

**Re-examining pathways to smallholder food security and the transformative potential of
agroecology: A case study from Malawi**

Thesis Presented to the Faculty of the Cornell Graduate School

In Partial Fulfillment of the Requirements for the Degree of Masters of Science

by

Sidney Lucille Madsen

December 2019

© 2019

Sidney Lucille Madsen

All rights reserved

Abstract: Based on interviews with small farmers in Malawi, I find that the current framing of food security in scientific literature reproduces discursive assumptions, presupposing farmers' problems and aspirations in a way that privileges production outputs for income generation as the solution to hunger. These assumptions limited the analytic power of theorized pathways to explain the mechanisms behind the way that farmers interviewed were moving towards food security. I argue instead that altering social and ecological relations of production, by which I mean control over land, labor, and farming inputs, are at least as important for smallholders' access to stable, adequate food as improvements in production outputs. Agroecology does much more to transform these relations than other agricultural paradigms, yet because of the analytical limitations of food security as a discourse, these "social and ecological pathways" to food security are overlooked. This exclusion matters because when core pathways remain invisible, the potential of paradigms like sustainable intensification to jeopardize food security by actively undermining these pathways goes unrecognized. I propose that food sovereignty provides a better narrative for understanding what matters for Malawian smallholders' food security, and the factors at play behind agricultural transitions to food security in many smallholders' contexts.

Biographical Sketch

I grew up in rural upstate New York on a small family farm. My childhood was filled with days of running through the field behind my house, catching crayfish in the creek, and weeding the garden with my sister. I watched as my mother grew all of the vegetables we needed for the summer. My mother taught me that, with the right coaxing, the earth could produce everything we needed to live. It was this beginning that gave me a deep appreciation for nature and agriculture's place in it, and which made me react so strongly to the environmental degradation I saw in the world around me. Coursework as an undergraduate at Cornell opened my eyes further to the widespread use of unsustainable farming practices and the international market dynamics that reinforce them.

My concern for the environment forced me to take action. I traveled to Mexico to work with the NGO CEDICAM, which promotes sustainable agriculture and reforestation in the Mixteca Alta. I spent the summer living with smallholder farmer families and researching the environmental and social effects of CEDICAM's work. I was impressed by the overwhelmingly positive attitude of farmers, accompanied by anecdotes of increased crop yields, better water availability, and reports of wildlife returning to reforested areas after decades of absence. I knew I needed to use my opportunities and skills as a researcher to give something back to the families that had welcomed me so completely into their homes and who were some of the wisest and most generous individuals I had ever met. This experience in Mexico galvanized a passion to research and understand the socio-environmental problems facing smallholders and community-based approaches to resolve them. Since undergraduate I have worked as a project coordinator and/or researcher in farming communities in Bolivia and Guatemala, and now Malawi.

Dedication

I dedicate this to my dad, Eugene Madsen. You showed me the value of curiosity, and the enthusiasm with which one can approach learning and life in general. I miss you every day.

Acknowledgements

This work was made possible with the support from my advisors Miguel Gomez and Rachel Bezner Kerr. I am very grateful for the time and support that Rachel made during the last two years to guide both this research and graduate studies. A talk with her did wonders to combat the bouts of self-doubt of a new graduate student, and I left most meetings feeling a renewed sense of purpose and confidence, which helped carry me to the end of this process. I was honored to work with such capable and inspiring partners during my fieldwork in Malawi. The SFHC team Laifolo, Esther, Lizzie, Dave, Chippie, Mercy, Paul, Thomas, Griselia, Vicky, Christina, and Mwapi, showed endless patience and care throughout fieldwork. The qualitative interviews and preliminary analysis performed by the dedicated efforts of the team of SFHC promoters have been fundamental to this thesis. I also thank the generous hosts that received myself and other Cornell students in their homes during fieldwork, and all the Malawian farmers that shared their snacks, stories, and homes with us. Finally, the team of Cornell students Raegan, Melissa, and Noelle were a joy to collaborate with throughout design, data collection (& Dutch blitz), and, especially in the case of Noelle- analysis and conceptualization. Throughout all stages of my thesis, I have seen my working relationships become friendships that I hope will last for many years.

I am grateful for funding from the NSF Graduate Research Fellowship Program for my graduate studies, while fieldwork was funded by the Richard Bradfield Research Award and the Daniel and Nina Carasso foundation.

Finally, I am grateful for the support of my truest of Ithacan friends, Preslava, Kiera, and Sophie, and my new colleague and friend, Stephanie. My partner, Jamie, helped me through anxious moments before conference presentations, defense, and was a steadfast support throughout the difficult times of my first couple years of graduate school. My grandmother, mom and sister have helped me to feel grounded, safe, and loved when I needed them most. My dog, Speck- the sweetest and exuberant hiking companion- forced me to take time for the other daily routines that animals need to be happy.

Table of Contents

| | |
|---|----|
| Biographical Sketch..... | 4 |
| Dedication..... | 5 |
| Acknowledgements..... | 6 |
| Table of Contents..... | 8 |
| Chapter 1: Literature Review..... | 9 |
| Chapter 2: Research Methods..... | 35 |
| Chapter 3: Results..... | 50 |
| Chapter 4: Discussion & Conclusion..... | 95 |

Chapter 1: Literature Review

1. Smallholder futures

Smallholder farmers, or families that rely on agriculture for at least part of food consumed and farm with a limited resource base (human, natural, physical capital), produce an estimated 70-75% of the food consumed in Asia, Latin America, and Sub-Saharan Africa, and 30-34% of all food consumed globally (HLPE, 2013; Ricciardi, Ramankutty, Mehrabi, Jarvis, & Chookolingo, 2018; Samberg, Gerber, Ramankutty, Herrero, & West, 2016). In addition, they produce the majority of nutrients to sustain human health, growing most vegetables, roots, and tubers consumed in these regions (Herrero et al., 2017). Cultivating a diversity of crops and crop varieties, smallholders are stewards of the world's agrobiodiversity, an increasingly crucial role as the spread of industrial agriculture has drastically narrowed agrobiodiversity globally (Campbell et al., 2017; IPBES, 2019; Jackson et al., 2012). In spite of these valuable contributions, smallholders make up a disproportionate number of the world's poorest and chronically hungry (HLPE, 2013).

Since the food and economic crisis of 2007-08 and the effects of increased international investment in biofuels and land speculation, smallholder farmers' struggle to secure a basic level of well-being has received growing international attention from state and intrastatal institutions, the private sector, civil society groups, and scholars (AGRA, 2008; GAFSP, 2017; La Via Campesina, 2008; Peter Rosset, 2009; World Bank, 2007). Two development outcomes are consistently proposed as envisioned goals for smallholder farmers, albeit by different actors: food security and food sovereignty. Food security, a term coined in 1974 by development policy

experts at the World Food Summit, “exists when all people, at all times, have physical, social, and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, 1996). Food sovereignty “is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems” (La Via Campesina, 2007).

Understandings of food sovereignty and food security have unfolded dialectically, often in opposition, sometimes in convergence, and the interpretations and relations of these concepts vary across geographies and scales (Jarosz, 2014). In some ways, there exists considerable overlap between these two goals- indeed, food sovereignty was initially proposed as the “precondition to genuine food security.” This overlap results from a noteworthy distinction between food security as a “concept” and food security as a discourse. Since its inception in the 1970s, food security has served as a term to describe the condition of adequate food intake, yet at the same time, food security has been deployed consistently within a set of prescriptive policies embedded in neoliberal ideas and agendas (Clapp 2014). It is important to note that, while food security discourse is applied to both farming and non-farming populations, it is often directed towards urban populations, despite the fact that a disproportionate number of the world’s hungry live in rural areas.

In this paper I will examine discursive framings of smallholder problems, the types of agricultural paradigms proposed as the solution to progress towards these envisioned goals, and how problem and solution are linked by scientific theorizations of farm-level pathways.

Discourse in policy

Food security gained prominence as a development objective following the world food price crisis of the 1970s. Immediately following the famines and price spikes of 1971-74, food security was equated with price stabilization and greater crop productivity, and countries pursued national self-sufficiency in food grains production through agricultural modernization, increasing mechanization and adoption of Green Revolution technologies such as high-yielding varieties and inorganic fertilizer. Influential work by Amartya Sen argued that national food availability contributed fewer deaths to famine than poverty, or lack of access to food, and in 1986, the World Bank modified the definition of food security, placing emphasis on the ability to buy food instead of self-sufficiency (Sen, 1981; World Bank, 1986). While an individual lens provided more granular detail of hunger, the redefinition of food security as an individual's purchasing power, not the ability to obtain food through other means like subsistence production, state social programs, or other forms of provisioning, coincided with the rise of neoliberal globalization policies, and the decline of Keynesian regulation of fixed exchange, which had underpinned post-Depression economic policies through the 1970s (Harvey, 2007; Jarosz, 2014; Peck & Tickell, 2002).

Neoliberalism is an economic and political logic that maintains that meeting human needs and well-being is best achieved through market mechanisms; as such, the role of the state is to facilitate the free flow of capital through liberalized markets. Major policy components are deregulation of industry, privatization of state enterprises and social services, and removal of protectionist tariffs or other barriers to free trade. In combination, these practices extend free

market relations based on principles of supply and demand to govern as many social and economic arrangements as possible (Williamson, 1990). The market's expanding influence on social life includes privileging certain ideals, such as individualism, efficiency, and self-help (Alkon & Mares, 2012; Stephenson, 2003).

The hegemonic ascendance of neoliberal ideology in the 1980s and its increasing entanglement with agricultural livelihoods is exemplified by structural adjustment programs. Structural adjustment programs, or conditional loans given by the International Monetary Fund and World Bank following the 1980s debt crisis, required indebted countries in the global South to systematically defund and devalue domestic agricultural sectors, switching from food production to export-oriented growth (McMichael, 2010). The formation of the World Trade Organization (WTO) in 1995 was evidence of the rise of neoliberal rule in international trade. Rulings by the WTO that privileged international free trade over domestic initiatives of self-sufficiency further institutionalized neoliberal ideologies into the governance of international food and agricultural systems, and facilitated the expansion of corporate power and control in national and global food systems, leading some to describe the current era as the “corporate food regime” (McMichael, 2012). These policies were imposed as remedies to a suite of mainstream development issues into which food security was grouped (Jarosz, 2014). Portraying smallholder farmers as suffering from inefficient farming practices and “yield gaps” (Cui et al., 2018; Denning et al., 2009a; Zhang et al., 2016), neoliberal rhetoric in the 21st century argues that food insecurity should be addressed by modernizing agricultural practices and technologies and further integrating smallholders into global capital markets as both producers and consumers. Progress towards these goals is facilitated most effectively by partnerships between state and transnational

agribusiness (AGRA, 2017), with the burden of responsibility for social services like hunger alleviation transferred from the state to individuals (Jarosz, 2014).

Neoliberal restructuring of international food and agricultural policies by multilateral institutions like the WTO had social and economic implications for smallholders: the uneven removal of agricultural subsidies and protective tariffs increased production costs while cheap imported grains drove down market prices (Weis, 2007). The food sovereignty movement, led by the international peasant organization, La Via Campesina, arose in 1996 to challenge unequal terms of trade, and contest the WTO's legitimacy to govern international food and agricultural policy (Jarosz, 2014; Rose, 2017). In contrast to the apolitical, technocratic rhetoric of food security discourse, food sovereignty is explicitly normative (Lee, 2013). La Via Campesina, which has grown in membership to over 200 million smallholders since its inception, critiques the power relations of neoliberal development policies, arguing that the solution to hunger and poverty is through reversing the globalization of food and agriculture institutionalized by the World Bank, WTO, corporations, and political powers. This reversal includes dismantling neoliberal trade agreements, reinvesting in domestic food production, instituting market and labor protections for farmers and rural workers, and significant land reform (Borras, 2008; La Via Campesina, 2007). Achieving farmer autonomy, or self-determination, over their inputs and outputs of production, is integral to the process and project of food sovereignty. In contrast to the individual centered in food security discourse, these goals are seen as achievable only through wider food system transformation and collective action (Rose, 2017).

Scholarship

Academic research on hunger and policies to address hunger have adopted the concept of food security in a number of different disciplines including agronomy, nutrition, and sociology; since the 1970s, definitions and metric of food security have morphed in tandem with political discourse (Coates, 2013; Jarosz, 2014). At a time of high prices and national food shortages in the early 1970s, national food availability was understood as the factor limiting adequate food for all, and scientific metrics mirrored that policy definition, using national data such as crop productivity of staple crops and total imports and exports of food compared to the caloric requirements of the population (Coates, 2013). By the end of the decade, high levels of hunger remained in countries that, following a food availability policy imperative, had modernized agricultural sectors and increased productivity. After the publication of Sen's work in 1981, which argued that domestic self-sufficiency incompletely addressed food insecurity (Sen, 1981), researchers in academic and policy institutions proposed new food security indicators to capture the condition of entitlement needed for a person to access food. Since the 1990s, household-level metrics of food insecurity including anthropometric indicators of individual nutrition, social indicators of food insecurity that capture uncertainty and inadequacy of diets such as the Household Food Insecurity Access Scale (HFIAS), and dietary diversity indices such as the Household Dietary Diversity Score (HDDS) have become standardized in food security research (Vaitla, Coates, & Maxwell, 2015). In scientific literature, the concept of food security and its indicators are often used interchangeably with those of nutrition; as the term evolved, food security and its metrics came to encompass aspects of nutritional status such as utilization of micronutrients, though measurements of nutritional status, like anthropometry, are not in themselves indicators of food security pillars like stable and certain food access (Coates, 2013).

Food sovereignty, on the other hand, is not easily quantifiable, though there is a growing body of scholarly writing on the topic (Dekeyser, Korsten, & Fioramonti, 2018; Rose, 2017; Schanbacher, 2010; Weiler et al., 2015). As Schiavoni explains, while there is a tendency in this academic work to evaluate food sovereignty as an outcome, often the object of analysis is not an endpoint, but continual efforts toward food sovereignty that actively construct an envisioned future (Schiavoni, 2017). Food sovereigntization is a continually evolving process of internal contestation and negotiation over what that outcome should be, and efforts towards realizing a vision are shaped by external state and societal forces. Due to this dynamic nature, food sovereignty studies would benefit from a historical, relational, and interactive framework (Schiavoni, 2017). This type of framework, however, does not lend itself easily to the type of scientific analysis commonly accepted by policymakers. At the same time as food sovereignty has gained momentum internationally, some corporate actors have relegated it to the social science realm, while food security retains legitimacy as a quantitatively-based hard science (Jarosz, 2014).

Competing discourses?

The food sovereignty movement directly challenges food security discourse's role in mobilizing neoliberal policy imperatives that further the social and economic marginalization of smallholder farmers. Due to this entanglement, some critical food studies scholars have expressed the desire to move away from the term food security (Schanbacher 2010; Rosset 2003). Food security scholars defend their continued engagement with the concept and indicators of food security, explaining that they avoid the normative assumptions underlying food security discourse. Clapp

(2014) argues that food security is an open-ended, descriptive condition that serves a distinct function of providing an individual lens on hunger (Clapp 2014). In this way, food security metrics serve to make knowable an important dimension of human well-being, in a way that food sovereignty does not, using scientific methods and metrics that have more legitimacy in policy circles. The question is whether scientific scholarship has indeed successfully dis-embedded food security as an indicator of human well-being from the discursive policy agenda.

As Kimura points out in her work on nutritionism, Michel Foucault's notion of *problematization* can be used to challenge the assertion that the scientific concept of food security and its related metrics remain value-free (Kimura, 2013). Scientific studies of food security do not just represent a given human state, but also the construction of a certain reality as a problem, one that should be analyzed for intervention. The circumstances that lead scientists to direct their attention to make something knowable is informed by the "networks of power, institutional mechanisms, and existing forms of knowledge" (Deacon, 2000). How scientific research, which holds a high level of legitimacy and power in modern society, is used to frame that problem, has social and cultural implications (Kimura, 2013). Just as the existing discourses, institutions, scholarship, and regulations help inform what is chosen as an object for knowledge, they are implicated in the representation of that reality; "truth is inseparable from the procedure establishing it" (Deleuze, Hand, & Hand, 1988, pg 63). This truth serves to (re)produce institutions and forms of conduct; in the context of international development, this means the type of interventions and actors that appear most appropriate for solving the problem of food security (Deacon, 2000). The concept of *problematization* helps to question whether food security scholarship, as a measurement of human well-being, can be divorced from the political

conditions that led to its identification as a problem in need of solutions. This paper will probe to what extent food security, as it is used in academic literature, produces a different or the same “truth” as the hegemonic discourses of the conjunctures in which the study of food security arose.

