it is not indigenous to Tanzania, it is increasingly becoming a popular plant for medicinal and nutritional value. See Ezekial et al., 2014.

a shelf to keep the bucket of water, and it would be enclosed by a wooden fence made from bamboo. "I was going to put in a new shower here, but my daughter decided to continue her studies in Mwanza city, so now I will pay for that. I'll wait to start my construction."

We talked about what else she grew on her farm and the land she uses. In total, she cultivated on 2.5 acres (1 Ha). She uses one acre surrounding her house, and the rest is planted in another plot, farther away from the lake. She rents a portion of it from another landowner in the village, but the rest is hers, through her husband and her family. Her husband, she says, is often away working, but is helpful when he is here. In addition to OFSP and other sweet potato varieties, she grows maize, rice, cassava (for both the roots and the leaves) and beans.

To OFSP promoters, Mama Edith is a 'successful farmer' because like other *Imala Gihabu* members she grew OFSP and sold it for a profit through her direct engagements with NGOs and commercial trade shows. TAHEA described her as the chef for OFSP, and she, like Mama Nane also traveled to meetings. Like other members, she also testified in meetings and in radio programs that OFSP has improved the health of her children, which is also deemed a success to the OFSP work. However, Mama Edith's prosperity stems from her own initiatives, taking advantage of opportunities to utilize the resources she has access to, while also prioritizing the needs of her daughter. Yet, this access only leads to certain short-term effects, and OFSP in Mama Edith's everyday life is just one of many opportunities for her to earn an income and look after herself and her children.

Summary of this section

Researchers, NGOs and donors highlight the prospects of the crop rather than situating the market development within the particular gendered, social, economic and political context in which it is grown and consumed. As Baden (1998) contends, "The gendered nature of marketing systems is pervasive, even though it is manifested in different ways according to the specific agro-ecological, historical, social and political context" (Baden, 1998: i). Mama Edith's experience with creating flour and other products point to her own experience of creating new products and diversifying her income sources. However, limited material support (including equipment and consistent market) diminish her potential for expanding beyond small-scale, occasional sales. These prospects are largely dependent on the institutional and political networks that support the supply of planting material, the market creation, and the framing of biofortified varieties as the more nutritious and marketable variety to potential consumers. Mama Edith's experience of producing products also demonstrate the unintended consequences of attempting to transform a subsistence crop into a commercial endeavor, and its divergence away from household benefits towards the market. Producing snack foods for her kiosk and for TAHEA utilized her harvest for food to be consumed outside her home and not for her children. This kind of marketization of OFSP is perpetuated from international and regional meetings taking place regarding the research, development and future investments of OFSP. One such meeting took place at the beginning of my fieldwork and demonstrated the origins of this discourse.

Meeting for Marketing, Processing of OFSP

In 2015, the annual regional meeting for the Sweet Potato for Health and Profit Initiative (SPHI)[33] program through the International Potato Centre (CIP) took place in Dar as Salaam. Scientists presented their latest data on various aspects of post-harvest processing and marketing of biofortified sweet potato. Previous studies had shown that sweet potato flour became rancid if stored for long periods of time. The latest research presented at the meeting centred on a comparison between sweet potato pulp (or fresh sweet potato roots that are boiled to a soft, moist and thick liquid consistency) and milled flour as an ingredient in bread and other baked products. The purpose of SPHI study was to address the risk of food loss due to lack of storage options, and to identify the techniques to produce, store and eventually process large quantities of biofortified sweet potato. Yet, sweet potato pulp required either a cold storage facility or immediate use. Proper equipment and a reliable energy source to fuel the equipment were needed to adequately process OFSP into either flour or pulp, both of which were unavailable to farmers in Mwasongwe. These discussions showed that processing and post-harvest techniques were not necessarily meant for the farmers cultivating sweet potato, but rather for investors who could supply the equipment and storage facilities for the processed products.

The SPHI meeting showcased examples of food products tested in other countries in the region. An entrepreneur from Kenya arrived at the meeting with a

[33] See Chapter 2 for a description of the International Potato Centre's (CIP) main program that led to the majority of OFSP production in the sub-Saharan African region.

pasta-making machine to demonstrate the development of sweet potato pasta in the form of gnocchi. A food scientist from Ghana arrived with two sample loaves of bread, called '*VitAbread*' made from milled sweet potato flour. A scientist from Uganda shared his sweet potato peanut butter, a blend of sweet potato flour and peanut butter. Juice, yogurt and donuts were all on display and offered for testing. Scientists displayed a successful example of a baked product manufactured and retailed in Rwanda called the 'The Golden Biscuit'. This cookie was packaged in a cylinder with yellow, gold-coloured print, and an animated orange sweet potato character in front of the cookies. The cookie itself is a hard texture and sweet to taste, with a hint of cinnamon. Meeting attendees debated the nutritional value of the cookie (especially its high levels of sugar) against the amount of beta carotene available to assess the trade-offs between nutrient and sugar content and the potential for commercial sales. Some suggested that these kinds of production examples aligned with increasing the overall access to vitamin A, while others questioned the use of sugar in the products causing other health concerns, especially in children. The debate did not mention who exactly would have access to the products, who would be able to afford the costs and where the cookies would be sold. From the supply side, there was little mention of specifically who were actually involved in creating the products. The presentation of the product at the meeting served as creating the possibility for an industry-level growth for others working in OFSP promotion in other countries, including Tanzania and without fully considering gendered labour, in the various process stages.

The meeting included a session on policy advocacy and how to bring African governments on board to encourage more farmers to grow it, and the growing interest in nutrition as a pathway towards economic growth. A representative from the African Union on the panel mentioned that as 2015 was the UN year for gender empowerment, it was an opportunity to showcase OFSP. Since the crop continues to be popularly identified as a 'women's crop' then OFSP could be a good addition to initiatives that furthered a gender empowerment agenda, which aligned with familiar and simplistic neoliberal gender framing seen in current international development discussions (Baden, 1998; Mbilinyi, 2010). Another panel member highlighted the growing interest in nutrition that started to see international movement such as the Scaling Up Nutrition (SUN)[34] and the Nutrition Report gain momentum in 2013. Yet, governments in the region, according to the panel member, did not seem on board with investing in nutrition unless there was an economic angle to it. According to advocates of OFSP, processing of the roots and highlighting the potential food products and potential for a large-scale industry emerging from the effort of farmers growing more nutritious foods could be the strategy for gaining government support. Referring back to the issue of gender empowerment, one of the original scientists involved in promoting OFSP framed the moment by suggesting, that getting government officials on board first through the potential economic gains, would be the approach to engaging with and assisting female sweet potato producers. Even though OFSP promotional materials did not explicitly mention women's empowerment as an anticipated outcome of OFSP, empowerment

[34] See http://scalingupnutrition.org/

is utilized to further the nutritionism agenda, rather than directly addressing notions of empowerment of female farmers. The scientist's comment reiterated the emphasis on OFSP and its potential, while instrumentalizing the value of who is actually growing it, who is investing in processing roots, and who benefits from these investments. According to the scientists, government support for women farmers could only happen if OFSP were accepted as a viable commercial opportunity for national economic growth. According to this logic, creating the demand for OFSP would eventually boost OFSP supply and therefore inevitably positively benefit women sweet potato growers. The conditions and factors associated with how the supply would increase seemed external to these discussions.

Summary of this Section

One of the closing remarks of the meeting raised the issue of economic incentives for large-scale acceptance of OFSP in the baking and food industry. A meeting attendee suggested that government and private investor incentive to invest in OFSP would come, only if the costs for producing OFSP pulp is determined to be considerably less than current investments in importing wheat. This labour cost associated with OFSP production is assumed to be low, as Mchinda suggests, since small-scale, mostly rural farmers perform the bulk of production in the country. As shown in other studies of Green Revolution advancements (Bezner-Kerr et al., 2012) or arguments in favour of large-scale land acquisitions (Li, 2010), increasing productivity, and associated employment prospects mask the inequalities in labour formed out of these development processes.

The ways in which the CIP and their partners researched the potential for OFSP showed a disconnect between an emphasis on the nutritional fix, embedded in OFSP, and what farmers, like Mama Edith experienced with OFSP's introduction into their farming systems over the last ten years. In previous chapters, I show how TAHEA's activities and promotional materials prepared by NGOs and researchers depicted Mama Edith as one of the successful farmers, to display the potential of the crop's success. Scientists and advocates exploring opportunities for sweet potato roots utilized the role of women in growing OFSP as a public relations strategy, and without investing in how OFSP could boost women's economic opportunities or health in the OFSP business in the long-term, and beyond producing and cultivating the crop. This is also seen in the expansion of the seed systems or vines. Alongside the growing demand for roots, parallel initiatives focused on the need to expand the access to high quality vines in larger quantities. This was also seen in the way scientists and research backed by the Bill and Melinda Gates Foundation attempted to create a new supply chain for planting materials. While the roots were seen as the means to produce other processed food items and hold the potential for creating a new flour industry, the vines were potentially seen as a means to boost farmers' income directly. As shown below, a new form of distributing vines was an integral component to converting sweet potato from solely a subsistence to a commercially viable crop for rural farmers in Mwasongwe.

Selling Vines

In order to demonstrate large-scale impact on vitamin A deficiency, larger quantities of OFSP had to be available for farmers. Lack of quality and quantity of sweet potato seed was one of the 'bottlenecks' identified by OFSP promoters (Low et al., 2017; Mcewan, 2015). Efforts focused on expanding access through commercial means: setting up a new, farmer-led system to distribute vines and extend the reach of vines out of the sweet potato growing areas to other regions in Tanzania. Yet, existing non-commercial vine distribution systems remained in operation, combining both the older varieties and biofortified varieties in Mwasongwe Village.

Planting vines required more water than the roots. Thus vines were often initially planted close to a water source. In Mwasongwe, members of *Imala Gihabu* began their sweet potato season at the plots close to the lake. Once the vines were set and have grown more nodes, farmers in Mwasongwe transplanted them upland, either close to where they lived or in other plots prepared for harvesting. This transfer frees up the land close to the water source for farmers to plant other crops. In the 2015 planting season, Mama Nane grew leafy green vegetables and okra, mostly to sell in the Buhongwa market, but also to feed her family. On a particular visit to Frederick's field by the water in January, 2016, both Anna and Frederick shared the same tip about transplanting sweet potato vines from the lowlands to uplands.

> Once the vines are ready to be transplanted, leave them out of the ground and out of the ridges for up to three days. The vines will dry out and moisture from the water in the soil will dry out. Once they are transplanted uplands, they will quickly perk up.

If the vines are depleted of the nutrients from the soil and the moisture they are receiving from the land close to the lake, then the vines will adapt better after transferring them upland, where the soil is drier, and less nutrient-rich, vines will adapt better. In other words, this strategy 'tricks' the vines to adapting from having no nutrients to having just very little in the upland soil. These methods were regularly used in sweet potato production, for both biofortified and non-biofortified varieties. As a crop widely known for withstanding long periods of drought and farmers of drought-prone areas depended on, transplanting vines from lowlands to uplands demonstrated the ways in which farmers managed the resources they had as best they could, with the limited resources available.