Food security and food sovereignty discourses are often polarized in academic and non-academic discussion as well as the types of policies they inform (Schanbacher, 2010), yet there exists common ground between them. Two of these commonalities are: 1) access to stable, adequate food (or food security as a condition) as a human right and 2) that one way to address food insecurity is through altering the existing agricultural paradigm. This second assertion is the principal focus of this paper and for that reason it is important to examine its perhaps self-evident nature.

Farm-level pathways to food security

Since the mid-2000s, a common state-level response to high levels of rural food insecurity in countries with large agricultural populations is to commit to allocating financial resources towards agricultural development (African Union, 2003), although in practice these promises have not always been honored by state governments, and the private sector holds a large share in recent agricultural investment (Fontan Sers & Mughal, 2019; GAFSP, 2017). The current state of empirical evidence of the linkage between agricultural interventions and food security and nutritional outcomes, however, is “weak and mixed at best” (Bhutta et al., 2013; Masset, Haddad, Cornelius, & Isaza-Castro, 2012; Webb & Kennedy, 2014). The discrepancy between empirical evidence and political action could be explained in a number of ways; one is the self-

evident nature of the linkage between a farmer's agricultural production and household well-being. The set of agricultural practices a farmer uses- the types of crops cultivated, the inputs applied, the cultivation techniques- all compose the basis of a farming livelihood. Targeting agricultural production is thus targeting a household's livelihood, which is intimately tied to the ability to meet dietary needs. There are many other factors linked to farmers' livelihoods: the size of landholdings, the price they receive for the commodity crops they sell, the cost of necessary services (education, healthcare)- and yet few of these are as frequently proposed or funded as points of intervention to improve food security. The current focus on agricultural development for targeting immediate issues of poverty and hunger likely exists in part because changing agricultural production is a technical solution feasible at a grassroots and policy-level, and a ripe opportunity to wed philanthropic and large-scale private sector interests (GAFSP, 2017; Patel, 2013; Paul, H., Steinbrecher, 2015).

While the relationship between agricultural interventions and food security is difficult to document in empirical work, a body of literature exists that seeks to pinpoint the causal linkage. Studies on farm-level pathways note several broad areas through which agriculture can influence nutrition: a) direct consumption of own production due to market imperfections, b) income from agriculture, and c) factors linked to gender (Carletto et al. 2015a; Hoddinott 2011; Herforth and Harris 2014). Often implicit in literature examining the first two pathways is an increase in a farm's agricultural production and productivity achieved via the agricultural intervention. Production can be eaten or sold with the income reinvested in food; in either case, the amount of food available in the household depends on an increase in the volume of crops harvested from a farmer's field. Alternatively, agricultural interventions that introduce new crops to a farming

system, such as higher-value crops or nutritionally important food crops, can improve food security through agricultural income and direct consumption pathways. Food prices are linked to household purchasing power for urban/non-farming people, but in smallholder farming households that rely on agricultural sales for their income, the relationship between lowering food prices and food security is unclear (G. Carletto et al., 2015a).

Many food security studies understand gender and direct-consumption pathways as directly related to the agricultural income pathway (C. Carletto, Corral, & Guelfi, 2017; G. Carletto, Ruel, Winters, & Zezza, 2015b; Gillespie & van den Bold, 2017; Hawkes & Ruel, 2008; J. Hoddinott, 2012; Kadiyala, Harris, Headey, Yosef, & Gillespie, 2014; Koppmair, Kassie, & Qaim, 2017; Qaim, 2017; Shankar, Poole, & Bird, 2019; Sibhatu & Qaim, 2018).

“The relevant pathway from all the input categories [of agricultural interventions] to diets and nutrition of farm households is the self-evident one – that their increased use boosts agricultural production and farm incomes (via market participation), thereby increasing the demand for dietary diversity and improved nutrition outcomes (Shankar et al., 2019).

This theorization follows economic models which posit that, where markets function properly, production and consumption decisions in farm households are completely separable. Farmers, like any rational individual, make production choices primarily to maximize profit by leveraging their comparative advantage, or specializing in the crop that would earn the highest price on their regional market, regardless of what their consumption preferences and needs are (Singh, Squire, Strauss, & World Bank., 1986). Acceptance of this “separability property” was exhibited in “conventional wisdom” of 1970s-80s agricultural development studies and policies, which saw the transition from subsistence or semi-subsistence to commercial agriculture as effective for addressing national-level economic growth and improving welfare for farming households. This

writing supported Green Revolution interventions that focused primarily on improving the productivity of a few grain crops (C. Carletto et al., 2017).

Since this time, a body of opposing literature challenged this convention, showing that general increases in productivity could come with adverse effects on smallholder households, especially for the poorest and most vulnerable groups (C. Carletto et al., 2017). The principal explanation in much food security scholarship for why smallholder farmers do not benefit from agricultural interventions that target an income pathway to food security, is the existence of market imperfections, and issues with intra-household decision-making such as gender inequity or missing market and nutritional information. Market imperfections include high transaction costs that make buying and selling food less feasible for farmers: poor and unevenly distributed market infrastructure, inadequate roads, lack of storage and distribution facilities, incomplete information, and poor access to credit (Qaim; Morduch, 1995), and are implicated in these studies as the principal reason that subsistence-oriented production remains widespread in much of rural Sub-Saharan Africa and South Asia (C. Carletto et al., 2017; G. Carletto et al., 2015b; Gillespie & van den Bold, 2017; Hawkes & Ruel, 2008; J. Hoddinott, 2012; Kadiyala et al., 2014; Koppmair et al., 2017; Qaim, 2017; Shankar et al., 2019; Sibhatu & Qaim, 2018). In recognition of the deviation of smallholder farmers from a standard economic household model, food security and nutrition scholars have developed a more nuanced view of the linkages between agricultural production, commercialization, income, and household well-being (C. Carletto et al., 2017), thus leading to the inclusion of direct-consumption and gender-equity pathways.

The theorized agricultural pathways to nutrition and food security play a significant role in the discussion and interpretation of quantitative research on the impact of agricultural policies and interventions. Depending on which pathway(s) a development institution finds most convincing, the appropriate agricultural intervention may vary, although the pathways are by no means mutually exclusive. For example, an intervention looking to work through the pathway of food production might introduce greater crop diversity to a farming system, while a development agency that finds agricultural income to be the most effective might encourage farmers to devote more land area to a cash crop. Some interventions tackle both food production and income pathways at once, for example intercropping a cash crop with a food crop (GAFSP, 2017), though pathways can also come into tension. For example, when farmers address food security via a direct-consumption pathway by diversifying crop production, some might see this as foregoing cultivation of cash crops that would better serve their food security via the income pathway (Sibhatu & Qaim, 2018). An intervention targeting the gender empowerment pathway is likely to focus more on holding workshops and trainings to alter gender norms alongside whatever new practices it promotes. In this way, the theorized pathways help to shape how we understand the potential of particular agricultural interventions to improve smallholder food security. Which variables are studied depends on the theoretical background relevant to the research; literature on farm-level pathways to food security not only influences interpretation of research findings, but the basics of research design, including which variables are measured and how that measurement is calculated. Finally, once a pathway is accepted as valid/true, a pathway itself can become an acceptable policy goal- serving almost as a stand-in for food security- a normative outcome that replaces the original end (Bose, 1998; Chatterjee, 1994).

Agricultural paradigms for food security

The idea of altering agricultural practices as a way to address food security has been widely accepted on a global scale. In smallholder communities, agricultural development policies are implemented- often deployed within discourses that explain or assume their potential to work through one of the farm-level pathways articulated in this section. While food security discourse overwhelmingly posits market access, and thus an agricultural income pathway, to food security, food sovereignty discourse emphasizes smallholder self-sufficiency and autonomy; of the existing theorizations, this approach would follow most closely a direct consumption pathway to food security.

Consistent with their oppositional standpoints on the foundational reasons for hunger and poverty, the type of paradigm shift that food security and food sovereignty discourse envision as necessary differs substantially. In the context of Sub-Saharan Africa, food sovereignty discourse legitimizes agroecology as an approach while food security discourse is linked to sustainable intensification (SI) (Bernard & Lux, 2017).

Agroecology: Agroecological approaches seek to ensure long-term productivity through the restoration of biodiversity and the full array of ecosystem functions that support food production and human well-being (i.e., clean water, nutrient cycling, and climate regulation) (Altieri, Funes-Monzote, & Petersen, 2012). Agroecology derives principles and practices for managing biodiverse farms from indigenous, local smallholder farmers' knowledge and elements of modern science in a "dialogue of wisdoms." While the science of agroecology has existed since the 1930s, growing concerns from the 1970s and onwards about the ecological impact of

industrialized agriculture, corporate consolidation of the food system, and the subsequent marginalization of small farmers, has brought it to international attention. Specific practices vary in place based on local social and environmental conditions, knowledge, and preferences but often include crop rotation, polyculture, agroforestry, cover crops and mulching, green manures, and crop-livestock mixtures (Wezel et al., 2009). Proponents of agroecology agree that there is a need to increase agricultural productivity, especially in places with yield gaps, though they also question whether increasing yields will be sufficient to reduce poverty and hunger for smallholders (Bernard & Lux, 2017). In this way, both agricultural income and direct consumption pathways, via diversified cropping systems, are considered important for reducing food insecurity.

Proponents of agroecology often center action-oriented approaches, or movements, to addressing the social dimensions of farming and food systems. As such, agroecology is considered a pillar in the construction of a food sovereign future that “helps build autonomy from unfavorable markets and restore degraded soils, and the social processes and movements that help bring these alternatives to scale” (Rosset and Martínez-Torres 2012). Seeing agroecology as inseparable from food sovereignty, many social movements assert that this agricultural paradigm will help to overthrow the hegemony of the corporate, industrial food regime, reconfiguring the food system into one controlled by smallholder producers (P. M. Rosset & Martínez-Torres, 2012).

Sustainable intensification (SI): SI focuses predominantly on improving productivity to address current and projected food system issues, while acknowledging the importance of changing diets and reducing food waste. SI emphasizes the need for efficient, productive agricultural systems-

“intensifying” production on cultivated land so as to feed the growing human population without expanding agricultural land area. The agricultural sector’s negative contributions to the environmental crisis are tackled by reducing encroachment into protected areas and reserves critical for biodiversity conservation, while increasing input efficiency and reducing fossil fuel emissions. No production approach (biotechnology, agroecology, conventional, organic) is excluded from the suite of practices needed to achieve both improved agricultural productivity and sustainability (Godfray and Garnett 2014). Despite this non-exclusion, the practices commonly applied under SI initiatives are genetic-level crop improvement such as genetically modified organisms (GMOs) and biofortified varieties, and precision agriculture technologies (AGRA, 2017; Bernard & Lux, 2017; Paul, H., Steinbrecher, 2015).

With SI approaches, poverty alleviation occurs when smallholders “progress from subsistence farming to market-oriented agriculture”(FAO, 2019b), with increased yields allowing producers to earn higher incomes through competitive participation in markets (Bernard & Lux, 2017), and thus to transition to food security principally through an agricultural income pathway.

Liberalised trade is proposed as an important strategy to reduce price volatility by importing food to cover domestic production shocks, while overall lower food prices would improve household access to food (OECD 2013; World Bank 2007; Clapp 2016). This policy approach to food security reduction through productivity and market access is consistent with the framework of food security discourse (Jarosz, 2014).

A notable difference between these two agricultural paradigms and their respective discourses, is their implications for farmers’ production relations. By production relations, I mean the social

(labor, market exchanges) and ecological foundations (soil, land, agrobiodiversity, water) of a farming livelihood.

Social relations of production

Following a political economy tradition, social relations of production are those “relations of people that shape how production is organized, including its technical conditions” (Bernstein, 2010). This includes the organization of production, distribution, and exchange, as well as property relations, which encompass physical, non-human inputs used for production of economic value, or the means of production. In the case of smallholder farmers, the means of production are the land, tools, seeds, soil amendments, and so on, and they can belong to the farmer themselves or to someone else. Social relations of production can include reproduction, which is the way that conditions of future production are secured from what is produced in the present. A household’s primary production is their harvest, and a farmer’s social relations of production determines the degree of entitlement he/she has to the harvested crops, which must be used to meet a number of different demands such as food (consumption), tools (inputs), domestic labor for household care, education and ceremonial occasions, and healthcare (Bernstein, 2010).

Proponents of SI see biotechnology as a powerful tool for adapting to climate change while producing enough food to meet the growing population’s needs (Paul, H., Steinbrecher, 2015). To access SI technologies such as hybrid or GM seeds, and other externally-produced inputs (fertilizer, bio- or chemical- herbicides/pesticides), smallholders must become more embedded in commodity markets, with commercializing production a critical step for acquiring the income necessary to purchase inputs from agro-dealers (AGRA, 2017). In an SI paradigm, commodity

markets and prices are dominant in organizing production; factors of production (seeds, fertilizer) are predominantly external to the farm, and a large share of a farmer's harvest is sold to meet production needs for the following year.

In contrast to capital-intensive SI technologies, agroecological approaches center farmers' control over production relations, attempting to build farmer self-sufficiency through knowledge and labor intensive production practices (Rose, 2017). This stance is reflected in the food sovereignty movement's opposition to GM technologies, which they argue increase corporate control and property rights over farmers' production, coercing smallholder participation in inequitable markets (Jarosz, 2014). Ninety percent of global grain trade is controlled by four agribusiness companies, three companies control 50% of the commercial seed markets, five agribusiness firms control 68% of agrochemicals sold, and seven companies controlling all fertilizer supply. In such a concentrated international market, profit in the food systems accrues to a small number of actors, who use this economic power to lobby for policy solutions and fund research that maintains their control (IPES-Food, 2016a). Agroecology reduces smallholders' dependency on commodity markets controlled by large private sector players, and thus reduces the marginalizing effects of trade and agricultural policies favored by these actors. A model of fewer external inputs, short value chains, and locally adapted seeds relies on food system circuits outside of agribusiness' control (McMichael, 2012; van der Ploeg, 2010). With greater relative autonomy, farmers are then able to re-organize their farming and market choices based on their own social and economic priorities. For many members of the food sovereignty movement, these priorities include investing in internal resources to further increase autonomy, and recovering

connectivity with consumers by building stable, nested markets within democratically organized food systems (Rose, 2017; van der Ploeg, 2010).

Ecological relations of production

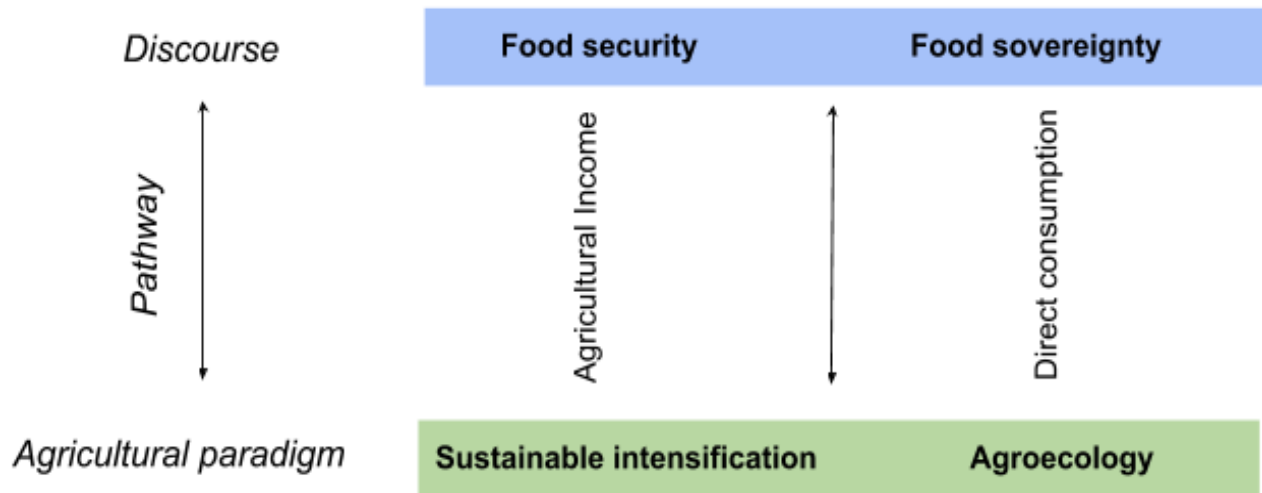
Farming practices “define human interaction with environmental conditions” and, depending on the agricultural paradigm, can serve to enhance and reproduce the ecological foundations of production and thus agricultural livelihoods, or undermine and degrade those conditions (Schneider & McMichael, 2010). Biological cycles and processes sustain the environmental conditions upon which farming production relies: primarily soil health and nutrient cycling, soil moisture and water cycling (especially in rainfed areas), and regulating services like pollination and biocontrol of pests (Zhang et al., 2007). A fundamental principle of agroecology is replacing chemically-based inputs through enhancing the ecological processes upon which agricultural production relies (Ponisio et al., 2014). While SI encompasses these approaches, and in fact explains that improving environmental performance is one of the “twin aims” of SI (H. C. J. Godfray & Garnett, 2014), wide-scale SI initiatives promote capital-intensive production inputs, like GM seeds, fertilizer, and other precision agriculture technologies, substituting manufactured growth factors in place of natural growth factors (soil biota, manure, intercropped varieties) (AGRA, 2017; GAFSP, 2017; Paul, H., Steinbrecher, 2015). This substitution or complementarity of inputs is seen as necessary to maximize yields. As such, farming activities develop by extending commodity flows, with market prices determining decision-making about agricultural production as much or more than the material and biological cycles of an agroecosystem (Friedmann, 2000; van der Ploeg, 2010).

Conclusion

While both food security and food sovereignty discourses agree that vulnerable populations have a right to stable, adequate diets, they disagree strongly on what must change to make that future possible for smallholder farmers. Food security discourse reproduces hegemonic ideas of trade and free markets as integral to a food secure future, while the food sovereignty movement decries these policies as the root of food insecurity itself. The conflation of the concept of food security as a descriptive indicator with food security as a discourse has led to the creation of opposing binaries between food security and food sovereignty. For example, although they used the term earlier in the movement, food sovereignty activists generally no longer advocate for food security. Some scholars argue that food security as a concept is a useful way to identify and understand hunger, bringing a level of granularity that is missing in food sovereignty as a project and process (Jennifer Clapp, 2014). In accordance with this argument, this study uses measurements of food security as an indicator of household well-being.

Food security and food sovereignty discourses hold that altering the agricultural practices of vulnerable smallholders is a key strategy for improving food security. Discursive differences have real implications however, for which farm-level pathway is conceptualized as most effective for translating production changes into household food security. In turn, which agricultural paradigm is considered most appropriate for alleviating hunger depends on which pathway is targeted (Fig 1).

Figure 1. Discourse, pathways and paradigms



As an analytical approach, pathway analysis can be a useful way to understand household-level processes of decision-making. Pathways matter because they are the often hidden causal logic behind a theory of change. Although it is important to note that the forces behind change are contingent and multiple, in an expert-driven development project seeking universal solutions, there is always a quest to identify and distill the nature and direction of processes through which hunger is alleviated. Understanding these processes can help decide which of the proposed agricultural paradigms (or what characteristics of those paradigms) is the most effective for achieving the envisioned change, and whether there might be something missing entirely from the equation.

Scope of study

In this study, I engage with debates in the literature, asking what is the potential of agroecology to improve smallholder food security? I also address gaps in scholarly work by examining the

pathways through which that improvement might occur. Finally, I discuss the implications of these findings for development discourse and the scientific research that informs it.

Development discourse often perpetuates assumptions of the inherent insufficiency of smallholder farming to provide an adequate level of household well-being. Rhetoric and scholarship depict smallholders as “trapped into subsistence farming,” (Radchenko & Corral, 2018), facing chronic hunger, and livelihood instability likely to be exacerbated by climate change. In such a portrayal, the problems of this population are over-simplified to create an “object of development” in a way that positions a certain solution to be best suited to meet their challenges (Ferguson, 1990). This framing is clear in the Gates Foundation’s vision of agricultural change, which locates the problem of African hunger and poverty in a low-investment, low-productivity, non-market oriented system, and the solution, embodied in the Alliance for a Green Revolution for Africa (AGRA), as the transformation to a market-oriented, highly-productive system (AGRA, 2017).

At the same time, these spaces are often characterized as “unlivable”, occupied by the dead and dying in a way that dehumanizes and obscures how these places sustain life and alternative worldviews (Barbier & Hochard, 2014; Geertz, 1963; McKittrick, 2013; Ngonghala et al., 2017); these characterizations are deployed to support policy pushes to proletarianize rural populations and consolidate landholdings through land-grabbing (Fine, F., van Wamelen, A., Lund, S., Cabral, A., Taoufik, A., Dörr, N., Leke, A., Roxburgh, C., Schubert, J., Cook, 2012; Patel, 2013). For example, AGRA’s vision includes the reduction of the number of the workforce employed in agriculture, implying an inevitable transition to only large and mid-sized

entrepreneurial farmers (Patel, 2013). In this paper I will attempt to move away from such an essentializing viewpoint of smallholders, at the same time that I avoid romanticising their situation, which in the case of the smallholder farmers in Malawi is one where basic needs are often barely met. Like many farmers around the world, this precarity is felt in the daily or seasonal struggle to provide their families with adequate quantity and quality of food.

Malawi Case Study

Malawi has a current population of 16.4 million, over 80% of who live in rural areas and rely on agriculture for their food and livelihoods. It is one of the poorest countries in the world, with 70% of the population living below the poverty line, and higher rates in rural areas (National Statistics Office (NSO) and ICF, 2017; World Bank, 2014). Smallholder farmers, working on average 1.2 hectares, grow maize as their primary staple, alongside legumes such as peanuts and beans, some tubers such as sweet potatoes and various cash crops, particularly tobacco. About one in three Malawian households experiences chronic food insecurity and calorie deficiencies (Ecker & Qaim, 2011; National Statistics Office (NSO) and ICF, 2017). The majority of arable land in Malawi is devoted to maize production, with the average crop diversity estimated at 2.3 crops per household (Kankwamba, Mapila, & Pauw, 2013). Dietary diversity is also very low; almost half of the Malawian diet consists of corn, contributing to high rates of under nutrition which, measured by child stunting (height for age), was estimated at 37% of all children under 5 years in the most recent national survey (National Statistics Office (NSO) and ICF, 2017). In the literature, high levels of food insecurity are often explained by environmental factors and low productivity farming practices. Food insecurity in Malawi has historical dimensions however; colonial and postcolonial state agricultural policies have continuously marginalized smallholder

farmers, instead privileging the interests of estate farmer, foreign donors, and business elites (Bezner Kerr and Patel 2014).

In reaction to high levels of food insecurity, in 2005 the Malawian government implemented a fertilizer and hybrid maize subsidy, or the Farm Input Subsidy Program (FISP) (Javdani, 2012), while legislation passed in 2018 restricted official seed sales to certified seed, or predominantly hybrid and GM varieties, despite the fact that the majority of farmers rely on farmer-saved seeds (Malawi Government, 2018). Over half of farming households in Malawi are reported to receive a subsidy coupon annually. FISP has had tangible benefits for multinational corporations, with Monsanto Malawi's sales increasing 85% from 2007 – 2010 (Bezner Kerr and Patel 2014).

While the government has provided coupons for some legume crops, this has been a minor activity. National-level maize production increased from a 43% food deficit to a 53% food surplus, winning FISP international acclaim as a successful program for addressing food insecurity. Recently however, the validity of these reported yield increases have been contested and there is concern that FISP is exacerbating soil degradation caused by monoculture maize cultivation even as it masks a decline in productivity that this soil degradation causes (Messina, Peter, & Snapp, 2017).

FISP follows decades of structural adjustment policies beginning in 1981, which opened up markets for seed and fertilizer to multinational companies, reduced the number of rural depots, devalued currency, and removed agricultural subsidies. Like many other low income countries, the government was forced to negotiate with the IMF in order to access loans. The roll-back of state-level services and market protections led to higher input prices and plummeting maize

prices, as well as the collapse of agricultural credit services. Once self-sufficient in maize in non-drought years, the country began to rely heavily on imported food aid and donors (Peters, 2006). More recently in the region, the Alliance for a Green Revolution in Africa has similarly advocated for making hybrid seeds and fertilizer more available to farmers, although via private companies. AGRA draws on familiar elements of food security rhetoric, emphasizing yield gaps, growing populations, and malnutrition as reasons to modernize rural populations into entrepreneurial farmers better connected to agro-dealers and the productivity-boosting technologies they provide (AGRA, 2017).

Previous research and study focus

This study builds on experience from long-term collaborative participatory action projects between Dr. Rachel Bezner Kerr and a project based at Ekwendeni Hospital, recently formalized into the non-profit organization, Soils, Food and Healthy Communities (SFHC). Using a farmer-to-farmer approach, SFHC has promoted experimentation and adoption of agroecological practices including legume cultivation, crop rotation, residue and soil organic matter management, and exchange and conservation of local seed varieties. Based on research findings, SFHC has expanded its focus from agroecological production practices to include workshops that address unequal household gender dynamics, such as household and farm division of labor, decision-making, and domestic violence. Primarily using quantitative analysis, research from SFHC villages has shown that agroecology and participatory approaches can be effective for combatting malnutrition and food insecurity (Kangmennaang et al., 2017). Based on feedback from SFHC staff and directors, the researchers in this study used qualitative methods to explore

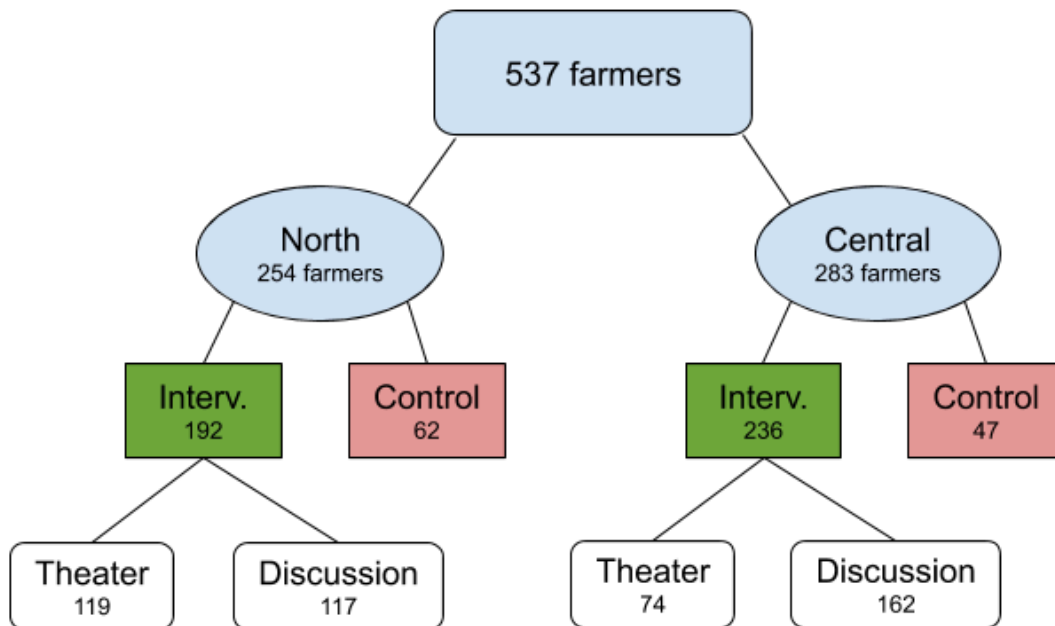
the pathways by which new practices of soil management and crop diversification led to improvements in farmers' access to stable, diverse, and adequate diets.

Chapter 2: Research Methods

I. Research design

The results presented in this paper are part of a longitudinal, three-year study, designed as a pre-post delayed intervention conducted in partnership with Soils Food and Healthy Communities (SFHC) in Malawi. Beginning in 2016, SFHC has implemented the project, “Building Sustainable and Equitable Food Systems using Participatory Communication and Agroecology in Malawi”, training farmers in the Northern district of Mzimba and the Central district of Dedza in agroecological practices, gender equity, recipe-making, and infant and maternal nutrition. An important component of the project was to understand which types of educational approaches are most effective for teaching this integrated curriculum, specifically comparing participatory knowledge transfer techniques of drama and farmer discussion groups.

Fig 2. Project participants in Northern and Central Malawi, distributed by study group



A total of 537 farmers from ten village areas in the Central and Northern regions were registered in the study; of these, eight village areas (four from each region) received immediate intervention of seed distribution and curriculum training, beginning in September 2016. The remaining two villages participated in the baseline survey but would receive the intervention beginning in 2019 (**Figure 2**). To compare the effectiveness of participatory communication methods, half of the intervention villages (two in each region) received the curriculum training in farmer discussion groups, and the other half received the training using participatory theater methods. In keeping with SFHC's farmer-to-farmer model, farmer promoters and FRTs were responsible for disseminating the trainings, after being trained themselves by SFHC staff. Promoters are regionally-based farmer leaders who are responsible for coordinating trainings, farmer meetings, and communication between their farmers and SFHC staff. FRTs are volunteer pairs of male and female farmers, democratically elected from each participating village, who help in farmer training, seed distribution, data collection and awareness raising. Like the farmer promoters, they provide support to participating farmers in their villages as they experiment with new agricultural and nutrition practices.

Research activities have included the baseline survey, yield assessments, two rounds of in-depth interviews, and an endline survey. This study was based on the second round of interviews conducted during fieldwork in the months of June-July 2018 by a research team composed of one undergraduate student and two graduate students from Cornell, five farmer promoters, and one field officer in the project. All Cornell students were involved in designing the semi-structured interview guide, and planning and carrying out the qualitative research and data

analysis workshops, with the support and feedback from SFHC staff. The Cornell students and promoters, after participating in the research workshop, conducted semi-structured interviews with project farmers, and all team members contributed to preliminary data analysis in the data analysis workshops

a. Participatory action research

The research project was planned and implemented in a way that was consistent with the principles of participatory action research (PAR). PAR is a research methodology that includes community members from the beginning of project design, implementation, and data collection itself (Méndez, Bacon, Cohen, & Gliessman, 2013). The process of PAR is iterative, with collaborators adjusting research and action through constant reflection and dialogue. Since its founding, SFHC is committed to PAR, with farmer promoters and participating farmers, included in project design and implementation, as well as the research itself. Malawian SFHC staff have years of experience conducting surveys, semi-structured and in-depth interviews, and focus groups, as well as in data analysis and writing for publication in scientific journals. Farmers' on-farm experimentation with agroecological practices and seed varieties informs project activities such as which type of seeds to distribute, and pre-existing knowledge of crop and soil management supplies valuable content for trainings. Farmer leaders also contribute to formal data collection for research in the form of on-farm yield surveys, and insect and bird biodiversity surveys.

The research team chose this approach to data collection because of its coherence with the broader socio-political position of SFHC and agroecology as a social movement, which

challenges the current development paradigm that privileges western expertise, top-down interventions, and universalized technical solutions to poverty and food security. Acknowledging that research paradigms are discursively co-created with methodology, this research method adds to efforts in participatory action research to transform how development research looks as a process and outcome. While institutions acknowledge the validity of participatory research, in practice engagement with participatory methods is often only strategic or perfunctory, without true commitment to sharing power and control of knowledge production (Cornwall, 2008); space can be made for participants to voice their opinions, but which groups speak and whether they are given the power to influence the direction of the project is another matter. Especially in development work, which is usually in communities with low levels of literacy, direct inclusion in research collection and analysis is uncommon. Yet some studies have effectively worked with community researchers to conduct qualitative research (Lentz, 2018). With SFHC's support, I integrated this method into my own research project.

b. Semi-structured interviews and community researchers

The overarching research question emerged from published results that found households who had adopted agroecological practices had achieved significant improvements in food security (Kangmennaang et al., 2017). Knowledge gaps remained to fully understand how this transformation had occurred, and investigating farm-level linkages between agroecology and food security was the principal goal of this study. The conditions, including market access, livelihood diversification, household dynamics, that facilitated some farmers' improvements in food security while limited others, were also examined. While results from previous SFHC studies informed the main thrust of the research, we designed the research protocol based on

preliminary analysis of interview transcripts from households participating in the project, as well as quantitative analysis of a baseline survey collected in January 2017 with all 537 households. After a review of existing food security literature, and drawing from the results of both quantitative and qualitative analysis, I identified key potential factors of food security and developed a semi-structured interview guide that would help identify the presence/absence of these factors at the household-level, the conditions relevant to their existence, and how they might relate to farmer adoption of agroecological practices. Data on some of these factors had already been collected for households in the baseline survey: land tenure and acreage, income sources, illness that affected farming, the size and composition of the household (head of household, number of children under 5, number of school-age children), assets and income quantity. Some of these factors were included in the baseline survey but lacked detail in relation to the project intervention, such as intra-household gender dynamics, market access, dry-season cultivation, and practices of social support. Finally, there were some topics that were largely missing from the survey data: seed access and sourcing, climate change and adaptation, food sourcing, expenditures and coping mechanisms, the nature of market relations for crop sales and perspectives on local market conditions, and the interrelated nature of individual and community food security. Semi-structured interviews were deemed the best approach to answering these questions; their flexible nature of probing allows the researcher to probe respondents further when answers hint at a relevant story, uncover an unspoken logic, or need further clarification (Maxwell, 2005). Yet the breadth of issues that are related to food security status and determinants required a structured approach to interviewing to ensure adequate detail about each household's food security status, systems of production and provisioning, and their internal within a reasonable timeframe (approximately an hour per interview).