Circulating Vines

Sweet potato farmers practice seed saving as part of their cultivation practices. Sweet potato seeds take the form of long, quarter-inch-wide, green vines. As indicated above, attached to the vines are nodes where the roots grow underneath the soil. To preserve and maintain the seeds, farmers cut a portion of their vines before roots begin to develop. The new cutting is planted again, until it grows another 10 – 15 cm apart, and then this new vine is cut again and planted. The process continues until a desired quantity of vine cuttings is reached for the next planting season. Similar to potatoes or yams (although they are technically from a different plant family), roots can also sprout new vines, but this method risks contamination from the root or outside bacteria, which produces poorer quality vines than vines that remain rootless. Preserving vines before the roots

grow is the preferred and proven option for seed saving (Kyamanywa et al., 2011). It is a common practice amongst sweet potato farmers.

Since white and yellow varieties of sweet potato have long been considered a much needed subsistence crop, government agricultural agencies maintained seed supply. For OFSP, NGOs such as TAHEA, played a key role in providing access to vines to *Imala Gihabu* alongside the national research institutes. As mentioned in chapter 3, private businesses also stepped in once the supply of OFSP vines for the various projects could no longer be met through the national systems alone.

Between 2004 and 2016, a total of 11 projects in Tanzania promoted OFSP six involved farmers in Mwasongwe village. Earlier interventions between 2005 and 2009, specifically targeted women as receivers of planting material, based on the assumption that women managed the white and yellow sweet potato varieties and would therefore take on the new orange varieties. These free vines ensured that farmers planted OFSP and distributed the vines through existing and imported social channels, and including sweet potato seed saving and production systems already in practice.

Most women in the farmer group multiplied a set of vines as a form of seed-saving, while also growing enough sweet potato roots for themselves and their families. Some farmers were able to maintain the same set of vines for several seasons. Others, however, lost their original vines to wilting, due to drought, or depleted vine quality due to pests or viruses, or their own lack of time and labour investments into managing the vines. Over time, vines soon lost their ability to produce roots due to various uncertainties during cultivation, transfers, and

storage. Mama Edith pointed out the vines that she says she has maintained from the initial distribution in 2004. This was not the case for others. Most members of *Imala Gihabu* depended on new vine distribution from projects through TAHEA every few seasons, after their vine supply gradually depleted.

Commercializing vines

As mentioned in Chapter 4, a reduction in vines in circulation prevented any large-scale, long-term production from taking place in Tanzania. From 2009 onwards, financial investments leveraged further emphasis on commercial seed systems in order to increase supply chains that could boost overall production, where selected farmers could manage and sell seeds to interested farmers in the area. OFSP initiatives emphasized expanding the scale of production, increasing yield and generating demand for the roots (Saltzman et al., 2013). This new wave of projects was also seen to contribute to the distinction between older varieties of sweet potato and the new, improved and orange ones. In order to further OFSP's reach to rural farmers in the Mwanza region, scientists and NGO staff needed to find a way to improve the quality of 'clean' vines (or vines with little to no sign of rotting or disease), while also increasing the quantity of vines in circulation. These clean vines required a controlled environment and a carefully managed distribution process to ensure that vines remained uncontaminated by pests or unaffected by poor weather conditions, where the ultimate goal was replacing poorer quality or 'unclean' vines already in circulation.

As part of the USD $67 million dollar investment by the Bill and Melinda Gates Foundation, together with scientists from the UK and CIP designed a system of

decentralized vine multipliers (DVM). This meant that rather than solely depending on the institutional distribution of vines through the national agricultural research centres, such as Ukiriguru, farmers would be able to access vines in locations set up in and around villages where OFSP and other sweet potato varieties are grown. One of the more visible initiatives included the construction of nurseries using locally sourced materials. For Mwasongwe village, the project set up two tunnels on either end of the village, both close to the lake. 'Vine tunnels' were made with raw tree branches tied together with twine into the shape of tent. A white, translucent, breathable netting purchased from the nearby market in Buhongwa was draped over the branches and tucked into the tunnel bottom.

The team of scientists and staff from Ukiriguru who managed the DVM project pre-selected farmers to manage the tunnels. Farmers were chosen based on their past involvement in OFSP projects, and their potential for managing the nurseries/tunnels, as well as their time and resource availability. Those engaged with DVMs in both Ukerewe (near Bukonyo village) and in Mwasongwe were all male farmers, who grew commercial crops, who had larger land holdings (greater than four acres) and who had direct contact with district extension offices. Two members from *Imala Gihabu* Frederick and John, took on the management of the tunnels in Mwasongwe. There were no women from *Imala Gihabu* or outside of the group who managed other DVMs. According to one of the reports, out of all the pilot sites women managed only 28% of all DVMS in the region (Mcewan et al., 2017). Even though sweet potatoes were mostly grown by women for home consumption, and several factors influenced who was able to participate in opportunities such as

DVMs, while attracting both male and female farmers. Factors affecting participation included the necessity for added resources, the time investment involved in maintaining the vines including the construction of the tunnels, and access to and use of land close to the lake. This meant that *Imala Gihabu* members situated close to the village centre, with various land holdings (including smaller plots close to the lake) and with limited access to additional labour would have to integrate an additional activity into their farming responsibilities and their other agricultural investments. Competing reproductive work also contributed to why commercializing vine distribution excluded female sweet potato producers.

The main goal behind DVMs was to create a market for these 'clean' vines. Vines grown under the protected tunnel could be sold at a premium to farmers in the area because the contaminate-free vines offered better quality root production. I was told that group members received the clean vines for free. Frederick or John occasionally collected vines from the tunnels and delivered them to the group members in the village. Anyone from outside the group who was interested could purchase bundles of vines from the farmers. Proceeds were then returned to the group. Frederick and John reported having irregular sales from the tunnels.

Farmers in Mwasongwe who grew sweet potato but who were not members of *Imala Gihabu* were not interested in receiving vines from the tunnels. The cost of transport to collect them, plus the cost to purchase the bundles, increased the investment for a crop they were not accustomed to purchasing at all. Both group members and non-group members preferred sharing vines between themselves, despite their perceived potential for being of poorer quality, unclean or

contaminated. These vines were free and more conveniently accessible. Some farmers complained of the lack of 'clean' vines available in Mwasongwe, due to the depleting supply of vines reused over several seasons and distributed from previous projects. However, some farmers such as Mama Edith managed to replant the same vines for more seasons than estimated by promoters. Others, like Henrietta continued to use the 'contaminated' vines received from her neighbours and fellow group members without reporting a noticeable loss in yield.

DVMs were seen as a more formal, controlled system; that attempted to replace an informal, yet established and socially valued network of sweet potato growers in existence prior to the introduction of OFSP. Henrietta an *Imala Gihabu* member, explained why she didn't use the vine tunnels directly.

> I keep my vines for all the varieties from the previous season. If there is not enough I will ask my neighbour for some and if they also do not have any, I will ask TAHEA or Ukiriguru. There is no reason for me to source them from the tunnels directly.

Henrietta, like other farmers, was reluctant to invest in vines through DVMs. The new

design intended to increase the quantity and quality of vines in circulation in Mwasongwe and surrounding areas, and beyond the initial 'adopters' of OFSP to others who had heard about OSP's potential and decided to invest in it. The expectation that farmers would invest more time and labour to plant the more nutrient-rich and potentially economically-valuable vines overlooked the value that many sweet potato growers placed on informal networks and low-resource input qualities of the older varieties. These kind of institutional networks between TAHEA and the Farmer Group *Imala Gihabu* offered more than opportunities to grow OFSP.

TAHEA's mandate specifically included working with women producers and thereby ensured greater involvement of the female group members. Social networks between group members was also seen as an important aspect of OFSP cultivation in that the connection formed initially transformed into other modes of support, including informal labour sharing (as mentioned in chapter 3), micro credit borrowing, and familial support for weddings, funerals, and long-term illnesses. At the end of my fieldwork in April, 2016, the vine tunnels were still in operation and Frederick and John continued to maintain them. Mario continued to host visitors from the UK who were interested in the project and who also documented progress on sales. As of 2017, there had been no further expansion and no additional tunnels were built.

While this initiative attempted to boost the circulation of vines in sweet potato growing areas, other initiatives attempted to extend circulation to other regions in the country to farmers interested in investing in the biofortified sweet potato for the first time. As discussed below, radio programs sought to present the economic and nutritional value of OSP to a national audience to connect potential buyers with farmers, such as members of *Imala Gihabu* who could supply vines to a new market.

Selling Vines Through *Kilimo Chetu*

During the end of the of the late rains in March 2016, Anna and I caught up with Mama Edith on her front porch, underneath the overhang, and overlooking her long driveway bordered by a blend of flowering trees and cassava. Mama Edith offered us a fresh mango to slice for myself as a snack. They were in season at the time, and her tree in

the front of her house, overflowed with them, as did all the other mango trees dispersed in and around Mwasongwe village. As we were just about to chat about her recent farming activities, her phone rang. It was a woman calling from Iringa (a main trading town south of the Mwanza region) to inquire about purchasing a large order of orange sweet potato vines. Even though I could hear that she was inquiring about a purchase, Mama Edith explained to us what the phone call was about after she hung up.

> She is calling from a women's group in IRINGA in central district. She had heard about OFSP and a neighbour who listened to the radio program two years ago. The program shared contact information for those who were selling vines across the country. So the neighbour passed on my number. I explained that she still has two more weeks until she is ready to plant so she should call then and we can prepare the order for her.

Mama Edith referred to a radio program broadcasted between 2013 and 2014 on Radio Maria. TAHEA and the Ukiriguru institute took part in the project, assisting with the distribution of planting materials and participating in the radio program. *Kilimo Chetu* included an interactive component, where listeners could call into the program. As part of the programming, a 'beep to vine' service connected sellers or vine suppliers to prospective and interested buyers from across the country and in particular areas where sweet potato is not usually grown as a priority or subsistence crop.

> Announcement: Dear listener of the 'Kilimo Chetu' our agriculture program. In order to improve [our] OFSP campaign we introduce a service where you can get orange sweet potatoes vines or seeds. Beep to 0686010388 and you will receive an SMS. Reply with number 1 if you live in Dar es Salaam, Pwani, Zanzibar; and number 2 if you live in Morogoro and neighborhood and number 3 if you live in lake zone regions (Mwanza ,Geita and Mara) Welcome to you all.[35]

[35] Radio Program broadcasted on Radio Maria on January, 2014. Recorded, Translated and transcribed by Joakim Lazer in July 2015.

The radio program's staff designed the 'beep to vine' system to cover five regions in the country. Through lists of farmers who grew sweet potato obtained from CIP, the program organized farmers as vine suppliers by region. These suppliers received their vines often from the national agricultural centre, from their own seed saving strategies, or from projects that included vine distribution. Mama Nane and Frederick both shared their versions of their experiences with beep to vine and how it impacted their production and sales of OFSP. In June 2015, Mama Nane explained to Anna and me how they managed the large order.

> After the radio show, we received a phone call from a farmer who ordered vines. We had to pool all our available vines and roots together, and the group met to gather enough for the order. TAHEA helped us to arrange a truck rental and we loaded the truck that was already carrying goods to the area. We loaded the bags onto to a truck. The buyer in Iringa paid for the transportation.

None of the farmers mentioned the exact amount of profit they earned from this large order, but the total appeared to be in the millions of TSH (1 million = CAD $560). There were many occasions during my time in Mwasongwe when this story came up. It was in some ways the 'peak' of their OFSP sales and subsequent 'success' in Mwasongwe. At around this time, Frederick launched his commercial business development, Mama Nane built her concrete and brick house and Mama Edith expanded her farm activities and her businesses. Yet, success in selling OFSP vines through radio and by other means seemed dependent on the institutional and financial networks that supported the economic valuation of OFSP. Farmers relied on TAHEA to secure the initial funds, the acquisition of planting materials and the facilitation and brokering of buyers for their harvest. The radio program

contributed to the strength of NGO dependence on OFSP's success, but only within the duration of the project.