The research proposal and interview questionnaire were designed and revised with SFHC staff's input. An initial version of the semi-structured interview guide was translated into Tumbuka and Chewa, the two Malawian languages spoken in the participating project areas. In addition to this collaboration, we extended the participatory process to the qualitative data collection itself, holding a four-day workshop to train SFHC farmer leaders in the method of semi-structured interviews. SFHC staff selected six community researchers, five farmer promoters and one farmer field officer, based on their familiarity with participating villages, level of literacy, and knowledge of the interview topic.

Based on input from Cornell students and SFHC staff, the planning behind workshop content and pedagogy held two principles in tension: scientific rigor and accessibility- maintaining the complexity of concepts and ideas, but being cognizant of the education-level of workshop participants. The goal was to adequately prepare the participants to conduct interviews, so that they would contribute rich and reliable data, and that they would gain a thorough understanding of the scientific process. Within the practical constraints of the language barrier and a limited timeframe (3-4 days), we hoped to introduce formal scientific concepts and practices to local researchers without previous training, imparting universally practical skills to be applied in our project and hopefully future research in the area. We structured the workshop to cover: concepts related to food security and agroecology, and the method and practice of qualitative interviews. Our pedagogical approach emphasized participant-generated content, small group discussion and drama, and hands-on practice.

The four day qualitative interview workshop began with an overview of the research process, from identifying questions to project design, before focusing on qualitative methods. We explained the mechanics behind the formulating of the research question and designing an interview guide, before turning to our own research topic. To adequately cover the research question and its interrelated topics, we used a brainstorming activity, where factors related to farmer food security were listed, grouped, and then organized into a concept map, with each step discussed in detail. This activity helped us to gauge the participants' familiarity with the research question and contextualize the specific questions asked in the interview guide. Next, the promoters split up into groups to read through each section of the interview guide, to become familiar with the content, as well as critique and revise the wording/translation of the guide. Drawing extensively on their own experience, SFHC staff led a session primarily focused on interviewing skills: appropriate attitude/conduct of an interviewer, obtaining informed consent, and how to effectively probe for further information. The promoters then practiced with each other in pairs, before heading to a nearby village to pilot the interview guide. This field visit was also performed in pairs, with each group accompanied by an experienced SFHC staff member who provided feedback and pointers. The translated versions of the interview guide were thus piloted and revised during a qualitative research workshop with community researchers and SFHC staff, with revisions made both to improve the accuracy of translation and the appropriateness/effectiveness of the questions themselves. As an additional training activity, all promoters were involved, either as observers or as translators, in several farmer interviews led by Cornell students. The interview guide was further modified after the Cornell researchers' first field visit, based on feedback from translators and discussion between team members.

c. Sampling methods

Based on preliminary analysis of the baseline survey, we conducted purposeful maximum variation sampling of project participants who had received the intervention. Because one aspect of the research question was to understand how heterogeneous household and market characteristics relate to variable food security levels, and the effectiveness of agroecological practices as an intervention for food security, we attempted to capture this heterogeneity in our selection of farmer participants. Households were selected based on variables that had been found to be strong predictors of food security in regression analysis of the baseline: social support, gender equity in decision-making, income level, market access, and region. This approach guided household selection, but was modified based on fieldwork logistics, such as whether or not a farmer was available at the time of the interview. Sixty farmers participating in the project were interviewed for the purpose of the study: thirty from Mzimba villages and thirty from the Dedza district. We decided on this sampling size based on methodological as well as logistical considerations.

Female-head of households were chosen as the primary respondent because of the interview guide's focus on decision-making about food sourcing and production choices, and gender equity. Women bear a disproportionate share of the workload related to upland and dry season subsistence farming, and food preparation (Bezner Kerr, 2005). For this reason, we felt women would be knowledgeable about the food purchasing and production choices explored through the interview. Also, given SFHC's focus on gender equity, we felt that if unequal gender relations existed in a household, the woman might be more likely to honestly answer questions about division of labor and decision-making. All farmers interviewed had participated in the project

trainings and activities for the past two growing seasons. While farmers had adopted practices more recently than in previous studies, SFHC staff judged that two growing seasons was enough time for farmers to be able to observe some of the dynamics of agroecological farming that were probed in the survey. The study was approved for human subjects by the Cornell IRB (Protocol # 1607006471A003) and oral informed consent was given by all participants.

d. Data collection

The farmer promoters interviewed five participating farmers each in the communities where they work and live. While the promoters' skillset was not one of classical research training, they were well equipped to be effective community researchers. As community leaders, the promoters were cognizant of relevant socio-economic or political factors localized to each village area and even each household. They had worked with respondent farmers during the past two years, and so were able to draw on previous observations of their farming practices and food security to better assess the accuracy of responses. This long-term relationship between promoters and farmers also meant that the dynamic of the interview was more likely to be open and trusting than that of an interview with a foreign student. Certainly, the promoters were far better at picking up on social cues, such as nervous laughter or hesitant responses, and comfortably following up to elucidate the root of this reaction. As fellow farmers applying the same agroecological practices addressed in the interviews to their own farmsteads, the promoters could draw on experiential knowledge to identify responses that merited further probing. Finally, many of the practices and trainings promoted by SFHC directly challenge existing norms around agricultural practices, gender roles, and environmental stewardship. Through their experience both as students and teachers of SFHC's training materials, the promoters had developed advanced skills in critical

thinking, which are fundamental to good qualitative interviewing. Many of the skills of community researchers were identified through SFHC staff's own experience performing qualitative interviews on similar topics within other project villages. SFHC staff's input was also crucial for designing workshop content that stressed caveats to threats to research validity that might be more common for a community researcher.

At the same time that the promoters' conducted their interviews, the Cornell students performed interviews with participating farmers, hiring translators who were familiar with the village areas and interview content. To gain greater depth of the local and household context, the Cornell team members conducted homestays in farming households in the village areas during data collection visits, eating meals, sleeping, and chatting with their hosts. Farmer Research Teams (FRTs) guided the students and their translators to participants, and performed introductions before the interviews, which were performed at the home of the selected farmer. This approach to both introductions and interview setting was logistically convenient, but also was an effort to create a more open and trusting atmosphere between interviewer and interviewee, to make the interview process more enjoyable and improve the validity of interview responses.

e. Data analysis

Upon completion of the interviews, two data analysis workshops were held, one in Mzimba with the promoters from that region, and one in Dedza with the respective community researchers. The aim of these workshops was to train the promoters in basic data analysis skills, demonstrate how the Cornell students would be using the interviews that the promoters had performed, and produce initial results to immediately share with participating communities. At the time of the

data workshop, the interviews had been conducted so recently that no interviews had been formally transcribed, so while a short activity with an interview transcription was included to explain the process of coding, the data analyzed came primarily from written field notes and “head notes” of the interviewers. This type of data was available because of how recently the interviews had happened. To facilitate data sharing, we prompted for farmers’ stories to narrate a more complete picture of a household’s food security . We also moved question by question through major sections of the interview guide, noting the responses we had heard frequently and those that had stood out as “anomalous”. This “data” was written by a notetaker and then grouped into categories, with in-depth discussion about the relationships between categories, and then organized to answer the research question. Finally, promoters selected key preliminary findings to present to the regional FRT at a meeting the next day.

The 60 interviews, five from each team member, were translated and transcribed by experienced Malawian students identified by SFHC staff. After receiving the transcription files, the interview was de-identified before importing it to Atlas TI for coding, with a master copy stored securely on Cornell Box. Based on notes from the data analysis workshop, an initial codebook elaborated in the field, and a literature review, myself and the undergraduate student created a codebook using a thematic coding approach, which we piloted together and then individually before revising the document into a final codebook, of 241 codes in 19 code groups, complete with specific definitions (appendix?). The process of qualitative coding involved intense collaboration to calibrate our coding techniques, in order to ensure that both team members were applying codes to the same types of data. We used a combination of descriptive, attribute, and value-coding in the first cycle of coding, choosing to post-pone the creation of interpretive codes and

categories until later in the coding process. After reading and coding all of the interviews, we returned to the original research question to frame our analysis. We then used a mixture of inductive/deductive logic to group codes and to create the conceptual model that helped to structure the results and discussion sections of this paper. Based on the literature review conducted before the research trip, we had an existing conceptual map that we found inaccurately represented farmers' stories. Hours of discussion between the research team members led to a rough iteration of this conceptual map, which was then modified with input from colleagues, SFHC staff, and academic advisors over a number of months. For each code group, we compiled all relevant interview excerpts into a single document to gain a richer understanding of the concept by examining variation in farmers' responses.

During a final trip to Malawi in January 2019, I received feedback from the farmer promoters and SFHC staff on the conceptual model and interpretation of key codes and categories generated during the qualitative coding and analysis. During a two day writing retreat, members of SFHC staff and three of the farmer promoters who had conducted the interviews, reviewed the coding categories and related interview excerpts. We discussed the meanings of the categories and whether they represented an accurate interpretation of farmers' responses. Staff and promoters gave feedback on the explanatory power of the conceptual models; whether they felt that it accurately captured the farmers' stories, and if there might be an alternative way of understanding the data.

II. Outcomes of collaboration with community researchers

We found that this research approach yielded many benefits to the Cornell students and community researchers. As expected, including promoters directly in the research process increased the transparency and accountability of project members. The framework behind the research design, as well as the data collection and analysis, were exposed to promoters' scrutiny. The results were also immediately communicated to participating communities, avoiding the lag-time that often leaves those farmers interviewed wondering what happened to their contribution to the research project. The Cornell students also found that this method served as a form of respondent validation (Torrance, 2012). During the data analysis workshop, it became clear that promoters' familiarity with the participating farmers and their cultural context gave them the ability to discern truthful vs. untruthful responses, giving invaluable depth to analysis. Farmers' responses may have been changed based on the positionality of the interviewer. For Cornell student interviewers, it is possible that a farmer would not feel comfortable speaking about personal issues they might find shameful to tell an outsider, like hunger, alcoholism, or gender inequity in the household, it also could be that interviewees would be more likely to exaggerate these issues if they thought that it would lead to continued support from the project. For promoter interviewers, farmers may have overstated their utilization of the practices or success, so that the promoters would be impressed with how well they had applied the trainings. Comparing data between Cornell researchers and community researchers was particularly illuminating as a type of triangulation: we were better able to identify differences in responses related to the positionality of interviewer, and consistency in responses helped us to feel more confident in their truthfulness.

In keeping with a participatory action research methodology, incorporating promoters into the research process was an effective form of capacity-building and empowerment. At the end of the data analysis workshop, we encouraged farmer promoters to identify a research question that they would like to ask, and then planned how they would go about answering this question. Through this activity, we found that acquiring a research skill set opened space for further exploration. The interview process itself appeared to be empowering for promoters, as many of the respondents revealed that they had learned and were effectively applying practices acquired through the promoters' training and mentorship. Both in their role as interviewers and presenters of research results, the promoters gained recognition as knowledge producers, which we hope will support to increase their legitimacy as community leaders; this legitimacy being essential for a strong farmer-to-farmer structure (Selener, Chenier, & Zelaya, 1997). The approach was also more redistributive of resources than a traditional research method that employs only the foreign researcher; promoters were paid for their work.

Working with community researchers was an effective way of knowledge sharing and co-production, both in the interview process, where researchers could decide the direction of follow-up questions, and in the data analysis process, where they decided *which* data mattered and how they should be interpreted. We found that community researchers' input grounded data analysis toward action-oriented, usable results, while emphasizing context-specific factors, which could then be directly used by promoters in their work. The research process also illuminated how the aggregate data reported by university researchers, which can seem like statistics external to the community members themselves, originate from community members themselves. Revealing the

research process increased promoters' recognition of community members as knowledge producers, with interview questions themselves uncovered new information to promoters about innovative planting patterns, manure making, and seed storage, that promoters did not know existed.

The process of collaboration with community researchers was truly enjoyable and one of the highlights of the research project. Particularly during the data analysis workshop, the enthusiasm and interest participants shared in comparing their experiences as interviewers, and the stories of the farmers they met, helped to build meaningful connections between team members.

Analysis in the data workshop with project partners laid the groundwork for interpreting the results, and helped to discern whether data were trustworthy and significant for answering the research questions. Community researchers' insights and the respondent validation of project farmers increased the reliability of the results presented in the next chapter.

Chapter 3: Results

I. Overall socio-economic and demographic information of project

The majority of participating households are headed by a monogamously married man and woman. A larger number of households where the respondent is separated, divorced, or widowed are headed by women than by men. Approximately 60% of male respondents and 75% of female respondents either had no school or did not complete primary school. For both women and men, the most common level of educational attainment was “some primary school.” Households in our survey were engaged in an average of 1.4 income generation activities, with a range from 0 – 3. The majority of households were engaged in either one or two income generation activities. Agricultural sales, most commonly soya beans or garden vegetables, were the most common source of income, followed by off-farm wage labor. A majority of households made less than 20,000 Malawian kwacha (about \$27.50 USD) from their most important source of income.

Pre-existing agricultural practices: Baseline

Over half of households (n= 371) included in the survey reported farming on less than 1.5 acres. Farmers also grow smaller gardens (*dimbas*) during the dry season, which serves as a source of food security. These gardens are usually smaller plots near bodies of water and wetlands, which have a higher water table and are suitable for dry season production (Moyo, 2014). We found that fewer than half of the households in the survey grew a *dimba*, and of those who grew a *dimba*, the majority estimated the size at a quarter of an acre. Soil conservation practices were being used by the majority of respondent households, with only 37 percent not using any type of soil conservation practice. The most common soil conservation practice was manure or compost

incorporation, with 48 percent of households using this practice. Early residue incorporation was the second most commonly used, with 11 percent using this practice. For both legume intercropping and tree planting, 7 percent of respondents reported using these soil conservation practices. Other less used practices were mulching (6%), crop rotation (4%), pit planting (1%) and sowing vertiver grass (1%).

Households were growing an average of 2.01 crops during the rainy season before the baseline survey (SD 1.04, range of 1-5). The most widely grown crops were hybrid maize (45%), local white maize (45%), and soya (42%). Thirty-one percent of farmers were growing groundnuts, 12.3 percent growing tobacco, and 10.1 percent growing sweet potatoes. The other ten crops cultivated were grown by 2 percent or fewer farmers.

Dietary diversity and food security: Baseline

Household dietary diversity is a measure of food security. Household Dietary Diversity Scores (HDDS) were assessed by asking the respondent to list everything that the household consumed in the past 24 hours, using 16 standardized categories of food types. The HDDS, developed by the Food and Agricultural Organization, involves aggregating these food categories into 12 food groups and summing them to calculate the HDDS (Vaitla et al., 2015). The average HDDS was 2.96, or approximately 3 food groups, with a standard deviation of 1.86 and a range of 0 to 11.

The Household Food Insecurity Access Prevalence (HFIAP) indicator is a commonly used food security literature (Coates, Swindale, & Bilinsky, 2007). Based on responses to ten food security questions probing quality, quantity, and stability of diet, this composite variable categorizes households as food secure, mildly food insecure, moderately food insecure, and severely food

insecure. Over 80 percent of households fell into the category of severely food insecure, with only 17 percent meeting the criteria for the other three levels of food insecurity, and only eight percent qualifying as food secure.

II. Regional differences

Interviews were conducted in the two different participating project areas and, consistent with the findings from regression analysis of the baseline survey, we found that regional differences in land tenure, market integration, and climatic events were relevant to understanding the amount of variation between respondents' stories.

Landholdings and ganyu

Landholdings in the Central region of Dedza are smaller (insert exact size of land), with few farmers able to harvest enough from their plots to meet subsistence needs. The majority of farmers rely on informal wage labor (known as *ganyu*) to purchase food and basic amenities. Opportunities for *ganyu* are variable; respondents reported that major local employers, such as the Christian seminary, often hired only some of the farmers who gather in front of their gates. This instability contributes to high levels of food insecurity, as farmers often depended on *ganyu* as a means to immediately purchase food or pay medical costs. Engaging frequently in wage labor also reduces the labor and time available for household members to cultivate their own fields, especially at crucial moments during the growing season, such as planting time, thereby negatively affecting crop productivity. In Mzimba, the Northern region of the project, farmers had greater access to land (1.4 acres vs 1.2 acres) and could produce adequate harvests to meet subsistence needs. Few farmers reported that they had done *ganyu* during the past year.

Production practices

Villages in the Central region are often the beneficiaries of more government extension services and NGO projects than the Northern villages participating in the study. In addition, more Central farmers had received training from government extension agents. In part due to this involvement with government/non-profit initiatives, more farmers in the Central region said that they had previously implemented agroecological practices, particularly compost/manure application. In both areas, farmers would use the word manure interchangeably with compost, so it was necessary to ask for specific details about how the compost prepared (ie. pure animal dung vs. processed dung combined with other materials). Through these responses, we found that often previous practices of compost-making were different than those taught by the project promoters. Sometimes farmers explained that though they had grown certain crops or applied practices at some point in their farming history, they had not done so in several years.

Tables 1a & 1b. Food security before/after the project for project households in Northern and Central areas

| Northern area | Control | | Intervention | |
|------------------------------------|------------|-----------|--------------|----------|
| | 2016 | 2019 | 2016 | 2019 |
| Food secure * (HFIAS) | 29.0% | 15.6% | 32% | 47.8% |
| Dietary Diversity (Average, SD) | 2.95, 1.30 | 5.0, 3.67 | 3.56, 1.94 | 6.0, 2.8 |

| | | | | |
|--|------------|------------|------------|------------|
| Crop diversity (crop species, no tobacco) (Average, SD) | 1.95, 1.22 | 2.28, 0.98 | 2.19, 1.13 | 3.31, 1.42 |
|--|------------|------------|------------|------------|

Table 1b.

| Central area | Control | | Intervention | |
|------------------------------------|------------|------------|--------------|-------------|
| | 2016 | 2019 | 2016 | 2019 |
| Food secure * (HFIAS) | 4.2% | 3.3% | 7.9% | 21.7% |
| Dietary Diversity (Average, SD) | 2.28, 1.38 | 4.0, 2.97 | 2.25, 1.26 | 4.0, 2.2 |
| Crop diversity (Average, SD) | 1.89, 0.79 | 1.97, 0.85 | 1.93, 0.92* | 3.11, 0.92* |
| *Significant at p<0.01 | | | | |

Climatic events

At the time of the interview in June and July, farmers had harvested major food crops from their upland rainfed field only a few months before in March. This was the second year of harvest since joining the project. Farmers in both regions said that they had been affected by climatic events, though with differing levels of severity. In the Central region, nearly all farmers reported crop loss to a prolonged El Niño/El Niña dry spell (Famine Early Warning Systems Network, 2018; FAO, 2019a), with no rainfall spanning 45 days during a critical part of the growing season, right after germination. Several respondents claimed that this had been the worst drought

in the past twenty years, and many harvested either no maize or a small fraction of the typical harvest. Project participants in the Northern region live at the base of a small mountain that influences weather patterns variably; some farmers reported drought during the past growing seasons, others flooding, and others were unaffected by any weather events. None had experienced weather-related crop losses to the extent of those suffered by farmers in the Central region.

While there are many other differences between the regions, I focus on these aspects due to their significance for farming livelihoods and production, and the way these characteristics/conditions relate to the success/failure of the agroecological intervention to improve farming livelihoods and food security. For the purpose of this analysis, I will employ farmers' stories selectively from each region to illustrate my argument, but I will not always reiterate their different regional contexts.

III. Changes in farm production outcomes

Based on conceptualized pathways in the literature, the pre-condition to food security is often an increase in farm productivity or a change in the types of crops grown. The first step to understanding the relationship between the agroecological intervention and food security therefore, was understanding whether or not participating farmers had experienced any production-level changes as a result of applying the new agroecological practices. We asked whether the practices used during the past two growing seasons were new or different from those the farmer had used previously and, if farmers had noticed a difference in recent farming

outcomes compared to those of past growing seasons, we probed more to explore the reasons they identified as the source of this change. A large number of respondents said they had observed improvements in their food security; these responses were corroborated by data analysis from the end-line survey collected in January 2019 (**Tables 1a & 1b**).

Changes in production outcomes unrelated to farming practices

As mentioned above, weather affected farmers' yields, and the majority of Central farmers reported that drought conditions had led to crop losses. Other factors that farmers mentioned as the cause of a change in production outcomes of the previous growing season were: an increase or decrease in the amount of rain-fed land they cultivated, pest outbreaks, illness that inhibited or delayed cultivation, and inadequate income to purchase farm inputs like seed and fertilizer. Some of these direct causes of a change in farm productivity were indirectly related to a farmers' practices, as will be discussed later.

IV. Changes in production related to project trainings on farming practices

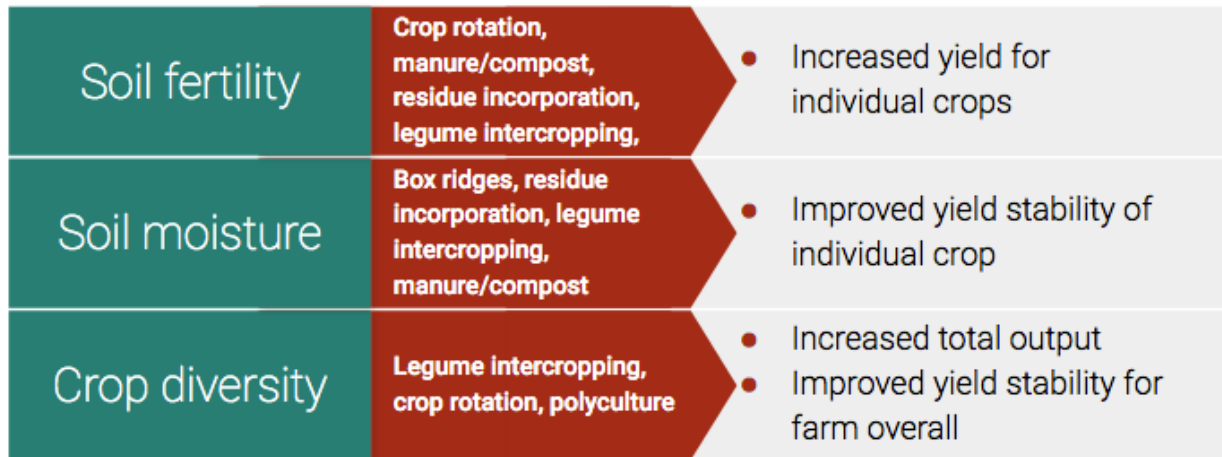
The interviews explored how farmers related their observations of on-farm changes to the new production practices.

1. Agroecological practices & production outcomes

After a respondent indicated that they had experienced some positive change in production outcomes of their farm as a result of a change in their farming practices, we followed up to identify exactly which new farming practice(s) contributed to this improvement, and the

biophysical attributes of the practices. The range of responses given by farmers are found in Figure 3.

Fig 3. Agroecological practices, biophysical effects, and related production outcomes.



Crop performance: Yield and crop health

In the Northern district, the majority of farmers reported that they had seen an increase in the overall performance of their crops which they related to different agroecological practices.

Respondents had measured this improvement in terms of yields, *“When I applied manure [from the project] I harvested 5 bags of maize, before that I was getting 3 bags from the same land”*

(Interview 46, Female, Central district 7/18), sometimes with descriptions of plant growth

“When you apply manure, the maize is green and it grows so well and so fast” (Interview 53,

Female, Central district, 7/18). The rate of germination and plant growth was something that

farmers emphasized, as the perceived shorter and more variable rainfall seasons of recent years

reduce the window of time for crops to mature and become more resilient to drought (Famine

Early Warning Systems Network, 2018).

As can be seen in the above two quotes, both respondents attributed the production improvements to the new practice of manure application, which was the agroecological practice most commonly credited for observed changes in yield. Farmers also reported better crop performance due to changes in the practices such as crop residue incorporation, crop rotation and legume intercropping. This farmer shared her experience with crop rotation. *“I have seen a change because last year when I grew soya, I buried crop residues, which improved the fertility of the soil, so I planted maize in the area and I harvested a lot”* (Interview 36, Female, Northern district, 6/18). Another farmer explained the change she had seen in her farm because of how they changed the management of the residue, or crop stalks remaining after harvest. *“At first we were just burning the residues but now that we have learnt we bury the residues the maize grows very fast”* (Interview 4, Female, Northern district, 6/18). This farmer explained how intercropping groundnuts and pigeonpeas had changed her farming compared to the past. *“At first we had problems with our crops. When you plant pigeon peas it brings fertility into the soil as well as groundnuts which makes our crops grow well”* (Interview 31, Female, Northern district, 6/18).

Farmers also talked about how the agroecological practices had increased *overall* productivity of their land- meaning the amount of all food crops combined- through polyculture, which uses limited space more efficiently. Intercropping maize with beans, for example, meant farmers could reduce the spacing between plantings, as beans have a different growing pattern/light requirement. For this reason, this farmer described the difference now that she is intercropping beans and maize: *“There is a change because in the past we were just making ridges anyhow, the spacing wasn’t good, but now [with the project] we have the correct spacing. [This is an*

improvement because] I can harvest more from a small piece of land” (Interview 46, Female, Central district, 7/18).

Improved yield stability: Reduction of crop loss

While improvements in farm productivity were more commonly experienced by Northern farmers as a result of the new practices, participants in both regions had found that the agroecological techniques reduced the impact of severe weather events and pest/disease outbreaks. Respondents commonly reported improvements in crops’ drought resilience related to the effects of the agroecological practices on soil moisture. In particular, farmers had noticed the effectiveness of practices of polyculture, manure, crop residue incorporation and box ridging, marking this difference through comparisons to past years in the crops’ physical health, *“our crops don’t wilt as much as they did... because the residues keep moisture in the soil”* (Interview 51, Female, Central district, 7/18). The same farmer also compared her own field to her neighbor’s during the drought, saying that *“[the new practice] helped because the crops didn’t die as much as the others that didn’t do these methods.”* Examples of the practices’ effects on drought tolerance were abundant, since dry spells had occurred in both regions during the previous growing season. Another farmer told us how, *“before we were complaining about the rains”*, but because the new manure practice had improved soil moisture, this year even with a dry spell, the crops had not dried up and *“I have harvested lots of maize like we did not have problems with rains”* (Interview 2, Female, Northern district, 6/18).

Many farmers explained that they had adopted the practices *because* of their advantages for resilience to weather events. After saying that she was harvesting more from her field since

beginning to use the agroecological practices, this farmer described how *“for the dry spell I usually depend on manure. The manure keeps the moisture, even the maize stalk [incorporation] also help with this.”* Acknowledging that flooding has also threatened production in recent years, she said, *“I have planted vetiver [grass], so when there are heavy rains the running water is stopped by the vetiver.”* Her experience during the past few years had shown that these practices are effective: *“The running water doesn’t carry my crops therefore I harvest well. Also even though the dry spell comes I know I will still harvest”* (Interview 2, Female, Northern district, 6/18). She was able to fully take advantage of years of adequate, if heavy, rainfall, and felt that, in times of drought, the practices served as a guarantee of some yield.

Farmers frequently attributed mitigation of unfavorable weather conditions to practices of intercropping and polyculture. This farmer compared outcomes of monoculture soya planting to an intercropped planting pattern. *“Yes, ...we harvest a lot... when we plant soya together with pigeon peas, the soya is planted on the middle of pigeon peas that provides shade to soya. When the rains come and go the soil remains moist because of the pigeon peas hence the soya grows well unlike when it’s planted on its own”* (Interview 34, Female, Central district, 7/18). Another farmer described the devastation of pest outbreaks in intercropped fields compared to the pure stands she previously planted, when pigeonpea plants were attacked by pests, the soya intercropped in the same field was unaffected by the outbreak and she was still able to harvest. This security that crop diversity provides to a farmer was repeated by this respondent, who explained that the reason she decided to grow more crops was because *“if one crop fails then I will benefit from another crop.”* She went on to demonstrate her point by saying that this had

happened last year when she planted soya and beans, “*the soya was destroyed by the drought so I survived on the beans*” (Interview 50, Female, Central district, 7/18).

Crop diversity: Practice and outcome

As illustrated in Table 2, per farm crop diversity was low (average of 2.07 crops) in both regions before the project intervention; farmers were cultivating primarily maize, soya, or groundnuts. As part of the project, seed was distributed to participants in October 2016, with farmers planting during the 2016-17 growing season. Farmers decided which crop seeds they wanted from the following options: finger millet, groundnut, soya, pigeonpea, and common bean. Because participants could only select three different crops, there was variation between which crop seeds households had sourced from the project. While most farmers had heard of the new crops, they were not growing them previously because they a) had not been unable to access the seeds for financial reasons or market unavailability, and/or b) had not chosen to purchase the seeds because they did not feel they could or would benefit from growing that particular crop.

Especially in the Northern region, the majority of interviewees reported that they had found numerous advantages in cultivating the new varieties and species of crops. As elaborated above, the soil fertility, soil moisture, and risk reduction benefits of intercropping and crop rotation with the new crops, improved both overall yield and yield stability despite unfavorable growing conditions. In addition, for many farmers, planting more types of crops was an end in itself because higher on-farm crop diversity meant stable subsistence access to a greater variety of foods.

Input Substitution

It is important to note that since they had begun implementing the agroecological practices, the majority of farmers had reduced their application of chemical fertilizer, primarily the basal dressing. The opinion expressed by the following farmer is representative of most respondents' views that this transition had favorable outcomes for their production:

Inter: Did you see any change in your yield because of using less fertilizer?

Resp: Yes, the maize grew very well where I applied manure unlike where I applied fertilizer because where I applied manure there was still moisture in the soil unlike where there was fertilizer.

-Interview 35, Female, Northern district, 7/18

Few farmers wanted to completely stop applying fertilizer; for many, their preferred strategy was to apply less fertilizer and substitute other soil fertility practices like manure-making, crop rotation, and crop residue incorporation.

Dimba

Most of the conversations about the production benefits of agroecological practices were centered on application of the practices in rainfed fields. The interviews were focused in such a way because trainings had emphasized this type of cultivation, as the upland field is the principle area of cultivation. Numerous interviews revealed, however, that farmers had also implemented the agroecological practices to their *dimba* plots located that retain residual moisture or can be irrigated with nearby water sources during the dry season. Similarly to their experience in rainfed fields, farmers found that the practices effectively improved the yield and resilience of their *dimba* crops. Here, a farmer explained how, within the limitations of a small *dimba* plot, she intensified her planting in the *dimba*, thereby increasing her overall production. “*The dimba is*

small, so now that we learnt that we can intercrop I plant a lot of crops on the same dimba so I am getting more” (Interview 47, Female, Central district, 7/18).

The production-level impacts of agroecology have been detailed in this section using farmers’ perspectives of the changes they had experienced since adopting the practices. In the Northern region, these stories are particularly representative of farmers’ perspectives, with nearly all farmers indicating that they had achieved one or more of the production outcomes. The intensity of the drought in the Central area meant that, while many farmers reported some mitigation of its effects because of the new soil management practices/crop diversification, these practices were often insufficient to prevent severe crop losses. For this reason, the following section, which explain how production-level outcomes of agroecological farming affect households’ well-being, primarily draws on stories from Northern farmers who did achieve these outcomes.