The project ended in 2015. The radio show moved onto other topics, but would still occasionally mention OFSP. Mama Edith and other farmers occasionally received calls from interested farmers looking for OFSP vines. While there was some success with increasing the market for vines through the radio program, sales remained inconsistent and dependent on the activities of the radio station. NGOs such as TAHEA negotiated for project funding that did not guarantee Mwasongwe village as a target site. Similarly, with Ukiriguru, staff working with OFSP depended on external funding for additional vine distribution and visits to project sites. By the time my fieldwork ended in April 2016, there were no further projects anticipated for Mwasongwe.

The retelling of these large sales transactions reinforced the myth of market creation and strengthened the aspirational characteristics of OFSP. Initial success brought a regional recognition and fame to the farmer group, and sales did follow, as in the case with Mama Edith's sales. Thus, the anticipation of OFSP promotion leading to further sales remained an ongoing feature in the success of the *Imala Gibahu* and their engagement with OFSP. At the same time, as seen with Mama Edith, the structural limitations are unintentionally in line with broader discussions of OFSP's prospects in that it relegates Mama Edith and other group members, not as female farmers with children, but rather, only as producers of OFSP. The processing and selling of OFSP on a large scale is imagined to occur elsewhere.

Conclusion

This chapter examined the emphasis of OFSP projects on selling OFSP and the myth of market creation as a solution to malnutrition. Highlighting the charismatic nutrient of vitamin A's nutritional and social value situated OFSP within a broader imagined market expansion. The emphasis on OFSP overshadowed the actual experiences of women who navigated choices and opportunities for income, and for providing food and better health for their families. The notion that the bread industry could be a market for large amounts of OFSP, help farmers earn higher incomes, and contribute to national economic growth while reducing dependence on wheat imports, is very far removed from the realities of farmers who engaged long-term with OFSP and who continued to negotiate opportunities stemming from the OFSP investments in the region. An emphasis on selling OFSP furthers the problematic neoliberal assumption that market creation is a solution to the social and health challenges related to malnutrition. The assumption is that large-scale sales and production would lead to population level impacts on nutritional health. Thus, commercializing sweet potato would lead to better nutritional health at the population level, as well as economic benefits and increased incomes from sales. While there is some truth to this, and while there has been some indication of increased incomes and changes in dietary health, large-scale investments and future plans for industry level OFSP production are distant from the everyday realities and opportunities for sweet potato producers; most of whom are women who continue to make their own choices for managing their health and income with and without biofortified sweet potato.

The emphasis placed by OFSP promoters on the particular components of the crop - the roots, the vines, and the expanded valuation of vitamin A overlooked the labour investments involved in growing food in general. While 'success' narratives boosted the popularity of the crop, they downplayed actual investments of women who produce biofortified sweet potato and their actual possibilities of prospering from these investments. Promoters emphasized the crop's commercial potential and advocated for growing more orange biofortified varieties than the non-biofortified varieties. At the same time, women sweet potato farmers such as Mama Edith mediated this emphasis with their own existing and changing economic pursuits. These economic pursuits were only partially supported by the OFSP promotional narrative. As a result, supplying nutrients for families and for the population at large could realistically only be partially achieved.

Chapter 6: Conclusion

The House that OFSP Built

Throughout the course of my fieldwork in Mwasongwe from June, 2015-March, 2016, Mama Nane's house had undergone a number of transformations. During my earlier visits in June 2015, the original mud brick house still stood at the back of her new cement house. After the two rainy seasons, the corners of the exterior walls were starting to crumble. Fortunately, by then, Mama Nane and her children had moved completely into the new section, adjacent to the old one. After one particular windstorm in January, 2016, the mud brick structure fell down completely. By the time I made my final visits in March, 2016, there was little trace of the old house.

Mama Nane's new home was built with concrete blocks in 2014. Since then, a few upgrades had been made. When she originally built the house, the bricks were still visible on the outside, and inside there was only a dirt floor. Many of the recent upgrades emerged from her involvement with international NGOs. In January 2016, a staff member from one of the NGOs arranged for Mama Nane to receive an honorarium for her contributions to OFSP projects over the last three years. The organization asked her what her preferred investment would be. She made a list: concrete floors inside her home, a final smooth concrete coating on her exterior walls, and a coat of orange paint to commemorate her affiliation with the orange-fleshed sweet potato. The amount of the honorarium was based on the estimated

costs of the upgrades. After texting a budget, the staff member sent the funds through Mpesa, the mobile money system in Tanzania.

By March 2016, most of the work had been completed, but not all of it. She was unable to complete one small section of flooring in her home, and she did not have the funds to purchase and paint the exterior walls orange. She said that the costs of transporting the gravel and bags of concrete were more expensive than she had budgeted for. Her health challenges over the year also contributed to the delays in upgrading her home. Her latest minor illness required her to redirect some of the funds towards covering health expenses.

Mama Nane's house upgrades exemplified how OFSP benefited her; it was a direct result of her relationship with an NGO. Over the years, she met with visitors interested in OFSP in Mwasongwe, attended meetings, and shared her stories on the radio. As she cultivated OFSP, harvested it and, at times, sold her harvest, she cultivated social relations with NGOs, and researchers promoting OFSP. These relationships led to the NGO staff member to further invest in her material needs. Mama Nane had, in fact, built a new home through all her involvement. Her house represented the success story that OFSP required to continue its expansion. Her image and her story are seen on flyers, and pamphlets, and YouTube videos. Former Prime Minister of Great Britain, David Cameron, re-told her story in London England, and she appeared in national and international research, development and media reports. NGOs working with Mama Nane were necessary brokers between OFSP promoters (agricultural development scientists, marketers and donors) and

sweet potato farmers. Mama Nane's house demonstrated the institutional and financial networks surrounding OFSP's visibility.

Yet this visibility placed the emphasis on OFSP, as the crop and the technology, as the fuel of her success. Her visibility was not based on her own abilities, her resourcefulness to navigate opportunities for generating income or her efforts to overcome her personal challenges with raising her children and grandchildren on her own. Neither was it based on the ways in which others in Mwasongwe collaborated or worked in other businesses to offset potential loss from growing more biofortified sweet potato instead of allocating land to other crops. Even though OFSP had been marketed as a potential means to boost nutritional health, and in particular, vitamin A, Mama Nane saw her engagement with OFSP as supporting her material needs, her housing and her expenses towards health. The nutritional benefits of OFSP were seasonal. The overall health impacts were minimal, and diluted by the ongoing challenges with limited affordable and available health services in Mwasongwe and the surrounding areas. For Mama Nane, the monetary benefits seemed to have overshadowed the marketed health benefits.

In 2016, as Mama Nane settled into her new concrete home in Mwasongwe, scientists were awarded the World Food Prize in Iowa, in the United States. Staff at *TIME* magazine were coming up with their annual top 25 list of inventions, of which OFSP would be one. The parallel events coincided with varying changes in the direction of OFSP promotion and in Mama Nane's engagement with OFSP projects. Several projects were coming to an end. TAHEA partnered with a different Bill and Melinda Gates Foundation project situated in Geita, a region to the west of Mwanza.

There were no projects for OFSP planned in Mwasongwe. The scientists embarked on a new phase involving synthesizing their work through academic journals, ongoing press releases and future proposals for expanding projects. Uncertainties around where OFSP would next be grown mirrored Mama Nane's uncertainties around her own sources of income, and which crops she would focus on for the next season, if OFSP vines were not expected to be available through new projects.

According to promoters of OFSP, female producers of sweet potato had the potential to improve their nutritional health, while also earning extra cash from the sale of roots and vines. As described in the previous chapters, however, the consistency and sustainability of such prospects also remained uncertain and dependent on external institutional financial inputs. OFSP success focused on the crop's value, where the labour behind the cultivation, preparation and consumption and sales transactions of the crop were undervalued. The disconnect between the global recognition of OFSP and biofortification and the actual socio-cultural and economic realities of sweet potato production regions in Tanzania revealed a number of underlying factors that are omitted in the technological, scientific framing of nutrition. The visibility of OFSP and its producers such as Mama Nane positioned female labour in farming as necessary to the story but also only to a certain extent. Aspirational versions of both the OFSP crop and the livelihoods of a female farmer in Mwasongwe served the overarching agenda of economic growth in nutritionism embedded in both agricultural development and international nutritional development discourses. In doing so, these discourses dismissed the unintended impacts of isolating a single crop production solution led by a

universalized framing of female famers. They remove dietary health, and food related challenges from their social, historical and gendered contexts while centering conditions of health as a challenge of market imperfection and inefficiency. A summary of the key findings reveal varying disconnects between the discursive networks of OFSP and material realities of female sweet potato farmers that reiterate this market-oriented the discovery and introduction of biofortified sweet potato, and the production, consumption and sales in Tanzania.

Key Findings

This thesis traced the discursive and material networks associated with a concept of 'nutrition in agricultural development' that permeated the farming and dietary practices of residents in Mwasongwe village, Tanzania. OFSP promotional discourse reinforced by the institutional and individual actors in agricultural research, nutritional science, civil society, media and government furthered the idea of nutritionism as a means to define values around dietary health and food production. In contrast, when residents in Mwasongwe shared their experiences with me, they revealed that the realities of uncertain climatic conditions, and an inconsistent availability of planting material produced translations of the concepts of farming, nutrition and managing one's health. On the one hand, projects encouraging the production and consumption of OFSP encouraged female farmers to diversify income opportunities through OFSP sales and processing. On the other, structural inequalities in terms of land and resource access, competing labour investments serve to restrict the kind of benefits available to them. Female sweet

potato farmers that were profiled in success stories and marketing campaigns benefitted through short-term project and institution-dependent networks. OFSP stories masked the actual stories of women's everyday livelihood practices. Other aspects of food systems, including the seasonal availability of food, the number and types of meals prepared and consumed and changing access to food sources due to commercialization (as in the case of the fishing industry), were all revealed to be factors in shaping dietary practices, and beyond the narratives of promoting OFSP production, consumption and sale. As an effort to piece together the non-commodified associations of food in Mwasongwe, the study revealed the social and non-economic value of cultivating food crops, preparing meals and nutritional health that surrounded OFSP promotional initiatives

Summary of Findings by Chapters

This following section summarizes the three main overarching findings based on my analysis: first, producing, consuming and selling OFSP only led to short term and seasonal gains at best for women (and some men) farmers. Second, the utilization of success stories featuring female farmers to further market OFSP overshadowed other responsibilities for labour and time investments in food systems. Lastly, OFSP projects reflected nutritional health as narrowly defined in terms of nutrient content and OFSP promotion was detached from the actual realities of growing, preparing and selling food in Mwasongwe. These findings raised questions around how scientific discourses interpret meanings of nutrition through dominant development narratives. As summarized below, a number of

unintended consequences of OFSP projects emerged from my study of the long-term promotion of biofortified sweet potato.