V. Theorized production-outcome pathways to household food security in practice

All of the stories composing the previous section of this paper came from farmers who had indicated that the agricultural intervention had helped them to meet the pre-condition for better household food security: improved crop productivity and/or crop diversity. Many of these households reported that these production change had contributed to better diversity and/or quantity of food in their diets. Consistent with the pathways theorized in nutrition and food security literature, many farmers reported that this increase in food security was achieved in part through two household-level pathways: a) the increased crop yield/crop diversity was used for direct subsistence consumption, b) the increased crop yield/crop diversity produced a surplus

which was then sold and used to purchase food in a way that increased the quantity/quality of diet.

a. Subsistence or direct consumption

By far the most common explanation for observed changes in short-term household food consumption was through the subsistence pathway for both staple and “relish” crops. This finding is unsurprising, as this was the most repeated justification for adopting the new crops and practices. Farmers reported that their maize harvests had lasted more of the year than before, feeding their families throughout the dry season. Many respondents described how the food security improvement was a result of both an increase in the quantity and diversity of harvested crops; they either hadn’t eaten this food at all before the project (eg. soya porridge), or they had eaten it much less frequently because they had needed to purchase it (groundnuts, soya, tobwa). The 24-hour HDDS survey provided further evidence that the majority of respondents (in the Northern region) had indeed consumed the new crops the previous day. This farmer is referring to soya porridge, which promoters taught farmers to prepare using their soya harvest.

“First, I am thankful that now I have food in my house. In the past food was scarce; my children now have porridge, relish isn’t scarce in my house, so for this I say things have changed.”

-Interview 2, Female, Northern district, 6/18

For many farmers, soya porridge was now an important meal that they and their children ate for breakfast, replacing a maize-based porridge that served this purpose before, or for some farmers, now providing a meal they had routinely skipped due to insufficient food. Another interviewee detailed the change she had observed in her household, *“We now have enough food and different type of food, like cooking soya porridge adding groundnuts flour and also using pigeon pea as relish”* (Interview 31, Female, Northern district, 6/18). This response covers the other major

crops and their respective recipes introduced with the project: groundnut flour that can be added to most relishes (greens, soya), soya porridge, and pigeonpeas. Another food/recipe commonly introduced to household's diets was *tobwa*, a non-alcoholic sweet beer prepared from millet and served as a breakfast meal. Many of the crops and recipes promoted by the project were customarily consumed in the villages; the project served to re-introduce forgotten knowledge or lost seeds.

b. Agriculture income/market pathway to food security

The income-related pathways to food security correspond with the production-level outcomes of the practices: higher yield and/or higher crop diversity.

Improved HDDS

Through reduced expenditure on food as well as increased income from surplus crop sales, some farmers were now purchasing foods they hadn't been able to afford before. A few used these gains to buy major food groups not produced in the community, like fish and rice, while others bought small luxuries like tea and sugar. This farmer, who indicated that her income had increased since using the new practices, through surplus crop sales, subsistence substitution, and input substitution, described a stark difference in her diet.

Inter: Is this the typical food you eat

Resp: Not all the time. We also eat eggs and meat depending on the money. Sometimes we even have porridge.

Inter: Before you joined [the project] what food were you having?

Resp: Vegetables only.

Inter: Where were you getting the vegetables?

Resp: Buying.

-Interview 47, Female, Central district, 7/18

One farmer explained how her income had increased through improved *dimba* cultivation. After learning to intercrop in her upland field, she had decided to experiment with intercropping in the *dimba* plot- which has even more limited space than an upland field, making the diversification aspect of intercropping particularly important. She was able to harvest more and reported that now, instead of solely relying on *ganyu* income to meet household needs, she could sell surplus *dimba* crops and buy fish. She also used this improvement to strategically protect household subsistence, covering expenses through *dimba* crop sales to avoid selling her upland harvest.

Improved crop productivity did not always lead to better food security however, and furthermore, some farmers reported they had gained food security *without* substantially increasing their crop productivity, but through other pathways, not widely discussed in food security literature.

VI. Hidden pathways

The previous section includes the stories of farmers whose pathways to food security followed those commonly theorized in nutrition and food security literature. There were many farmers who reported better access to food, yet whose stories did not fit the pathways of income and direct-consumption, such as this story of Grace, a single parent and farmer from the Central region.

As a result of beginning to intercrop, incorporate crop residue, and apply manure to her field she had increased her yields, growing enough to provide food for her family that she used to have to buy, while nearly **halving the amount of money spent on fertilizer**, from 22,000 MK (30 USD)

to 12,000 MK (17 USD) (her yearly income was around 70,000 MK or 97 USD). By reducing these costs, she had freed up income to pay for her child's **primary school costs**, which she normally would have covered by working as a *ganyu* laborer. She explained that, as a result, she spent less time doing *ganyu* work and instead cultivated a *dimba* (dry season plot). This year was the first time she had grown crops in her own *dimba*. While before her earnings from *ganyu* had immediately been used to purchase food, this year she had spent disposable earnings to rent land for a *dimba*. Through these many changes and interconnections, her food security had improved.

- Interview 58, Female, Central district, 7/18

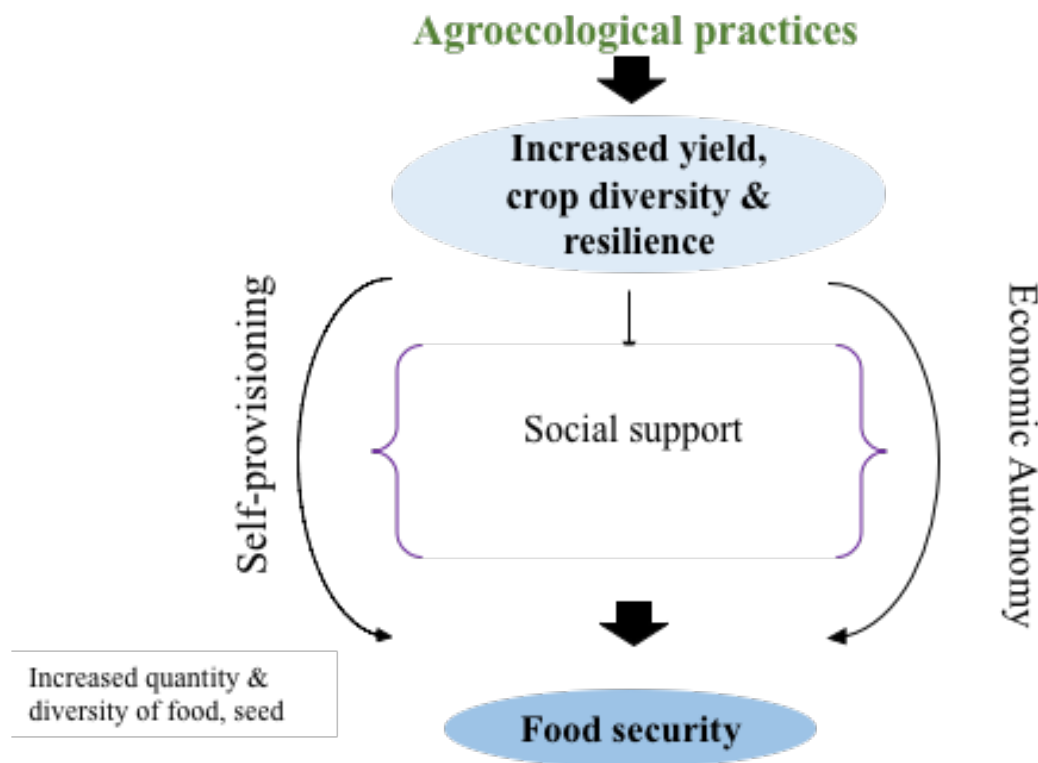
In summary, Grace had strategically deployed a combination of strategies - reduced food expenditures, less fertilizer expenditure, and reduced *ganyu* - to increase her farm's productive capacity and her control over her food access. This story exemplifies those of farmers who had not achieved sufficient increases in crop yields to substantially improve household food security during the first years after adoption, but used the cost-saving advantages of the agroecological practices to reinvest their labor into their own production and gain more control over food access,.

Concept model: Brief overview

The following concept model illustrates pathways to food security documented by farmers' stories that deviated from pathways conceptualized in the literature (Figure 4). The most common strategy was that of self-provisioning, or increasing their subsistence/farming capacity by investing in ecological capital and other internal resources, while reducing their dependency on external resources (van der Ploeg, 2010). In this way farmers reduce monetary costs as they

maintain or increase overall levels of production. Less frequent, though related to self-provisioning, were stories of farmers who were able to better control the terms of market engagement- what we term here economic autonomy. I posit that, by following a logic of autonomy these strategies have the potential to create conditions for smallholders' long-term food security in ways emphasized in food sovereignty rhetoric.

Figure 4. Agroecological pathways to food security



Logic of autonomy

Farmers actions showed that maximizing control over their food and production choices was often the driving logic behind their decisions. This was illustrated by both their explanations for why they farmed, their identity as a farmer, and the choices they made with the agency they had,

as well as their explanations for how the new practices had helped them. Integral to this driving logic was the concept of food security, though not expressed in such terminology. Like the majority of farmers, this farmer believed that having additional income is not a way to exit farming, but to become a better farmer so that she can improve her self-reliance.

I: Why are you a farmer?

R: I am able to do most things on my own

I: is it because you don't want to rely on other people or you can't rely on other people?

R: we rely on ourselves

I: why is it that you want to rely on your own

R: we don't want to spend a lot of money

I: if you had a lot of money would you stop farming?

R: no, we would continue farming

I: why

R: money will help enhance our farming

I: why is it important to enhance your farming?

R: It's because we want to rely on our own.

-Interview 55, Female, Central district, 7/18

Relying on our own means reducing reliance on cash and market transactions. Autonomy from the market was important to farmers for two reasons, both of which are also integral to food security.

a. Markets as risk

Many farmers explained that they farmed because that was the way to prevent hunger from entering the household, and *“to avoid such problems, we grow different kinds of crops every year as a family in so doing we don't buy food from the market like maize because we always have it (42).”* Like the majority of farmers we talked to, this farmer saw keeping household food consumption independent from cash income or market transactions as the surest way to avoid hunger.

All farmers expressed interest in selling some portion of their crops, but only those crops of which they had a surplus for household consumption and next year's production. At the same time, they felt a common mistrust of the market. This farmer's response illustrates a common attitude toward commercialization and market engagement.

Inter: If you ever had a good market that really gives good prices for maize, would you sell it all at that price and buy your food with the money?

Resp: No

Inter: Why not?

Resp: That means I will starve myself

-Interview 40, Female, Central district, 7/18

No interviewee answered this hypothetical question affirmatively. Cash is finite, prices are fickle, and grocery shop shelves may be left unstocked. In addition, farmers rarely believed that the hypothetical good price would ever be offered in their local markets. Vendors "steal", setting low prices, using miscalibrated scales that show purchases to be heavier and sales to be lighter than the actual quantity. The idea of stealing was repeated by many farmers; the fluctuation in prices offered by vendors, either geographically or temporally distinct, was considered an expression of extremely dishonest behavior. A fair price is a stable one, and with little to no evidence that they would ever be offered consistently fair prices, farmers often found ways to actively distance themselves from market dependency.

b. Farming identity

Depending on cash and markets as a way to feed your family is a risky business, while relying on one's own ability to farm is a surer bet, but also a preference. One farmer explained that this mindset is one shared even by urban Malawians.

Inter: Why are you a farmer?

Resp: That is where I get food, when you don't farm you cannot get food

Inter: If you had another way to get food apart from being a farmer, would you prefer to do that?

Resp: No, I cannot stop [farming]. Maybe if one is a boss, but still even if you are [a boss] you still farm. Even people staying in town also rent fields [to farm].

-Interview 45, Female, Central district, 7/18

As mentioned earlier, producing food to feed one's household is a large part of a farmer's identity. The majority of farmers saw their livelihoods and production choices as integrally linked to the health and wellbeing of their family, as captured by these farmers responses:

“For me to be a farmer, I saw that when I grow crops I wouldn't lack anything on my home”

-Interview 53, Female, Central district, 7/18

“When you farm you provide for yourself and your household has food, making bodies healthy.

-Interview 34, Female, Northern district, 6/18

These farmers demonstrated confidence that farming was a way to guarantee against hunger and food insecurity. This conception of farming as a productive, desirable livelihood is in stark contrast to the image of desperate, market-less farmers trapped into subsistence production (Radchenko & Corral, 2018). While some respondents expressed pride in being farmers and self-reliant, and hoped that their children would continue farming, others' answered with more ambivalence; they understand that they have limited other options, both because they are not trained for another career and because these employment alternatives are extremely limited or undesirable. For example, compared to the livelihood of a *ganyu* laborer, being a farmer was much preferred. This opinion is expressed by this respondent,

I: Why are you a farmer and why do you stay a farmer?

R: Because I have seen that being a farmer is beneficial like am able to feed my family rather than relying on doing ganyu that cannot have a good retain for supporting my household?

-Interview 42, Female, Central district, 7/18

Farmers also showed confidence that farming could work for them; *ganyu* could not. Farming was a way out of poverty; one could farm and through farming not lack anything in the house.

VII. Production relations-based pathways to food security

While many farmers saw farming as their preferred livelihood option, and a desirable way to sustain a future for themselves and their children, they realized that their ability to provide for themselves was often jeopardized by their lack of control over important factors of production. The importance of this control was especially evident in the case of farmers who, though they had achieved better harvests through the agroecological practices, remained very food insecure; for many, this was a result of continued reliance on unstable or exploitative market and production relations. Those farmers who appeared most likely to sustain/expand upon those qualities of agroecological farming that had yielded them benefits during the past couple of years had deployed common strategies of self-provisioning and/or building economic autonomy, thereby gaining more control over the socio-ecological factors of production.

Self-provisioning

Providing for themselves, in both food and the means of production- what we will term **self-provisioning** was a major motivation for respondents to engage in farming (van der Ploeg, 2010). Integral to building the capacity to self-provision is the reinvestment of resources in enhancing and/or stabilizing internal factors of production. The degree to which respondents indicated that they were stabilizing internal factors of production vs. enhancing them depended on several factors, such as household dynamics and characteristics often related to regional differences in land access, off-farm income, and weather events. Malawian farmers' household

resources primarily consist of locally produced inputs, crop yields, income from crop sales and other sources, land, and labor. Adoption of agroecological practices led to self-provisioning of food and fertilizer through subsistence and input substitution respectively, allowed participating farmers to strategically reallocate income and labor into building their farm's productive capacity.

Subsistence substitution

A number of farmers in the Northern district had substantially increased their production of food crops for home consumption, to the point of almost entirely meeting subsistence needs in a culturally appropriate and nutritious form. Instead of facing the uncertainty of the empty shelves of local grocery shops and the sporadic chances to earn cash through brick-making or other *ganyu* opportunities needed to purchase this food, farmers could be sure their children would not be hungry. This quote represents a change that respondents frequently mentioned:

Inter: Do you have any problem concerning your nutrition.

Resp: Not really but maybe if you want a certain food and you don't have money that's the problem we meet.

Inter: Do you think you will meet these problems this year

Resp: No what we lacked now we are able to manage and such problems will not find us.

-Interview 19, Female, Northern district, 6/18

Because farmers consider foods like groundnuts, beans, and other relishes to be essential to a good diet, the fact that in the past they had either not cultivated these crops at all or harvested a lower yield meant that they previously had needed to purchase them, usually in insufficient quantities. Farmers' income is extremely limited, which is why "subsistence substitution", or the replacement with one's own production of a previously purchased food, played an important role in household food security. This farmer, who had produced all of the main ingredients of her

meals the previous day- beans, maize, groundnuts, soya- explained how this was a change from before.

Inter: Before you joined [the project] were you eating this food

Resp: No the food was scarce we would go to Rumphu to buy even though the money was hard but now we grow ourselves.

-Interview 8, Female, Northern district, 6/18

Subsistence substitution is different from a direct consumption pathway to food security. It is not measured as a dietary addition, but a change in the source of that food in a way that increased the reliability/certainty that they would consistently be able have a healthy, diverse diet. Another farmer's response to a question about whether she has a preference between growing certain crops or purchasing them further emphasizes this idea. "Yes, like groundnuts if you don't have it, no matter how much you want it, but if you [grow it] and you don't have money, then you have it. We are happy now that we have groundnuts in our house" (Interview 17, Female, Central district, 7/18). In short, project participants have found that growing a diversity of food crops had improved access to foods they see as important and at the same time made that access more predictable and stable. Besides guaranteeing greater stability of food, avoiding food expenditure freed up income that farmers were able to spend in new ways, often to further improve food security.