Chapter 2 analyzed the gradual progression of vitamin A and the hidden hunger agenda into agricultural development agendas in Tanzania and the sub-Saharan Africa region. The 'discovery' narrative of biofortified sweet potato acted as a means to initiate a re-invention of a crop for rural and resource-poor regions, with variable water access, and limited diversity of food options. The weaving of scientific studies into an international development agenda focused on protein malnutrition established a firm nutritionism discourse around dietary health in the Global South. Organizations working directly in regions that reported high degrees of malnutrition were instrumental in carrying out the activities, delivering information and material (in the case of supplementation campaigns) in order to feed into the emphasis on nutrients as an indicator of an adequate diet. This discovery of OFSP and the subsequent construction of the nutritionism discourse also showed the absence of any recognition of the gendered condition of food systems embedded in a nutritionism-framing of dietary health.

As shown in Chapter 3, the cultivation of biofortified sweet potato coincided with the production of nutritionism discourse at varying scales, and the instrumental framing of female farmers to market OFSP. In Mwasongwe village, *Imala Gihabu* members mentioned the material gains from their production of OFSP. At the same time, the historical account of agricultural development as prescribed by colonial authorities extended into dietary health, and revealed the institutional

shortcomings and disconnect between growing food and managing daily dietary health to prevent issues of malnutrition.

With the emphasis on dietary health, a close examination of dietary practices in Chapter 4 showed how inconsistent access to and availability of food due to climatic uncertainty shaped the daily food habits in Mwasongwe. Seasonal variability around agricultural practices meant risks of protein malnutrition were also seasonally present and were evident even with farmers who over the years had invested in OFSP. OFSP was meant to be available all year, but most farmers only planted it once. With few storage options, roots need to be consumed within weeks after harvest, or they eventually decay. Promotional events emphasized female household members' key role in preparing meals and ensuring the quality and quantity of food for themselves and their families. In doing so, underlying health concerns, and inadequate access to health services to accommodate these concerns, remained under-acknowledged. The ongoing emphasis by OFSP promoters on female household members as in charge of dietary practices and promoting the consumption of OFSP to improve nutritional health overshadowed actual food-related labour and time investments by women in Mwasongwe, including ongoing engagement with supplementation campaigns and mama lishe businesses.

Chapter 5 highlighted the disconnect between the discursive emphasis on the potential economic value of OFSP and the actual experience with growing, consuming and selling OFSP. As described by scientists, government representatives and NGO staff, the potential for OFSP to transform into a commercial, industrial-level crop, was detached from the actual realities and possibilities of sweet potato

producers in Mwasongwe. As indicated in the chapter, the aspirational plans of producing enough OFSP to replace the need for wheat in the bread industry (as mentioned in the media and in international science meetings) assumed that sweet potato producers would increase production and feed into the expanded industry. At the same time, NGOs working with farmers opened the idea of OFSP producers also processing and producing other OFSP products such as bread or snack foods. Yet these possibilities were only restricted to small-scale operations. Mama Edith attempted to expand her production of OFSP into processed food, such as bread and snacks, but did not have access to the equipment and additional resources needed to expand the reach beyond Mwasongwe village. This points to the disconnect between the overarching emphasis on women benefiting from OFSP in marketing the crop, and the realities of women who grow sweet potato in Mwasongwe.

Female Farmers

Overall, marketing the production, consumption sales of OFSP centred on normative gender roles, which positioned female household members as responsible for instances of poor nutrition in theirs and their children's diets. OFSP promotional discourse utilized this assumption and targeted female farmers to rectify these inadequacies. The depiction of female farmers through stories and media coverage concentrated on potential and material benefits. As shown above, OFSP promotion and production shaped a certain framing of female farmers as growing nutritious crops, but, in reality, this promotion of 'women as *'producers of nutrition'* was inhibited by certain material and financial constraints, for example

shown through women's limited engagement with OFSP commercial production, while maintaining their own small-scale subsistence farming practices...

Mama Edith and Mama Nane both grew other vegetables for sale and for household use. Mama Edith's business in the village also offers other foods and snacks for sale, generating an income for additional purchases for her and her family. Frederick also ran a mama lishe with his wife, which offered rice and beans and some fruit when available. These examples revealed that even though farmers involved in OFSP directly benefited from their involvement, other activities in the village suggested a much more complex and diverse interconnection between food, labour and nutrition. Yet, the emphasis on female farmers and their roles as producers and preparers of food continue to pervade the broader gendered context of agricultural development.

The main narratives associated with the hidden hunger agenda in promoting OFSP, where nutrients in food are the indicators of nutritional value, instrumentalized women's roles in food production and provision while their actual and diverse investments were under-acknowledged. In doing so, overall stories of success depicted female farmers as the main beneficiaries of growing and consuming OFSP, even though benefits were short-term and occasional.

An emphasis on female farmers in the narrative dismissed other labour investments in Mwasongwe that contributed to better nutrition and diets. Owners of mama lishes, who typically purchase food and add value through preparation, transport and sale of cooked dishes, are an example of alternatives to focusing solely on food production as women's economic roles. Mama lishes also indirectly reduced

the burden on females in household in terms of meal preparation. Their autonomy as food business owners challenged the normative identity of rural women as food producers as shown in media and television.

Realities of Mama Shuja Wa Chakula ("Female Food Heroes")

Near the end of my fieldwork, I took one of my last meals in Mwanza at a café in the city centre. The TV, positioned at the corner of the small room, broadcasted the last segment of the reality TV show, *Mama Shuja Wa Chakula* (Female Food Heroes). The reality TV program, funded and coordinated by Oxfam International, selected female farmers from across the country who applied to participate in farm challenges. The farmers competed for prize money, and the winners were decided according to the number of votes received by viewers. TV crews filmed the farmers as they went about their everyday activities in a specified village. They were expected to 'live in' for the duration of the shoot. While watching the show in Mwanza, the ideal female farmer was on display and the competition was centered on the most 'successful' one. More than that, the idea of female labour, as representative of a 'good farmer,' supported underlying assumption on which OFSP promotion and addressing vitamin A deficiency is based: that women's labour in food production and provision are necessary and expected, but isolated from other aspects of their lives. The program and its associated NGO-supported initiative reinforced the role of rural women in the food system, omitting other aspects of their lives that may underpin the conditions in which they farm. It raises further questions about how food production is valued, how it is perceived and who in particular benefits from the various labour and time investments. Growing food as a

means to address poor diets directly implicates female household members, especially in terms of framing nutrition on solely technical terms. This has implications of how nutrition is framed in Tanzania and globally in the future and globally, and how biofortification initiatives to address nutrition will, or will not consider the gender dimensions of food systems in their efforts to curtail malnutrition.

The Future of Biofortification and the 'Humble' Sweet Potato

Nutrition to Nourishment

As mentioned in chapter 4, dietary practices in the Mwanza region were dependent on a number of factors, including: the seasonal availability of food; climatic uncertainty; changing access to Lake Victoria, the continued burden of sourcing water from far away boreholes, and the concern about accessing arable land close to water sources. There was little or no consideration of nutrient content in the trade-offs and choices that residents in Mwasongwe made around the food they grew, ate and sold. This finding points to how nutritional health as defined by people living in Mwasongwe consists of more than just consumption foods known to contain certain nutrients such as vitamin A. *Lishe*, or nourishment in Swahili, is used to describe biofortified sweet potato, as in *viazi lishe*. Yet, as seen in the previous chapters, in the context of producing economic gains, publicity and through the expansion of social networks for those who grew it, *viazi lishe* served as a means of nourishment beyond the biophysical needs and toward the socio-economic needs. Biofortified crops such as sweet potato offered more than their non-biofortified

counterparts, and in addition to added nutrients, more income, more access to additional social networks beyond Mwasongwe village and more material gains. Mama lishes offered nourishment, in the form of freshly cooked meals and in a communal setting. Highlighting the role of Mama lishes in Mwasongwe showed how women's labour investment outside of the household was economically, socially and nutritionally valued by mama lishes themselves and by customers who frequently used their services. Meals were prepared fresh and offered to the public at a reasonable cost. Mama lishes offered a space where prepared meals and meal settings became the entry into social connection in market spaces, commercial centres and places of transition. Food consisted of more than nutrients but social nourishment, and nourishment for those in the midst of seeking their own economic means.

Experiences of mama lishes as meal providers expand our perception of the 'female food hero' beyond producers and small-scale farmers and processers to autonomous business owners. Contrary to the overarching nutritionism discourse within OFSP promotion, the scientific framing of food's value as quantifiable nutrients is only partially relevant to the social, economic and cultural context of the region. In focusing on notions of nourishment, Mwasongwe residents acknowledge the social and political conditions that shape their relationships with food and food production and provision systems. This means that the value of food is not "easily reduced, generalized or standardized into the soundbites of [nutritionism's] pedagogy" (Yates-Doerr, 2015: 294). Meals are balanced, plentiful, and offer alternatives to depending on meals made by female household members. Mama

Lishes, in some ways, fulfilled the role that proponents of OFSP hoped that biofortified sweet potato and their producers would fulfill – by providing nutrient-rich, balanced, fresh meals for themselves and their children and families, while offering the same to their neighbours and fellow citizens through market sales.

Women in food businesses that fell outside the producer/consumer roles, like mama lishes, were not recognized by the OFSP projects. Instead, their focus on dietary health's perceived value in terms of vitamin A and broader agricultural development agendas were driven by productivity and market-oriented outputs. Mama Lishes exist and have existed outside of nutritional science and agricultural development interventionist support. More so, recent political narratives under President Magufuli's leadership framed the roles of women in Tanzanian society in a particular way which affects how nutrition is narrowly interpreted and implemented on a national level.

Current Context: *Hapa Kazi Tu*

In March, 2016, the President of Tanzania, John Magufuli, was nearing the end of his first six months in office. His election campaign slogan, '*Hapa Kazi Tu'* (or here there is only work), largely focused on eliminating corruption, while boosting economic growth in high value areas such as tourism, agriculture and mining. His nickname 'the Bulldozer' reflected his perceived leadership style which involved making firm and fast decisions and bypassing political 'games' in order to achieve what he promised. His approach coincided with declining tolerance for those opposing government decisions. Reported assassination attempts, wrongful arrests and intimidation by security forces in the country are continuing to fuel

authoritarian governance practices that aims to control the political and subsequent socio-economic future of Tanzanians (HRW, 2017).

For the rural population in the country, *hapa kazi tu* was meant to ignite a desire for change and drive a collective sense of progress by and for Tanzanian citizens. For agriculture, a new agricultural strategy document released in 2016 indicated a renewed interest by the incoming President and the ruling CCM party in the sector. The strategy emphasized modernization and engagement with the private sector. The policy recognized current shortcomings between productivity and potential for processed foods that, if addressed, would reduce dependence on imported goods to meet growing urban food demands (Government of Tanzania 2016b; 12). The policy also implicitly mentioned caloric deficiency as the main nutritional health challenge. This challenge, according to the policy, should be addressed by increasing incomes for farmers, which would result in greater purchasing power, assuming that would lead to higher levels of caloric intake (Ibid, 38). It resonated with notions of 'self-reliance', as described by Lal (2015), but extending the responsibility for achieving self-reliance on its citizens. As shown through the biofortified sweet potato promotion, the gendered and social divisions of labour in production, along with underlying structural causes of poverty are not recognized within these policies that prioritize economic growth. Magufuli's emphasis on *hapa kazi tu* reiterated this priority, and focused on the work as generic, rather than on who was actually going to do it and who in the end would benefit.