Input Substitution

Many respondents recognized that building soil health with the agroecological practices allowed them to become less dependent on fertilizer, and this carried a strong financial motivation to adopt the new techniques. Most interviewees reported that they were spending less on fertilizer, with a range between those who had entirely stopped applying fertilizer and those who had halved their application. The majority of farmers interviewed believed that fertilizer was an

essential input to guarantee a good harvest; at the same time, it was the most costly, and therefore uncertain, requirement for farming. As such, farmers were accustomed to struggling to earn a certain amount of money each year to be used to purchase fertilizer. With the agroecological soil fertility practices that drastically reduced the need for fertilizer, respondents described numerous changes in their lives, with implications for the short- and long-term.

The problematic combination of the perceived need for fertilizer and the difficulty of acquiring it is indicated in responses in the baseline survey: 70% out of 342 farmers reported that fertilizer was their most “pressing agricultural concern”. Selling subsistence crops and performing *ganyu* were drastic but common measures farmers had previously used to earn the cash necessary to buy fertilizer. Marketing stored maize needed for household consumption almost guaranteed severe food insecurity, as buying the staple crop back during the “lean season” of December-February was close to impossible for cash-strapped families. Often the only other available option to replace maize stores was also the alternative for acquiring fertilizer in the first place: earning income through laboring on someone else’s farm, or *ganyu*. Demand for *ganyu* is highest however, during the beginning of the growing season, which is also when farmers themselves need to dedicate their time and labor to cultivating their own fields. In this way, while doing *ganyu* might provide earnings so that a farmer’s production benefits from fertilizer, the process of acquiring this fertilizer can lead to neglect to timely or adequate completion of farming tasks required for good yields, such as soil preparation, planting, and weeding. Reducing expenditures on fertilizer meant that farmers no longer had to engage in income-generating activities that often jeopardized their current food security in order to guarantee crop yields in the next growing season.

In a related way, farmers saw agroecological practices as a strategy to ensure good yields, and thus food security, even in years when they had no money. These farmers explained how learning to apply manure had provided an alternative way to farm well even when there is no money for fertilizer.

“Now that we use manure the yield is good because in the past when we didn’t have fertilizer we were just staying without doing anything else and we got low yields. Now we use manure as fertilizer”

-Interview 4, Female, Northern district, 6/18

Yes, because in the past we did not have fertilizer we were not harvesting enough food but now that we are also using manure even if we don’t have fertilizer we are able to harvest.

-Interview 40, Female, Northern district, 6/18

The sense of powerlessness that farmers experience through reliance on fertilizer is clear in this quote; even though she knew that, with no fertilizer, her crops would grow poorly, in years with insufficient cash there was nothing else to be done. This quote is representative of many farmers’ stories, who found that the new practices reduced their dependency on fertilizer while maintaining, or even increasing yields. Besides guaranteeing production of some crop, reducing fertilizer dependency freed farmers from the way fertilizer access had constrained many farmers’ production choices, such as which crops they grew. A few farmers said they had stopped growing crops that were important to their food security or income (potatoes, certain varieties of beans, tobacco) because they could not consistently afford adequate fertilizer.

Labor

Sufficient energy to farm (labor) as a limiting factor of production was mentioned by a number of farmers, especially in the Central region, where *ganyu* was a much more common livelihood

strategy and farmers were left with insufficient time to care for their own plot. Labor was especially an issue for widows or female-head of households whose husband did not contribute to farming activities for reasons of gender inequity, seasonal migrant labor, polygamy, or a combination.

The labor impacts of the project played out in several ways. Interestingly, many farmers explained that the new practices had reduced the amount of time needed to cultivate, allowing them to redistribute labor to the *dimba* or other household activities. Farmer 24 explains this here,

Inter: Do you think growing new crops and using new farming practices have changed the amount of work and time you spend on your field

Resp: Yes, now we don't have a lot of work to do unlike in the past years

Inter: Oooh (laughs)... now you are spending less time.

Resp: Yes, we work in a short period and there is less work

Inter: What is the work you do in a short period of time

Resp: We go to the Dimba and come back at a good time and even go at the field

Inter: How does this change concern you

Resp: The work we are doing now is helping our lives, we don't have heavy work and we are less busy

-Interview 24, Female, Central district, 7/18

The explanations given for the reduced farming workload included labor-saving through: burying crop residue at the same time as making planting ridges instead of heaping and burning crop residue, mulching to suppress weeds, and intensification of planting area through intercropping. On the other hand, some interviewees said that the practices were more onerous-like preparing and applying manure, while others said they hadn't noticed an increase or decrease in the time farming.

A common change farmers had experienced was the reduction of the necessity to do *ganyu* as a coping mechanism/income activity. Numerous farmers said that the past year was one of the only years that they had been able to entirely able to avoid *ganyu*. In part this was related to the seed they received from the project. Especially in the Central region, the majority of farmers relied on *ganyu* as a means to access seed each year. Many farmers who, like Grace, had greatly reduced expenditures on fertilizer and/or food purchasing, which they had previously purchased via earnings from *ganyu*, were able to redirect their energy and time into their own crop production. A smaller number of farmers had earned substantial income from crop sales so as to cover expenses with those earnings instead of depending on *ganyu*.

Depending less on the “heavy” work of *ganyu* gave farmers the opportunity to invest their energy more strategically. The *dimba* is a guarantee of relish and staple foods during the dry season, as most *dimbas* produce vegetable crops like mustard greens, and small quantities of rainfed crops like maize and beans. The *dimba* is also an important source of income, with many farmers earning petty cash by selling mustard greens and other relish crops to neighbors. Like most farmers, Grace expressed the preference for *dimba* cultivation over *ganyu* income as a strategy to guarantee more stable access to food during the dry season. Indeed, Grace explained that the difference between relying on *ganyu* for food and a *dimba* was “*now with a dimba I always have food to eat in the morning*” (Interview 58, Female, Central district, 7/18). Doing *ganyu* often means neglecting your own land; this farmer, when asked why she preferred growing a *dimba* to relying on *ganyu* as a livelihood activity, explained the tension between these options: “*I can do ganyu but how am I supposed to do ganyu when I have my own work to do [in the dimba]?*” Instead, she would prefer to cultivate her *dimba* land because, “*I can benefit*

from it unlike ganyu, where the money will finish” (Interview 22, Female, Central district, 7/18).

Most farmers in the Central district cultivated a *dimba* every year but struggled with low yields because, *“if we do ganyu and then work at the dimba, I am already tired at the dimba so I don’t do as much work”* (Interview 51, Female, Central district, 7/18). With sufficient time/energy, a *dimba* can provide considerable quantities of food and income at a critical time of year. After a good harvest from her upland crops, this same farmer was able to avoid doing *ganyu* and focus on her *dimba* plot, from which she harvested 3 bags of maize.

Several farmers who had a good harvest the previous years reported that they had been able to hire *ganyu* laborers for one of the first times ever to work in their upland field so that they could expand the area under production. This leads to the third way in which farmers increased self-provisioning- through investment in the land.

Land & soil

Respondents understood the critical role of land for their livelihoods, both in terms of the health (soil fertility) and quantity of land under cultivation. Besides fertilizer access, land access was a limiting factor for a farmer’s production. While several farmers, including Grace, had approached this limitation by reinvesting money into renting more land, farmers’ most common strategy for enhancing their farm was through investing their labor and income into rebuilding the soil as the basis of production.

Explaining that their previous cropping practices had degraded the land and they were committed to continually replenishing it, farmers said that they would continue to use the agroecological

practices because they wanted to bring fertility back to the soil. They acknowledged the soil's vital role in supporting their livelihoods and saw observed improvement in yields as directly linked to their efforts implementing the agroecological practices. Production decisions made based on this motive included intercropping (many farmers explained that they had chosen to grow legume crops like pigeonpeas and groundnuts because of their contribution to soil fertility) and manure making. Farmers expressed their confidence that investing in soil fertility practices could help ensure a good harvest the next year, and served as a preventative measure to reduce crop failure in drought years. To further their ability to improve soil health, several farmers had purchased pigs with their crop earnings on which they relied for manure-materials.

Fewer respondents understood the way that fertilizer inputs masked declines in soil health, yet this farmer was deliberately moving away from fertilizer dependency. Although she had earned more income this year, she did not purchase fertilizer to apply to her crop...

“Because when you are so used to applying fertilizer in your field and it happens that you don't have money to buy fertilizer it becomes very hard for the crops to grow since the soil is used to fertilizer, that's why I want the soil to get used to no fertilizer as well.”

-Interview 8, Female, Northern district, 6/18

For her, it is important that not just her household, but her land, can become independent from fertilizer inputs. Farmers also based production decisions, such as which crops to grow, on whether the crops would make them more or less reliant on fertilizer. On the other hand, there were several stories from who, seeking to further improve yields, reinvested earnings from crop sales into purchasing more fertilizer than they had in the past. When questioned about why this was, one explained that, although she had harvested very well from a plot on which she had substituted manure for fertilizer (enough maize to last the entire year, enough to sell crops and purchase meat), she was “used” to fertilizer and would continue to buy it despite its expense.

Other factors of production: Seeds

Seed access was a critical improvement for many farmers during the first year of production. It is important to note that the seeds distributed during the first year of the project also provided farmers with a resource that otherwise would have been costly, but in the North few would have purchased seeds on a yearly basis so this did not significantly reduce the cost of production.

Those farmers who were able to save and multiply seed for use during the next growing season avoided economic and market constraints that had limited the varieties and species of crops they cultivated in the past, the quality of seed, and the timing of planting. This last factor was particularly significant in the Central region, as this farmer explains,

I: Didn't you know about these improved varieties before?

R: I knew about them but I was getting the seeds from other people in the form of ganyu, but mostly when we were getting the seeds it was late and the lands will be dried up making it hard to plant

I: Why didn't you do ganyu early?

R: The owner of the ganyu wait for the rains to fall first before they give you the ganyu

I: Why didn't you just save your own seeds?

R: Because the time we plant is late and the seeds are mostly of poor quality we don't have enough harvest to save.

-Interview 47, Female, Central district, 7/18

After receiving the project seed, the farmer had been able to produce a higher yield than in previous years. *Ganyu* for seed prevented farmers from being able to plant at the appropriate time during the growing season, both because they were laboring in others fields to plant their crops, and because they had to complete the job before they received payment, which was often in the form of seed. For this reason, maintaining control over seeds was a way for farmers to break dependency on *ganyu*-for-seed, and thereby greatly increase their odds of a good harvest (see LaDue 2019 for more details).

Economic autonomy

While self-provisioning helped farmers to reduce cash demands, farmers still needed and wanted access to cash income; the ability to decide how they earned that cash was very important for their food security. Several farmers deployed the benefits of agroecological practices to increase their power over the terms under which they engaged in market relations, strategically reinvesting labor and income that was made more accessible through the practices.

The majority of farmers who had sold crops during the past few months, had done so unwillingly, in response to some crisis like an illness. They were unwilling to make this sale because they knew it negatively affected their future food security. For those farmers who had harvested well but continued to be food insecure, most explained that some problem had occurred, and they had sold crops at a low price (a tin of maize for 1500 MK or \$2), leaving their family with inadequate stores to feed them for the rest of the year. They knew the cost- buying back grain at double the price, begging, eating their seed, or neglecting their own production for ganyu, or even renting out their land- but also that there was no other option at the time (ganyu/loans being unavailable).

Those farmers who reported having sufficient stores of maize and other food crops had often taken specific measures to avoid circumstances of forced sales. The use of agroecological practices allowed some farmers to take advantage of increased crop diversity and yields to create conditions for longer term control over the terms of market engagement, or economic autonomy. Achieving economic autonomy often meant reducing dependency on the market through input substitution (discussed in self-provisioning section), and building up access to **i) financial**

(loans) and **non-financial assets** that can strengthen their production capacity. Improved access to these assets, as well as more food security and fewer cash demands **ii)** meant that **farmers are more able to deal with unexpected crises such as illness or crop losses** without having to sell subsistence crops, which is associated with an increase in their **iii) market power-** the ability to sell production strategically at a preferred price and time.

I. Diversification of assets and income

An important aspect of controlling when and the terms of market sales is planning for annual and unplanned expenses. Several farmers, using income from crop sales, had purchased assets to use strategically in the future. One woman, who reported an increase in her income since applying the new practices, explained that she had used money from crop sales to purchase pigs in anticipation of selling them later in the year to pay for school fees. SFHC promoters explained that investing in livestock that can increase the value of the initial investment is a common strategy to bank earnings for a planned later expense. Several farmers had invested the extra cash earned through the practices in the same way, purchasing pigs and chicken.

Other farmers had invested savings into the “village bank”, or small savings groups. In the Northern region, we heard several accounts from farmers who were able to draw on the bank savings as an alternative to selling subsistence crops to meet a cash demand. As membership is often limited to those who have enough cash to pay the initial start-up pay-in, the additional income from crop sales could play an important role in accessing village banks, whose members reported considerably more often that they were able to sell crops when it was strategic for them, instead of jeopardizing future food security in order to pay a hospital fee now.

A number of farmers had deployed the cost and yield advantages of the agroecological practices as a way to diversify their income sources, both agricultural and non-agricultural. Earning petty cash from small businesses- food/input shops, doughnut making, food distribution (buying and selling food)- is another way that farmers plan to pay for expenses (keeping food crops for home consumption), but often require some initial funds for investment, which a number of farmers reported they had acquired as a result of surplus crop sales or reduced expenditure on fertilizer/food. One farmer had grown tobacco for the first time the previous year.

“We did not have enough fertilizer to put to maize and Tobacco but now since we do manure we learnt from [the project] that’s why we found fertilizer to put to Tobacco.”
-Interview 35, Female, Northern district, 6/18

Realizing that the new soil fertility practices greatly reduced the amount of fertilizer needed for her maize field, she instead applied the fertilizer to tobacco. Substituting manure for fertilizer for food crops removed the constraint that had prevented her from growing tobacco in the past; the investment needed to meet its fertilizer requirements. She observed that she had still harvested well from the maize field despite applying less fertilizer; in fact, she found that the manure had increased retention of soil moisture, improving maize growth. With the additional income from tobacco sales, she planned to finish roofing the house with iron sheets that year. Improving one’s house- specifically by replacing thatched roofs with iron sheets- was another way that farmers chose to spend income from increased crop sales.

II. Coping

I: Why is there a change in terms of the problems [your household faces]?

R: There is a change because now when I have a problem I can sell crops and solve it.

-Interview 1, Female, Northern district, 6/18

Farmer 1 found that, since adopting practices, she was better able to deal with problems of illness and other cash-demanding crises by selling her crops. While many farmers had earned money by selling their harvests, almost all farmers indicated that, if they did not have a surplus of harvest (beyond the amount needed to feed their family for the year), this sale was not strategic for improving household food security. It could be strategic, however, for maintaining it; producing other crops to sell as a way to meet expenses was a strategy critical to maintaining assets and the ability to farm. As detailed earlier, many farmers explained how their crop sales had allowed them to reduce or entirely stop engaging in *ganyu* as a way to earn income. For a few farmers, the last year was the first time they remembered having the option to not do *ganyu*. By substituting crop sales to cover these expenses, farmers had more time and energy for their own production during key times of the growing season.

We also heard several stories of how farmers avoided repeating more negative coping strategies on which they had relied previously, such as renting out land and taking loans at high interest rates, by selling crops. One farmer, who had switched from relying on tobacco as a source of income to soya and groundnut sales explained how this change had improved her income because, “*now we plant more varieties that we can sell rather than just waiting on one type.*” Before, because of the long growing season, harvest, and auction process associated with tobacco, she had been forced to take out loans at a prohibitive interest rate of 20% to cover household expenses in the meantime. This story was repeated by other farmers who had found a similar benefit in the new crops, like this one:

“Yes, [my income] has changed. At first we were finding problems. We did not know anything; like us women when there is no money in the house and you don’t know where your husband has gone to we would just travel long distances to order vegetables so that we can sell in Rumphi so that you can buy soap. Now that we are in [the project] money

is not too much of a problem unlike in the past, for instance when you grow beans and you harvest 4 to 5 tins and you sell one tin that means you find money to buy soap, salt and using some for maize mill.”

-Interview 38, Female, Northern district, 6/18

This story illustrates how growing a diversity of crops gave this farmer and other women a much less arduous alternative for earning petty cash to pay for small, but essential, household purchases. While the interviews did not elicit many rich details about the gendered dimension of the intervention, this improved income access was echoed in other interviews,

“Yes we find income now, these days there is democracy, even a woman finds Money for herself you don’t just depend on the husband.”