Paralleling *hapa kazi tu*, the president recently instigated certain measures that also reflected his views on gender relations and what constituted 'women's work'. In 2017, Magufuli reinforced a law established in the 1960's banning pregnant adolescents and young women from continuing their education. He is quoted in a national newspaper article as saying "if they are pregnant, they are out" (HRW, 2017; Katoye, 2017). Without an option to continue their education after the birth of their children, young girls are then restricted in their opportunities for earning incomes. Rather than investing in sex education curriculum or accommodating those who are pregnant to ensure that are able to complete their studies, such a law positions unmarried pregnant young women as wrongdoers. This furthers the discourse around female inadequacies, requiring state intervention to manage it. It does not consider any responsibilities that the fathers of the (unborn) children might have.

In 2018, Magufuli also advocated for men marrying multiple women as a means to reduce dependence on prostitution (Kimbunga, 2018). The policy statement on polygamy perpetuates a narrative of women's economic dependence on marital relations rather than emphasizing women's own opportunities. Multiple news articles quoted the president as stating, "Our women are crying every day due to lack of men to marry and support them economically hence they engage in prostitution" (Ibid, 2018). Poverty, lack of job opportunities, culture and the disintegration of family unit are blamed for the trend, according to one of the news sources. However, rather than addressing underlying power dynamics, such a policy statement positions women as inherently weak and positions men as essentially

powerful. These recent political and legal references made by Magufuli, coupled with a growing concern for diminishing space for dialogue around government policies in the country shows the restrictions on opening up new opportunities for women, and the future of informal labour, such as Mama Lishes or food production in Tanzania.

One billion by 2030

Despite the obvious political obstacles for women and the ongoing economic prioritization of nutrition in national policy agenda in Tanzania, the OFSP project, with its inconsistencies and irregular uptake of sweet potato by farmers, was still recognized within international development institutions a 'successful' example of the potential for biofortification within agricultural development. As mentioned in Chapter 2, the Consultative Group for International Agricultural Research (CGIAR) managed a large portion of the biofortification initiatives that were taking place in the Global South. The scientists awarded the World Food Prize were all based in one of the networked CGIAR centres. The International Potato Centre focused on OFSP whereas Harvest Plus, another branch of the agricultural research network, focused on a different system, that selected one biofortified crop per participating country.[36] In Rwanda, this was iron-fortified beans, in India it was iron pearl millet. Nigeria took on orange or vitamin A cassava and Zambia promoted orange, vitamin A maize. Based on these preliminary studies, a further expansion from seven countries to 30 countries is expected to focus on distribution and uptake (rather than further

[36] See: https://www.ifpri.org/publication/prioritizing-countries-biofortification-interventions-using-country-level-data for background study.

testing of varieties). For Harvest Plus, enough evidence has been established showing the potential efficacy of biofortification for each participating country has been established. Harvest Plus's goal is to reach one billion people with biofortified crops by 2030 (IFPRI, 2017). These expanded programs will likely continue to implement and integrate biofortified crops in the same way as OFSP, and without full acknowledgement of the multiple financial, social and gendered conditions at varying scales that influence how various men and women engage in producing, selling, and consuming these food crops.

Climatic uncertainties and an ongoing dependence on institutional networks surrounding biofortification and nutrition interventions reveal the disconnect between narrowly defined large-scale, development and nutritional and agricultural science and finance networks defining the nutrition problem as a lack of nutrients and the realities of underlying social, economic and environmental conditions to food-related challenges. These challenges cannot be resolved solely by scientific achievement and awards, but could be better addressed by acknowledging the inherent gender considerations embedded in food production, provision and marketing in rural landscapes. Such an expansion of different experiences, perceptions, knowledges and insight should help to broaden the definition of nutrition beyond the technical components assembled as a means to economic growth, and to seek out ways to navigate food-related challenges within rather than outside of everyday realities.

References

Abu-Jawdeh, M., Becquey, E., Birba, O., Golan, J., Port, A. Le, Rawat, R., & Bold, M., (2015). HKI's Creating homestead agriculture for nutrition and gender equity program in Tanzania: baseline report, 1–96.

Addison, L., & Schnurr, M., (2015). Growing burdens? Disease-resistant genetically modified bananas and the potential gendered implications for labor in Uganda. *Agriculture and Human Values*, *33*(4), 967–978.

Allen, D. R., (2002). *Managing motherhood, Managing risk: Fertility and danger in west central Tanzania.* Ann Arbor: University of Michigan Press.

Allen, P., & Sachs, C., (2007). Women and food chains: the gendered politics of food. *International Journal of Sociology of Food and Agriculture. 15*(1), 1–23.

Alliance for a Green Revolution in Africa (AGRA), (2016). Africa agriculture status report 2016: Progress towards agricultural transformation. Retrieved January 2017 https://agra.org/wp-content/uploads/2016/06/AASR-report_2016-1.pdf

Allison, S., (2015). "*Tanzania's New President John Magufuli targets corruption with surprise visits sackings."* The Guardian*,* December 2015. Retrieved https://www.theguardian.com/global-development/2015/dec/08/tanzania-new-president-john-magufuli-targets-corruption-surprise-visits-sackings

Anderson, M., (2015)."*Tanzania's youth prepare for key role in pivotal presidential poll"* The Guardian. October, 1st, 2015. Retrieved https://www.theguardian.com/global-development/2015/oct/01/tanzania-youth-prepare-for-key-role-in-pivotal-presidential-poll.

Andrade, M. (2009). Orange Sweetpotato(OFSP). *Conference Brief #4*, International Potato Centre, Lima, 2–5.

Avakain, A., Haber, B., (2005). *From Betty Crocker to Feminist Food Studies: Critical Perspectives on Women and Food*. University of Massachusetts Press: Boston.

Aylward, C., Biscaye, P., Harris, K. P., Lafayette, M., True, Z., Anderson, C. L., & Reynolds, T., (2015). Maize Yield Trends and Agricultural Policy in East Africa Macro-Level Literature Review for Six Countries. *Evans School Policy Analysis and Research* (310), 52. https://evans.uw.edu/sites/default/files/EPAR_UW_310_National-Level_Maize%20Yield%20Trends_5.31.16.pdf

Bach, M., (2011). Charisma and rationalism in Max Weber's sociology. *Sociologia & Anthropologia, 1*(1), 51-70.

Balarajan, Y., & Reich, M. R., (2016). Political economy challenges in nutrition. *Globalization and Health, 12*(1), 70.

Berik, G., (2017). Beyond the rhetoric of gender equality at the World Bank and the IMF *Canadian Journal of Development Studies.* 5189(November).

Bezner-Kerr, R., (2005). Food Security in Northern Malawi: Gender, Kinship Relations and Entitlements in Historical Context. *Journal of Southern African Studies*, *31*(1), 53–74.

Bezner-Kerr, R., (2012). Lessons from the old Green Revolution for the new: Social, environmental and nutritional issues for agricultural change in Africa. *Progress in Development Studies* 12, (2&3) (2012) 213–229.

Bezner-Kerr, R., (2014). Lost and Found Crops: Agrobiodiversity, Indigenous Knowledge , and a Feminist Political Ecology of Sorghum and Finger Millet in Northern Malawi. *Annals of the Association of American Geographers*, *104*(January 2013), 577–593.

Bilketoff, C., Landekar, H., Kimura, A., (2014). Interrogating Moral and Quantification Discourses in Nutritional Knowledge. *Gastronomica*, *14*(3), 17–26.

Bill & Melinda Gates Foundation, (2013). Agricultural Development: Strategy Document. Retrieved: December 10th, 2012 http://www.gatesfoundation.org/agriculturaldevelopment/Documents/agricultural-development-strategy-overview.pdf.

Black, R. E., Allen, L. H., Bhutta, Z. A., Caulfield, L. E., de Onis, M., Ezzati, M., Rivera, J., (2008). Maternal and child Under-nutrition: global and regional exposures and health consequences. *Lancet*, *371* (9608), 243–60.

Bold, M. van den, & Quisumbing, A. R., Gillespie, S., (2013). Women's Empowerment and Nutrition Evidence Review, (September). International Food Policy Research Institute.

Bouis, H. E., & Saltzman, A., (2017). Improving nutrition through biofortification : A review of evidence from HarvestPlus , 2003 through 2016. *Global Food Security*, *12*(January), 49–58.

Bouis, H. E., Hotz, C., McClafferty, B., Meenakshi, J. V., & Pfeiffer, W. H., (2011). Biofortification: A new tool to reduce micronutrient malnutrition. *Food and Nutrition Bulletin*, *32.*

Brauw, A., De, Eozenou, P., & Gilligan, D., Hotz, C.,Kumar, N.,Meenakshi, J., (2015). Biofortification, crop adoption, and health information: impact pathways in Mozambique and Uganda. Harvest Plus Working Paper (21).

Brauw, A., Gilligan, D.O., Low, J., (2017). Introducing Orange Sweet Potato: Tracing the Evolution of Evidence on its Effectiveness. *African Journal of Food, Agriculture, Nutrition and Development*, *17*(2), 12106–12115.

Brigitte Chung, Y., (2017). Engendering the New Enclosures: Development, Involuntary Resettlement and the Struggles for Social Reproduction in Coastal Tanzania. *Development and Change*, *48*(1), 98–120.

Brooks, S., (2010). *Rice Biofortification: Lessons for Global Science and Development*. London: Earthscan.

Brooks, S., (2011). Is international agricultural research a global public good? The case of rice biofortification. *The Journal of Peasant Studies*, *38*(1), 67–80.

Brooks, S., & Johnson-beebout, S. E., (2012). Contestation as Continuity? Biofortification research and the CGIAR. In Sumberg, J. and Thompson, J. (Eds.) *Contested Agronomy: Agricultural Research in a Changing World*, London: Routledge. 1–28.

Brooks, S., (2013). Biofortification: lessons from the Golden Rice project. *Food Chain*, *3*, 77–88.

Brooks, S., (2015). Investing in Food Security? Philanthrocapitalism, Biotechnology and Development, in New Philanthropy and Social Justice: Debating the Conceptual and Policy Discourse. Behrooz Morvaridi (ed).

Bryceson, D. F., (1988). *Food insecurity and the social division of labour in Tanzania, 1919-1985* (Order No. U017480). Available from ProQuest Dissertations & Theses Global. Retrieved from http://search.proquest.com/docview/301499640?accountid=9894.

Bryceson, D.F., (1992). *Food Insecurity and the Social Division of Labour in Tanzania, 1919-1985.* St. Martin's Press: New York.

Bryceson, D.F., (1995). 'Gender Relations in Rural Tanzania: Power Poetics or Cultural Consensus?', in C. Creighton and C.K. Omari (eds) *Gender, Family and Household in Tanzania,* Aldershot: Avebury, 37–69..

Burchi, F., Fanzo, J., & Frison, E., (2011). The Role of Food and Nutrition System Approaches in Tackling Hidden Hunger. *International Journal of Environmental Research and Public Health*, 358–373. http://doi.org/10.3390/ijerph8020358

Callon, M., (1986). "Some elements in the sociology of translation", In J Law(Ed.).*Power, Action, Believe*, Routledge, London) pp 19-34.

Cannon, T., (2002). Gender and climate hazards in Bangladesh. *Gender and Development* 10 (2), 45–50.

Christiaensen, L., (2017). Agriculture in Africa: Telling Myths from Facts A Synthesis. *Food Policy*, *67* (February), 28.

Cloete, E., (2008). Africa's "Charismatic Megafauna" and Berlin's "Two Concepts of Liberty": Postcolony Routes to Utopia? *Politikon: South African Journal of Political Studies*, *35*(3), 257.

Coen-Flynn, S., (2005). *Food, Culture and Survival in an African City*. Palgrave: Macmillan.

Cornwall, A., & Brock, K., (2005). What do buzzwords do for development policy? a critical look at "participation", "empowerment" and "poverty reduction." *Third World Quarterly*, *26*(7), 1043–1060.

Cornwall, A., E. Harrison and A. Whitehead. (2007). Gender myths and feminist fabled: the struggle for interpretive power in gender and development. *Development and Change*, 38(1), 1-20.

Davidson, J., (2010). Cultivating knowledge: Development, dissemblance, and discursive contradictions among the Diola of Guinea-Bissau. *American Ethnologist*, *37*(2), 212–226.

Dawson, N., Martin, A., & Sikor, T., (2016). Green Revolution in Sub-Saharan Africa : Implications of imposed innovation for the wellbeing of rural smallholders. *World Development*, *78*, 204–218. https://doi.org/10.1016/j.worlddev.2015.10.008

Dettwyler, K. A. (2014). *Dancing skeletons: Life and death in West Africa* (20th anniversary ed.). Long Grove, Illinois: Waveland Press.

Dixon, J., (2016). Critical nutrition studies within critical agrarian studies: a review and analysis. *The Journal of Peasant Studies,* 6150(August), 1–9. http://doi.org/10.1080/03066150.2016.1198513

Doss, C., Meinzen-Dick, R., Quisumbing, A., & Theis, S., (2018). Women in Agriculture : Four myths, 16 (March)*Global Food Security*. http://doi.org/10.1016/j.gfs.2017.10.001

Elson, D., (1999). 'Labour Markets as Gendered Institutions: Equality, Efficiency and Empowerment Issues', *World Development*, 27(3): 611-627.

Evenson, R. E. and D. Gollin., (2003). Assessing the Impact of the Green Revolution, 1960- 2000, *Science* 300 (May): 758-762.

Ezekial, E., Shabani, O., Chamshama, M., Ngaga, Y, Mdolwa,M., (2014). Survival, growth and biomass production in moringa oleifera provenances at Gairo inland, Ruvu Coastal Region in Tanzania. *African Journal of Plant Science*. 8(1) 54-64.

Farganis, S., (1989). The Social Construction of Gender: The Turn to Fiction. In Unger,R.,(Ed.) *Representations: Social Constructions of Gender,* Amity- ville, New York: Baywood.

Feierman, S., (1991). Peasant Intellectuals: Anthropology and History in Tanzania. Madison: University of Wisconsin Press.

Ferreira, S. M., & Hofmeyr, M., (2014). Managing charismatic carnivores in small areas : large felids in South Africa. *South African Journal of Wildlife Research*, *44*(April), 32–42.

Fiorella, K. J., Camlin, C. S., Salmen, C. R., Omondi, R., Hickey, M. D., Omollo, D. O., . Brashares, J. S., (2015). Transactional fish-for-sex relationships amid declining fish access in Kenya. *World Development, 74*, 323-332.

Foucault, M., (1976). *The Will to Knowledge: The History of Sexuality Volume 1* (trans. R Hurley, 1998).

Fouéré, M., (2014). Julius Nyerere, Ujamaa, and political morality in contemporary Tanzania. *African Studies Review, 57*(1), 1-24. doi:10.1017/asr.2014.3

Franzel S., Sinja J., Simpson B., (2014). Farmer-to-farmer extension in Kenya: the perspectives of organizations using the approach. ICRAF Working Paper No. 181. Nairobi, World Agroforestry Centre. DOI: http://dx.doi.org/10.5716/WP14380.PDF

Gargani, J., Maclean, R., (2017). Scaling Science. *Stanford Social Innovation Review*. Editorial. Retrieved https://ssir.org/articles/entry/scaling_science.

Geheb, K., Kalloch, S., Medard, M., Nyapendi, A. T., Lwenya, C., & Kyangwa, M., (2008). Nile perch and the hungry of Lake Victoria: Gender, status and food in an East African fishery. *Food Policy*, *33*(1), 85–98.

Gibbons, P., (1997). The Poor Relation: A Political Economy of the Marketing Chain for Dagaa in Tanzania." *CDR Working Paper* 97.2. Center for Development, University of Copenhagen.

Gibbons, P., (2001). Civil society, locality and globalization in Tanzania: a forty-year perspective, *Development and Change* 32: 819–844.

Gillespie, S., Dr, Haddad, L., Prof, Mannar, V., MS, Menon, P., PhD, Nisbett, N., (2013). The politics of reducing malnutrition: Building commitment and accelerating progress. *Lancet, the, 382*(9891), 552-569.

Gilligan, D. O., Mcniven, S., & Quisumbing, A., (2014). Bargaining Power and Biofortification The Role of Gender in Adoption of Orange Sweet Potato in Uganda, *IFPRI Discussion Paper,* 01353(June).

Gilks, J. L., and Orr, J., (1927). The Nutritional Condition of the East African Native. *Lancet* 29(2), 560–62.

Gillespie, S., Menon, P., & Kennedy, A. L., (2015). Scaling Up Impact on Nutrition: What Will It Take ?*Advances in Nutrition,* 1 – 4, (12), 440-451. http://doi.org/10.3945/an.115.008276.

Gitabu, G., (2017). "Tanzania Challenged to invest in Orange fleshed sweet potatoes." *The Guardian.* October 9th, 2017. Retrieved December 1st, 2017. https://ippmedia.com/en/news/tanzanians-challenged-invest-orange-fleshed-sweet-potatoes.

Government of Tanzania, (2013). Summary of the Agricultural Policy. Retrieved October 16th, 2013: http://www.tanzania.go.tz/pdf/agricultureandlivestockpolicy.pdf.

Government of Tanzania, (2016). Agriculture Sector Development Strategy II (2015-2025) retrieved June 2018: http://extwprlegs1.fao.org/docs/pdf/tan160643.pdf.

Green, M., (2012). Anticipatory development: Mobilizing civil society in Tanzania. *Critique of Anthropology*, *32*(3), 309–333.

Green, M., (2010). After Ujamaa? Cultures of Governance and the Representation of Power in Tanzania. *Social Analysis*, *54*(1), 15–34.

Green, M,. (2012). Anticipatory development: Mobilizing civil society in Tanzania. *Critique of Anthropology*, *32*(3), 309–333.

G8 Cooperation Framework, (2012). G8 cooperation framework to support the New Alliance for Food Security and Nutrition in Tanzania. https://www.usaid.gov/sites/default/files/documents/1868/TanzaniaCooperationFramework.pdf

Guthman, J. (2014). Introducing Critical Nutrition: A special issue on dietary adcvice and its discontents.*) Gastronomica,* 14(3,1-4.

Gupta A., Ferguson J., (1997). Culture, power, place: Ethnography at the end of an era. In: Gupta A, Ferguson J, editors. *Culture, Power, Place: Explorations in Critical Anthropology*. Durham, NC: Duke University Press, pp 1–29.

Guyer, J., Peters, P., (1987). Introduction, in Conceptualizing the Household: Issues of Theory and Policy in Africa, Special Issue, *Development and Change*, 18,(2), 197-214.

Haddad, L., Hoddinott, J., Alderman, H., (1997). *Intrahousehold Resource Allocation in Developing Countries*. Baltimore: Johns Hopkins University Press.

Haddad, L., (2013). *Ending Undernutrition: Our Legacy to the Post 2015 Generation*, London and Brighton: Children's Investment Fund Foundation and IDS.

Hagenimana, V., A. Oyunga, J. Low, S. M. Nojoroge, S. T. Gichuki, and J. Kabira., (1999). Testing the Effects of Women Farmers' Adoption and Production of Orange-Flesh Sweet Potatoes on Dietary Vitamin A Intake in Kenya. Research Report Series 3. Washington, DC: International Center for Research on Women.

Harvest Plus, (2012). Disseminating Orange-Fleshed Sweet potato: Findings from a Harvest Plus Project in Mozambique and Uganda.IFPRI: Washington.

Haskell, M, Tanumihardojo, SA, Palmer, A., Melse-Boonstra, A., Talsma, E., Burri, B., (2017). Effect of Regular Consumption of Provitamin A Biofortified Staple Crops on Vitamin A Status in Populations in Low-Income Countries, *17*(2), 11865–11878.

Hayes-Conroy, A., Hayes-Conroy, J., (2013). *Doing Nutrition Differently: Critical approaches to Diet and Dietary Intervention*. Burlington, VT: Ashgate.

Hedges S., (2016). Sending children to school: rural livelihoods and parental investment in education in northern Tanzania. *Evolution And Human Behavior.* 37(2):142-151.

Helen Keller International, (2012). *Orange-Fleshed Sweet Potato Situation Analysis and Needs Assessment Tanzania Report*. Dar es Salaam: HKI.

Helen Keller International, (2012). "*Eat Orange! For sight and life–saving Vitamin A*" Project Brief.

Hellin, J., Dixon, J., (2008). Operationalising participatory research and farmer-to-farmer extension: the Kamayoq in Peru. *Development in Practice* 18,627-632.

Howard, M. T., Millard, A. V., (1997). *Hunger and Shame: Child Malnutrition and Poverty on Mount Kilimanjaro*. New York: Routledge.

Hodgson, D., (1999). Critical Interventions: Dilemmas of Accountability in Contemporary Ethnographic Research. *Identities*, *6*(2-3), 201–224.

Hodgson, D. L., & Mccurdy, S., (1996). Wayward Wives, Misfit Mothers , and Disobedient Daughters : " Wicked " Women and the Reconfiguration of Gender in Africa. *The Canadian Journal of African Studies*, *30*(1), 1–9.

Hotz, C., Cornelia L., Abdelrahman L., James T., Grace N., Agnes N. Masawi, R. Baingana, A., Carriquiry, de Brauw, A. Meenakshi, A., Gilligan,G., (2012a). A Large Scale Intervention to Introduce Beta Carotene Rich Orange Sweet Potato Was Effective in Increasing Vitamin A Intakes among Children and Women in Rural Uganda, *Journal of Nutrition* 142: 1871-1880.

Hotz, C., Brauw, A. Eozenou,P., Gilligan, D., Moursi, M., Munhaua, B., van Jaarsveld, P., Carriquiry, A., Meenakshi, J.V., (2012b). A large-scale intervention to introduce orange sweet potato in rural Mozambique increases vitamin A intakes among children and women., *British Journal of Nutrition*, 108(1), 163-176.

Human Rights Watch (HRW), (2017). "I had a dream to go to school: Barriers to secondary school education." Retrieved June, 2018: https://www.hrw.org/report/2017/02/14/i-had-dream-finish-school/barriers-secondary-education-tanzania.

Husted, K., (2017). "Why America is growing the most sweet potatoes since WWI" *National Public Radio*. January, Retrieved April 2017.https://www.npr.org/sections/thesalt/2017/01/19/510436364/why-america-is-growing-the-most-sweet-potatoes-since-wwii

IFPRI, (2017). "Getting to 1 Billion: Scaling Biofortification. Retrieved June, 2018: https://www.ifpri.org/event/getting-one-billion.

International Potato Centre, (2010). Sweet Potato Action For Security and Health in Africa. https://nkxms1019hx1xmtstxk3k9sko-wpengine.netdna-ssl.com/wp-content/uploads/sasha-documents/Brochure_SASHA.pdf.

Jaarsveld, P.V., Faber, M., Tanumihardjo, S.A., Nestel, P., Lombard, C.J., Benade, A.J., (2005). Beta-carotene-rich orange-fleshed sweet potato improves the vitamin A status of primary school children assessed with the modified-relative-dose-response test. *American Journal of Clinical Nutrition*, (81), 1080-1087.

Jangu, M. H. (2012). Healing Environmental Harms : Social Change and Sukuma Traditional Medicine on Tanzania ' S Extractive Frontier. *Thesis*.

Jennings, M., (2008). *Surrogates of the state: NGOs, development, and Ujamaa in Tanzania*. Bloomfield, CT: Kumarian Press, Inc.

Joosse, P., (2014). Becoming a God: Max Weber and the social construction of charisma. *Journal of Classical Sociology*, 5–21.

Jones, K. M., & de Brauw, A., (2015). Using Agriculture to Improve Child Health: Promoting Orange Sweet Potatoes Reduces Diarrhea. *World Development*, *74*, 15–24. http://doi.org/10.1016/j.worlddev.2015.04.007

Kapinga, R., Ewell, P., Jeremiah, S., Kileo, R., (1991). Sweet Potato in Tanzania Farming Systems: Implications for Research. *Research Paper, Ministry of Agriculture*, Dar Es Salaam;.

Kennedy, G., Pedro, M.R., Seghieri, C.,Nantel, G., Brouwer, I., (2007). Dietary diversity score is a useful indicator of micronutrient intake in non-breastfeeding Filipino children. *Journal of Nutrition,* 137, 1-6.

Kimbunga, A., (2018). "Magafuli supports polygamy to end prostitution." AllAfrica Retrieved June, 2018: https://allafrica.com/stories/201802120740.html.

Kimura, A.H., (2013). *Hidden Hunger: Gender and the Politics of Smarter Foods*. New York: Cornell University Press.

Kimura, A, Biltekoff, C., Murdy, J. , Hayes-Conroy, J., (2014). Nutrition as a project. *Gastronomica*, *1*(August 2014), 1689–1699. http://doi.org/10.1017/CBO9781107415324.004

Kivner, S., (2016). "Sweet Potato Vitamin A research wins World Food Prize." *BBC world News*. Retrieved March, 2018: www.bbc.com/news/science-environment-37619154

Koopman, J., (2012). Will Africa's green revolution squeeze African family farmers to death? Lessons from small-scale high-cost rice production in the Senegal River Valley. Review of African Political Economy 39, no. 133: 500–11.

Koponen, J., (1994). *Development for exploitation: German colonial policies in mainland Tanzania, 1884-1914* (2nd ed.). Helsinki, Finland: Finnish Historical Society.

Kunhlein, H., Pelto, G., (1997). *Culture, Environment and food to prevent vitamin A deficiency*. International Development Research Centre (IDRC): Ottawa, Canada.

Kyamanywa, S., Kashaija, I. N., Getu, E., Amata, R., Senkesha, N., & Kullaya, A., (2011). Enhancing Food Security through Improved Seed Systems of Appropriate Varieties of Cassava, Potato and Sweetpotato Resilient to Climate Change in Eastern Africa, *ILRI Project Report*,(November).

Lal, P., (2010). Militants, Mothers, and the National Family: Ujamaa, Gender, and Rural Development in Postcolonial Tanzania. *The Journal of African History*, *51*(November 2009), 1–20.

Lal, P., (2015). Self-reliance and the State: The multiple meanings of development in early post-colonial Tanzania. Africa: *The Journal of the International African Institute, 82(2),* 212-234.

Landekar P., (2011). Nutrition as Exposure: Nutritional Epigenetics and the new Metabolism. *Biosocieties,* 6(2), 167-94.

Langwick, S. A., (2011). *Bodies, politics, and African healing: The matter of maladies in Tanzania*. Bloomington: Indiana University Press.

Latour, B., (1986). *Science in Action: How to follow scientist and engineers in society*. Harvard: Boston.

Latour, B., (2007). *Reassembling the Social: An Introduction to Actor Network Theory*. Oxford: UK.

Law, J., (1992). Notes on the theory of the actor-network: ordering, strategy, and heterogeneity. *Systems Practice*, 5(4), 379-393.

Leavens, K., & Anderson, C. L., (2011). Gender and agriculture in Tanzania. *Evans School of Public Affairs University of Washington (EPAR)*, (Brief No. 134), 1–14.

Levinson, F.J., McLachlan, M., (1999). How did we get here? A History of International Nutrition. ed. Thomas Marchione, *Scaling Up, Scaling Down Overcoming Malnutrition in Developing Countries* (pp41-48) . Amsterdam: Gordon and Breach.

Lovett, M., (1996). "She Thinks She's Like a Man": Marriage and de-Constructing Gender Identity in Colonial Buha, Tanzania from 1943-1960." *The Canadian Journal of African Studies* 30, (1), 52-68.

Low, J., Arimond, N., Osman, B., Cunguara, F. Z., and Tschirley, D., (2007). "A food-based approach introducing orange-fleshed sweet potatoes increased vitamin A intake and serum retinol concentrations among young children in rural Mozambique." *Journal of Nutrition,* 137 (5),1320-1327.

Low, J., Lynam, B., Lemaga, C., Crissman, I. Barker, G. Thiele, S., Namanda, C., Wheatle y, M., AAndrade, M (2009). Sweetpotato in Sub-Saharan Africa**.** G. Loebenstein, G. Thottappilly (Eds.), *The Sweetpotato (*359-390). Springer Science and Business Media B.V; Dordrecht.

Low, J., Arimond, M., Labarta, R., Andrade, M., Namanda, S., (2013). The introduction of orange-fleshed sweet potato in Mozambican diets: a marginal change to make a major difference in (Jessica Fanzo, Danny Hunter, Teresa Borelli, and Fererico Mattei (eds). (pp.285 -299) *Diversifying Food and Diets: Using Agricultural Biodiversity to Improve Nutritional Health* Earthscan; London..

Low, J., Nyongesa, M., Quinn, S., Parker, M., (2015). Potato and Sweet Potato in Africa: Transforming the Value Chains for Food and Nutrition Security. CABI: UK.

Low, J. W., Mwanga, R. O. M., Andrade, M., Carey, E., & Ball, A., (2017). Tackling vitamin A deficiency with biofortified Sweet Potato in sub-Saharan Africa. *Global Food Security*, *14*(January), 23–30.

Mackenzie, F., (1991). Political economy of the environment, gender, and resistance under colonialism: Murang'a district, Kenya, 1910–1950. *Canadian Journal of African Studies / Revue Canadienne Des Études Africaines, 25*(2), 226-256.

Makoye, K., (2017). "Tanzania's ban on pregnant girls in school violates basic rights: campaigners" Reuters. https://www.reuters.com/article/us-tanzania-girls/tanzanias-ban-on-pregnant-girls-in-school-violates-basic-rights-campaigners-idUSKBN19H1FE

Mason, J. B., Lotfi, M., Dalmiya, N., Sethuraman, K., & Deitchler, M., (2001). The Micronutrient Report: Current Progress and Trends in the Control of Vitamin A, Iodine and Iron Deficiencies, Ottawa: The Micronutrient Initiative/ International Development Research Centre.

Mbabu A., Munyua H., Mulongo G., David S., Brendin M., (2015). *Learning the Smart Way: Lessons Learned by the Reaching Agents of Change Project.* International Potato Center: Nairobi..

Mbilinyi, M., (1988). Agribusiness and women peasants in Tanzania. *Development and Change*, *19*(4), 549–583. http://doi.org/10.1111/j.1467-7660.1988.tb00313.x

Mbilinyi, M., (2016). Debating Land and Agrarian Issues from a Gender Perspective. *Journal of Political Economy*, *5*(5), 2–3. http://doi.org/10.1177/2277976017699312

Mbilinyi, M., (2016). Analyzing the history of agrarian struggles in Tanzania from a feminist perspective. *Review of African Political Economy*, *43*(sup1), 115–129.

Mcewan, M., Almekinders, C., Abidin, P. E., Andrade, M., Carey, E. E., Gibson, R. W., Schulz, S., (2015). Can Small Still Be Beautiful? Moving Local Sweetpotato Seed Systems to Scale in Sub-Saharan Africa, (ii), 289–310.

Mcewan, M., & Mayanja, S., (2013). Upscaling the orange-fleshed sweetpotato in East and Central Africa, (May), 29–31.

McGarvey, S. T., (2009). Interdisciplinary translational research in anthropology, nutrition, and public health. *Annual Review of Anthropology*, *38*(1), 233–249.

McLaren, D.S., (1974). The great protein fiasco. *Lancet*, (2),93–96.

Medard, M., (2012). Relations between People, Relations about Things: Gendered Investment and the Case of the Lake Victoria fishery, Tanzania. *Signs*, *37*(3), 555–563.

Medard, M., & Wilson, D. C.,(1996). Changing Economic Problems for Women in the Nile Perch Fishing Communities on Lake Victoria. *Anthropolgica*, *38*(2), 28.

Meinzen-Dick, R, Johnson, N., Quisumbing, A., (2011). Gender, Assets , and Agricultural Development Programs: A Conceptual Framework. *CAPRi Working Paper No.99*, (99).

Mintz, S. W., & Du Bois, C. M., (2002). The Anthropology of Food and Eating. *Annual Review of Anthropology*, *31*(1), 99–119.

Mohammed, O., (2015). "Charts showing president Kikwete's economic legacy in Tanzania." Quartz Africa: Retrieved June, 2018: https://qz.com/africa/459503/charts-showing-president-jakaya-kikwetes-economic-legacy-in-tanzania.

Mojola, S. A., (2011). Fishing in dangerous waters: Ecology, gender and economy in HIV risk. *Social Science & Medicine, 72*(2), 149-156.

Moore, H. L., and Vaughn, M. (1994). Cutting Down Trees: Gender, Nutrition, and Agricultural Change in the Northern Province of Zambia, 1890–1990. Portsmounth, NH: Heinemann.

Moseley, W., Schnurr, M., & Bezner Kerr, R., (2015). Interrogating the technocratic (neoliberal) agenda for agricultural development and hunger alleviation in Africa. *African Geographical Review*, *34*(1), 1–7.

Moseley, W., (2017). "One step forward, two steps back in farmer knowledge exchange: scaling up as Fordist replication in drag" in Agronomy for Development, J. Sumberg (ed). University of Sussex: Brighton.

Mosse, D., Lewis, D., (2006). Theoretical Approaches to Brokerage and Translation in Development. In *Brokers and Translators in Development* Bloomfield, CT: Kumarian Press. http://doi.org/10.1016/j.profnurs.2015.04.010

Mosse, D., Lewis, D. eds. (2006). Development Brokers and Translators. The Ethnography of Aid and Agencies. Bloomfield, CT: Kumarian Press.

Mosse, D., (2005). Cultivating Development. London: Pluto Books.

Ngaiza, R., Mtunda, K., Low, J., (2012). Why Invest in Orange-fleshed Sweetpotato in Tanzania? A Vitamin A and Food Security Powerhouse Packed into One Root. CIP *Policy Brief*: *May*.

Ngotho, A., (2017). https://www.the-star.co.ke/news/2017/11/01/climate-change-makes-farmers-turn-to-pulses_c1661082

Ohna, I., & Kaarhus, R., (2012). No Meal without Ugali? Social Significance of Food and Consumption in a Tanzanian Village, *34*(1), 3–14.

O'Laughlin, B. (2007). A Bigger Piece of a Very Small Pie: Intra-household Resource Allocation and Poverty Reduction in Africa. *Development and Change*, *38*(1), 21–44.

O'Laughlin, B., (2008). "Missing Men? The Debate over Rural Poverty and Women-headed Households in Southern Africa." *The Journal of Peasant Studies* 25, no. 2: 1–48.

O'Laughlin, B., (2008). A Bigger Piece of a very Small Pie: Intra-household Resource Allocation and Poverty Reduction in Africa. IN Cornwall, A., Harrison, E., Whitehead, A. (eds.) *Gender Myths and Feminist Fables: The Struggle for Interpretative Power in Gender and Development.)* U.S.A: Blackwell, 21-44.

Patel, R., Bezner Kerr, R., Shumba, L., & Dakishoni, L. (2014). Cook, eat, man, woman: understanding the New Alliance for Food Security and Nutrition, nutritionism and its alternatives from Malawi. *The Journal of Peasant Studies*, *42*(1), 21–44.

Pauw, K., Thurlow, J. (2012). The Role of Agricultural Growth in Reducing Poverty and Hunger: The Case of Tanzania. In Fan and Lorch (eds) Reshaping Agriculture for Nutrition and Health. International Food Policy Research Institute; Washington D.C.

Pinstrup-Andersen, P., & International Food Policy Research Institute. (1993). *The political economy of food and nutrition policies*. Baltimore, MD: Johns Hopkins University Press.

Pittore, K., & Robinson, E., (2015). Food, Markets and Nutrition: Maximizing the Impacts of Private Sector Engagement in Tanzania: Case studies and key messages from the workshop, (April)IDS: Sussex.

Pollock, N. J., (2007). Nutrition and anthropology: Cooperation and convergences – pacific examples. *Ecology of Food and Nutrition, 46*(3-4), 245-261.

Ponte, S., (2002). *Farmers and Markets in Tanzania: How Policy Reforms Affect Rural Livelihoods in Africa.* Heinneman: Westport.

Potrykus, I., (2010). 'Lessons from the Humanitarian Golden Rice project: regulation prevents development of public good genetically engineered crop products', *New Biotechnology*, 27, 466-472.

Quisumbing, A. R., (2003). Household decisions, gender, and development: A synthesis of research. Washington, DC: International Food Policy Research Institute.

Rabinow, P., (1984). *The Foucault reader*. New York: Pantheon Books.

Rabinow, P., Rose, N., (2006). Thoughts on The Concept of Biopower Today. *Biosocieties,* 1(2), 195-217.

Radio Maria, (2014). *Kilimo Chetu* Episode 14, Broadcasted October 2014, translated July 2015.

Rai, S., Waylen, G., (2014). *New Frontiers in Feminist Political Economy,* London: Routledge.

Raschke, V., U. Oltersdorf, I. Elmadfa, M. L. Wahlqvist, A. Kouris-Blazos, and B. Cheema (2008). Investigation of the Dietary Intake and Health Status in East Africa in the 1960s: A Systematic Review of the Historic Oltersdorf Collection. *Ecology of Food and Nutrition* 47: 1–43.

Razavi, S., (2009). Engendering the Political Economy of Agrarian Change. *Journal of Peasant Studies* 36, (1), 197–226.

Republic of Tanzania, (2016). The Tanzanian Fisheries Sector: Challenges and Opportunities. September, 2016. file:///Users/MacBookAir/Downloads/The%20Tanzanian%20Fisheries%20Sector%20-%20Challenges%20and%20opportunities.pdf

Republic of Tanzania, (1997). The Planning Commission Dar Es Salaam and Regional Commissioner's Office, Mwanza Region Socio-Economic Profile. *National Parks*.

Republic of Tanzania, (2002). Water Policy. Government of Tanzania, Retrieved http://www.tzonline.org/pdf/waterpolicy20021.pdf

Richards, P., (1993). Cultivation: knowledge or performance? In: M. Hobart, ed. An anthropological critique of development: the growth of ignorance. London: Routledge, 61–78.

Rossi, B., (2006). Aid Policies and Recipient Strategies in Niger: Why Donors and Recipients Should Not Be Compartmentalized into Separate "Worlds of Knowledge". In David Mosse and David Lewis (eds.) *Development Brokers and Translators: The Ethnography of Aid and Agencies*. Kumaran Press. Illinois, 27-50.

Reich and Balarajan, (2012). Political economy analysis for food and nutrition security. HNP Discussion Paper. Washington, DC: World Bank and SAFANSI.

Republic of Tanzania, (Ministry of Health), (2015). *2025 Vision*. Retrieved January 2018: , http://www.mof.go.tz/mofdocs/overarch/vision2025.htm

Rizzo M., (2006). What was left of the groundnut scheme? Development disaster and labour market in southern tanganyika 1946–1952. *Journal of Agrarian Change, 6*(2), 205-238.

Ruel, M. T., & Alderman, H., (2013). Nutrition-sensitive interventions and programmes: How can they help to accelerate progress in improving maternal and child nutrition? *The Lancet*, (382), 536–551.

Saltzman, A., Birol, E., Bouis, H. E., Boy, E., De Moura, F. F., Islam, Y., & Pfeiffer, W. H., (2013). Biofortification: Progress toward a more nourishing future. *Global Food Security*, *2*(1), 9–17.

Scaling up Nutrition (SUN), (2014) An Introduction to the Scaling up Nutrition Movement http://scalingupnutrition.org/wp-content/uploads/2015/06/Orange_Internal_InOutline_ENG_20140415_web.pdf.

Schroeder, R., (1997). Shady Practices: Agroforestry and Gender Politics in The Gambia. University of California Press: Los Angeles.

Scott, J., (1998). Seeing like a state: How Certain Schemes to Improve the Human Condition have Failed. Yale University Press, New Haven.

Scott, J.W., (1988). Gender and the Politics of History. New York: Columbia University Press.

Scrinis, G. (2008). On the Ideology of Nutritionism. *Gastronomica*, *8*(Winter), 39–48.

Semba, R. D. (2016). The rise and fall of protein malnutrition in global health. *Annals of Nutrition and Metabolism*, *69*(2), 79–88. http://doi.org/10.1159/000449175

Sewando, P. T., (2014). Cassava value chain and its products in Morogoro rural district, Tanzania. *Development in Practice*, *24*(8), 1048–1061. http://doi.org/10.1080/09614524.2014.966653

Shikuku, K. M., Okello, J. J., Sindi, K., Ewan, M. M., Low, J., & Mcewan, M., (2014). Gender, farmer attitudes, and adoption of bio-fortified food crops in sub-Saharan Africa: The case of orange-fleshed sweetpotato in Tanzania. presentation at the Agricultural & Applied Economics Association's 2014 AAEA Annual Meeting, Minneapolis, MN, July 27-29, 2014. http://ageconsearch.umn.edu/bitstream/171425/2/Okello_4660.pdf

Sindi, K. Wambugu, S., (2012). *Going-To-Scale With Sweetpotato Vines Distribution In Tanzania Marando Bora Baseline Study, (February).* International Potato Centre: Lima.

Sindi, K., Low, J., (2010). Use of OFSP to Combat Vitamin A Deficiency in SSA through Innovative Delivery Systems.

Skarstein, R., (2005). Economic liberalization and smallholder productivity in Tanzania. From promised success to real failure, 1985-1998. *Journal of Agrarian Change*, *5*, 334–362.

Snyder, K., (2005). The Iraqw of Tanzania: Negotiating Rural Development: Camebridge: Westview Press.

Sommer, A., I. Tarwotjo, E. West, K. P. Djunaedi, A. A. Loeden, R. Tilden, L. Mele, and Aceh Study Group. (1986). Impact of Vitamin A Supplementation on Childhood Mortality: A Randomized Controlled Community Trial. *The Lancet* 1:169–73.

Sommer, A., (1995). Vitamin A deficiency and its consequences: a field guide to detection and control, 88.

Sommer, A., (2008). A Historical Review of Vitamin A Deficiency and Clinical Disease : (May), 1835–1839.

Sperber, A., (2015). "Tanzania Set for Tightest Election in History." *Foreign Policy.* Retrieved March, 2017, from: http://foreignpolicy.com/2015/10/23/tanzania-set-for-tightest-election-in-history.

Stone, G.D., Glover, D., (2016). Disembedding Grain: Golden Rice, The Green Revolution, and Heirloom Seeds in the Philippines," *Agriculture and Human Values*, V 33, 1.

Sumberg, J., (2017). *Agronomy for Development.* University of Sussex: Brighton.

Tanzania Food and Nutrition Centre, (2014). *Tanzania National Nutrition Survey*, (November), 1–96.

TIME, (2016). "Top 25 inventions of 2016". *TIME magazine online.* Retrieved March, 2018: http://time.com/4572079/best-inventions-2016/.

Tsing, A., (2005). *Friction: An Ethnography of Global Connections*. Princeton and Oxford: Princeton University Press.

Tsing, A., (1997). Transitions as Translations. In Joan C Scott, Cora Kaplan, Debra Keates (eds.) *Transitions, Environments, Translations: Feminisms in International Politics.* Routledge: New York and London, 253-272.

Tsing, A., (2015). *The mushroom at the end of the world: On the possibility of life in capitalist ruins.* Princeton University Press: Princeton.Tubjerg, T., (2007). Reflections on Charisma. *Nordic Journal of Religion and Society*. 20 (2),167-178.

Udry, C., (1996). Gender, Agricultural Production, and the Theory of the Household, *The Journal Of Political Economy*: *104*(5), 1010–1046.

UNICEF, (2007). Vitamin A Supplementation: A decade of progress. Retrieved December, 2017 from: https://www.unicef.org/publications/files/Vitamin_A_Supplementation.pdf.

UNICEF, (2013). Key facts and figures on nutrition. Retrieved December, 2017 from: https://www.unicef.org/nutrition/index_faces-of-malnutrition.html

UNICEF, (2016). Tanzania Nutrition Overview. Retrieved December, 2017 from: https://www.unicef.org/tanzania/nutrition.html

United States Agency for International Development (USAID), (2012). Progress Report: *Boosting Harvests, Fighting Poverty.* Retrieved January 10th, 2013: https://reliefweb.int/sites/reliefweb.int/files/resources/ftf_progress_report_2012.pdf

Wamboyi, J., (2015). Revisiting the economics of transactional sex: evidence from Tanzania. *Review of African political economy*,145(42),437 – 454.

Waized, B., Ndyetabula, D., Temu, A., Robinson, E., & Henson, S., (2015). *Reducing Hunger and Nutrition: Promoting Biofortified Crops for Nutrition: Lesson from Orange-fleshed Sweet Potato (OFSP) in Tanzania*, IDS: Sussex.

Weber, M., (1922 [1978]). Economy and Society, (ed G Roth and C Wittich). Berkeley, CA; London; Los Angeles, CA: University of California Press.

Wigboldus, S., Klerkx, L., Leeuwis, C., Schut, M., Muilerman, S., & Jochemsen, H., (2016). Systemic perspectives on scaling agricultural innovations. A review. *Agronomy for Sustainable Development*, (December), 36-46.

World Food Prize, (2016). "Media Release for 2016 Laureates "retrieved December, 2016: https://www.worldfoodprize.org/en/laureates/2016_andrade_mwanga_low_and_bouis/

World Health Organization, (WHO) (2017). What is Malnutrition? Retrieved: http://www.who.int/features/qa/malnutrition/en/.

Yates-Doerr, E., (2017). The Opacity of Reduction: Nutritional Black-boxing and the Meanings of Nourishment. *Food, Culture and Society,15:2, 293-313.*