When asked about what this change meant for her she responded, *“I feel really good as of now I don’t even look for a man to give me soap”* (Interview 8, Female, Northern district, 6/18). The independence supported by these new sources of income was critical for some farmers because, while the project included trainings on gender equity, most of the respondents still reported issues of gender inequity in areas of labor distribution and decision-making about household purchases/sales.

III. Market Power

Changes in farming practices helped farmers to build up financial and non-financial assets, reducing their reliance on coping methods that negatively affect their food security. These strategies also served to improve farmers’ control over marketing their production, referred to here as ‘market power’. Farmers with market power had decided *how much, which crops* and *when* they would sell crops. Those farmers with the greatest market power also successfully negotiated prices with buyers.

The capacity to deliberately budget crop harvests to meet household needs throughout the year was a goal expressed by many farmers. This budgeting is a complex process, as indicated by this farmer.

“When you plant Groundnuts sometimes you can harvest 40 tins, so when you find 40 tins you can be able to decide that you should save some for the next season, sell some to find School fees and keep some for food.”

-Interview 8, Female, Northern district, 6/18

A farmer who can meet their family’s needs for seed saving, home consumption, and household expenses must have a surplus crop, but also find a buyer who can offer a fair price, earning enough to pay for school fees. The vast majority of farmers were unsatisfied with the prices they received from almost all parties- neighbors, farm-gate traders, vendors at the marketplace, and consumers at the marketplace. While participating farmers are in the process of forming a farmers’ cooperative, at the time of the interviews this effort had yielded few results. What improvements in pricing farmers had achieved were through the increased market value of the new crop species compared to previous crops they had marketed (soya, groundnuts, beans vs. maize) and selling at a time when market prices had risen.

The timing of crop sales was tricky; most farmers said the prices were higher closer to the next planting season- however selling at this time can often be a desperate measure to access cash by selling seeds needed for planting. Many farmers also said that selling closer to planting season was also bad timing, because at that point they were more likely to be without sufficient stores to sell and also guarantee enough seed for planting. Those farmers who were the most food secure at the time of the interview planned to sell crop surpluses in November or December of that year.

The flexibility afforded by having a greater diversity of marketable crops was significant for farmers' control over market engagement. Interviewees frequently expressed their preference for selling pigeonpea, soya, or groundnut over selling maize. This farmer explains the bind she faced previously when maize was her only marketable crop,

Inter: Can you think of a time you had to sell maize anyway even though you did not want to?

Resp: Yes, in the past

Inter: Can you tell me about that?

Resp: In the past we were only growing maize and we were finding money when we sell maize, we would find money to use for buying soap, clothes and for milling. Now that we are growing crops from [the project] money is not really a problem."

-Interview 35, Female, Northern district, 6/18

As the dietary staple and therefore most abundantly grown and marketed crop, market price for maize is lower than other crops during harvest time, and because of relatively inflexible demand (maize flour for the daily nsima is prioritized over almost any other household need), prices rise dramatically during the dry, or "hungry", season. By growing diverse crops, farmers were able to meet cash demands but avoid selling important subsistence crop (maize), instead selling other relish crops, like groundnuts, and still having enough to eat as relish for the rest of the year. As this farmer indicates, finding money to cover basic household expenses was a problem when this income was only available through maize sales. Although a farmer still might be uncertain whether all relish crops will last for household consumption for the year, she can say definitively that she will *not* sell maize this year. As another farmer explained selling subsistence relish crops is better than the alternative- selling maize and not being able to buy back a sufficient quantity because of the price increase. Some respondents reported that maize prices fluctuate more than other relish crops, but the primary issue is that a household consumes maize in far greater quantities than relish crops, which they can buy in "smaller portions."

Until this point, the impacts of agroecological practices on food security have been analyzed at a household-level. Understanding how agroecological practices interact with existing social practices of alleviating food insecurity at the community-level is key to grasping its transformative potential.

VIII. Collective food security & agroecology

An important feature of the research question was understanding how agroecological practices with the potential to improve household food security worked through existing channels of social support at a community scale. We found that the project trainings and seed improved access to seed and food via social practices of food and input sharing, food sales, and *ganyu*. These practices of social support reinforced reciprocity, trust between project participants and other community members, improving their social status. These strategies are all forms of social support; whether a farmer is paid in cash or in-kind for *ganyu*, whether a neighbor shares food and is paid immediately in cash or not at all, these exchanges are based on long existing social relationships of reciprocity, for which the terms are never explicitly stated. Almost all farmers agreed that “*when they [the neighbors] ask for food we have to share, because in the future I will also need it from them*” (Interview 2, Female, Northern district, 6/18).

The reciprocal nature of these relationships means however, that if you are a poor farmer for many years in a row this safety net may not be available for you, as one farmer noted:

Inter: Do you think you will grow these crops again next year?

Resp: Yes, I cannot stop.

Inter: Why will you not stop?

Resp: I have starved for a long time because of not having seeds and I was lacking so many things plus my friends did not want me. Now that I have everything people now come to me.

Inter: Because you have grown more food now you have more friends?

Resp: Yes.

-Interview 45, Female, Northern district, 6/18

In addition to improving her own food security, this farmer had gained social status through the new practices. She now is considered a “boss” at farming- with those friends who had previously rejected her for her poverty now “admiring” the success of her farm and coming to her for advice on manure-making (knowledge sharing was also a community-level impact of the project) as well as to request food. The FRT confirmed that this woman had been one of the poorer members of the community, indicating that the transformative potential of agroecology is not limited to those most resource-endowed.

Food & input sharing

Especially in the Northern villages, practices of sharing food to those families who harvested poorly or experienced some other hardship to cause food shortages were particularly common. Often food was shared without the recipient’s request, though some respondents reported that they would “beg” when they had no alternative to find food. The active nature of the sharer in this relationship is noted by this respondent:

Inter: When you have a better yield does that affect your neighbors

Resp: Yes, when I have harvested a lot and my friends don’t have food I share them

Inter: Have you done that in recent years sharing your friends

Resp: When I did not have food I was not sharing, since you share when you have food, so in the past I was not able to share but now since I find food I share

-Interview 39, Female, Northern district, 6/18

Like this farmer, the majority of Northern farmers interviewed explained that they were more able to share food with other community members because of their own improvements in food

security. For some, this was even a reversal in a long-standing trend of being the recipients rather than the givers of food. While seed sharing was less common, farmers also reported that they had shared seeds with their neighbors, which previously they had purchased at the market. This farmer's comment illustrates the understandings of reciprocity and collective well-being shared by many of the farmers interviewed.

I: Does sharing seeds usually happen?

R: Sharing seeds is like keeping them, you can ask from them later.

I: Have you given anyone seed?

R: Yes a lot of people.

-Interview 12, Female, Northern district, 6/18

While seeds were the most frequently shared inputs, a few other farmers had given compost/manure materials or prepared compost manure for friends that needed these production inputs.

Food selling

Food purchasing/selling between community members occurred in the Northern region, often as a form of social support and, like food sharing, household-level production improvements increased the frequency of these exchanges. In one example, because she had harvested more soya than before, a farmer had sold to her neighbor- something she did rarely. Besides being a source of income for her, she explained that this transaction benefited her neighbor because soya was scarce at the time and difficult to find locally, while the price she had charged her neighbor was lower than what she might have been charged at the market.

Ganyu as social support

Some of the Northern farmers had hired *ganyu* for the first time because of the surplus yields and related crop sales they had enjoyed that year. While *ganyu* was often a less desirable income generating activity, we heard stories of the ways in which it served to benefit the *ganyu* laborer. Farmers generally agreed that those who had more friends would be given more opportunities for *ganyu*- and some explained that they hired friends to work for them, not always because they needed work done, but because they knew the friend needed the opportunity to earn cash or food.

Embedded markets for collective autonomy

In food sovereignty discourse, localized production and exchange of crops sustain an ideal food system. The types of reciprocity and trust-based exchanges exemplified in the previous section would form the basis of this “embedded marketplace.” We sought to probe an underlying assumption behind this vision; namely that farmers prefer these types of markets to existing ones. In the Northern region, more farmers, like this farmer, shared this framework of exchange-based relations, especially when compared to the alternative of selling to untrustworthy vendors.

Inter: What is the difference when you sell to neighbors and sell to the vendors?

Resp: Neighbors are close to me and when next time am in need of something they can also help me unlike the vendors when they buy they don't come back and they also add prices.

Inter: Do you sell as a favor to them?

Resp: We help each other here in the village.

Inter: How is it helping? I don't understand.

Resp: I mean when I come to you and ask you for a cloth and you give me, that doesn't mean you have thrown your cloth away but simply I will help you too one day when you need something

Inter: You don't charge them money for crops?

Resp: When the person doesn't have money I give for free and when one wants to buy they pay me. (34)

-Interview 34, Female, Northern district, 6/18

This same farmer cited above however, acknowledged that she received higher prices for their crops when she sold at the marketplace than when she sold to community members, though the price of transport reduced the margin of difference. Especially in the Central villages, where a larger marketplace was closer (some villages were within a 15-30 minute walk vs. 45 minute walk in the Northern village), farmers preferred to sell there compared to community members, who often bargained for a lower price and/or the seller felt compelled to offer a larger quantity of produce (eg. mustard greens) to a friend than they would had sold to a vendor to whom they did not feel socially obligated. In fact, farmers complained in the Central area that they would sell to a friend even though they did not want to, as they had not harvested enough to meet their own needs. Selling as “helping” was an idea frequently expressed by respondents.

Interestingly, the same farmers who said they preferred to sell in town also preferred to purchase food from their neighbors. As a SFHC staff member explained, this is not a contradictory stance. Farmers understand when their neighbors sell crops to outside vendors and not to them. They know the farmer has worked hard, and if they can't pay the price the farmer wants, it is okay that they sell at a better price. Yet at the same time, many farmers are excited that they now have the chance to share with those that supported them in the past. Whether a farmer chooses to allocate their production to a business transaction with outside vendors to acquire much needed cash, or engages in exchange with this production as a form of “selling as helping”, building relationships that are more durable and meaningful, depends on the farmer's situation at a household and community level.

Conclusion

The pathways described in this section are by no means comprehensive; notably, although the interviews attempted to probe the effects of gender relations on household food security, the responses provided insufficient data to write extensively on the ways that gender inequality might affect how agroecology play out. The lack of gender analysis is a limitation of the study. What can be claimed is that existing conceptualizations of food security pathways via agricultural interventions failed to capture the attributes of agroecology that farmers found most causally linked to improvements in their food security. Why this gap between theory and reality exists is related to contextual factors of the study site, but I argue that it is also a product of the discursive context in which food security literature is situated and has implications for which solutions to smallholder hunger state and international development agencies implement.

Chapter 4: Discussion & Conclusion

Both food security and food sovereignty discourses advocate food security, or stable access to nutritionally adequate food, as an envisioned goal for smallholder agriculture. A popular approach to addressing hunger in rural areas is through agricultural interventions based on the hope that, by enhancing smallholder livelihoods through the improvement of farm productivity and/or management, food security will be achieved. There is little evidence however, of if, or how, agricultural interventions are actually improving food security. This study sought to provide evidence of whether adopting agroecological practices led to gains in food security for smallholder farmers in Malawi, and if so, by what pathways those improvements were achieved.

Food security as a valuable concept?

The farmers' stories and perceptions represented in the results section were selected to engage with debates about ending hunger, smallholder livelihoods, and the future of agricultural practices. What is often left out of these debates is what farmers themselves feel about these questions, and whether they are even appropriate ones to ask. That the metric of progress be representative of the needs and aspirations of those who are its "beneficiaries," is critical for the value of the intervention. The farmers participating in this study were largely unaware of the term "food security", yet in the decision-making and preferences they expressed in interviews, it became clear that ensuring access to stable, adequate variety and quantities of food was a priority. In this way, food security as an indicator of project success is valuable. This might be self-evident, but there is some debate about the usefulness of food security as an indicator of household well-being (Schanbacher, 2010). Farmers' aspirations however, were rarely as narrow

as unconditional food security; they cared about how the terms of short-term food security affected their longer-term food security and livelihood goals. The farmers in this study recognized that, within the existing socio-political and economic milieu, they achieved and maintained food security *through* regaining and then maintaining control over their socio-ecological relations of production. In this way, food security as pursued by the participating farmers aligned closer with food sovereignty discourse, because unlike food security discourse, the focal goal of food sovereignty is increasing farmers' control over defining their food system, and the decisions they make as producers.

The ways that altering production relations translates directly into food security however, are not theorized in scientific studies of household transitions to food security. How can this gap occur when these pathways were so prominently part of the way many of the households studied achieved gains in their access to food?

Discourse and scientific pathways

The discrepancy between theorized and observed pathways to food security indicates that existing academic literature has limited explanatory and interpretive utility for conceptualizing processes to improve smallholder livelihoods. The analytical trap is assuming the separability of food security as a concept- measured and studied in scientific literature- and food security as a discourse. While some authors argue that food security as a concept still holds value (Jennifer Clapp, 2014) (and the relevance of food security to the farmers in this study provides underlying evidence of the salience of the concept), the dominant theorizations of food security pathways do not entirely disembed food security, as an indicator of household well-being, from the

assumptions inherent in the discourse that deploys it. Assumptions about the causes and solutions to smallholder hunger become part and parcel of the studies themselves, particularly in research on household-level pathways to food security.

Many studies based on the accepted theoretical models of household pathways to food security hold presuppositions inconsistent with the findings of this study: 1) that the income pathway is the ideal pathway for addressing farmer food security and that 2) operating through this preferred pathway whenever they are able, farmers make farming decisions based on a certain logic of profit maximization. Put differently, these models presuppose both the purpose of farmers' livelihoods and the root of their livelihood problem: the aspirations of their livelihoods are commercial sales, the reason they farm is to earn money, and their major food security limitation is the inability to earn enough money because of their low volume of sales and/or incomplete markets. This framing creates normative blinders for food security studies, narrowing the existing theorized pathways to food security and stunting their analytical utility and interpretive validity. At the same time, this framing prefigures metrics of success, positioning certain agricultural paradigms as more effective for combatting food insecurity.

a. Market imperfections and food insecurity

In the results, farmers' orientation towards markets and their livelihoods exposed the problematic and inaccurate nature of assuming the dominance of profit logic in the context of Malawi. A profit, or market logic, is one where choices are primarily decided with the goal to maximize profits, yet farmers in this study rarely voiced this opinion; indeed, they saw a limited role for commercialization in improving their livelihoods. In the results, respondents commonly

expressed one or both of the following reasons for this perspective: a) market dependency was risky for their livelihood, and b) as farmers, their role was, first and foremost, producing food for their family. Farmers were well aware of the nature of local and export markets; the mythical fair price offered by a buyer, and the seasonal price increases that jeopardized their ability to purchase food. In this study, access to markets did not change the nature of that relationship: prices were consistently poor and those farmers who were most food insecure were those who had sold crops. In addition to the very real dangers of relying on the market for food and production necessities, active distanciation from market dependency was an expression of farming identities of self-sufficiency and autonomy, and an assertion of difference from unfortunate *ganyu* laborers and urban dwellers who relied on others for their livelihoods. No farmer expressed a desire to entirely abstain from market transactions, but emphasized that these transactions should be on *their terms*; that the farmer receives a fair price and *chooses* to part with the produce sold.

In contrast to these stories, many food security studies and meta-reviews reproduce the normative assumption of neoclassical economics that commercialization pathways have superior outcomes compared to subsistence pathways and that farmers, if they are able, act according to this profit logic (C. Carletto et al., 2017; G. Carletto et al., 2015b; Gillespie & van den Bold, 2017; Hawkes & Ruel, 2008; J. Hoddinott, 2012; Kadiyala et al., 2014; Koppmair et al., 2017; Qaim, 2017; Shankar et al., 2019; Sibhatu & Qaim, 2018). Especially in the case of direct-consumption, theorizations of other pathways appear to stem from the question, “why are income pathways insufficient to explain household decision-making around production and consumption choices?” The answer in contemporary food security literature is that the income pathway to food security, in the case of smallholders, is distinct from that of large-scale farmers and non-

food producers because it is closely tied with household consumption, or “non-separable.” This means that farmers make choices about what and how much of a crop to produce and sell often based on what food they need or want to keep for their own subsistence, or the direct-consumption pathway. Much food security scholarship accepts that market imperfections are the principal reason that direct-consumption pathways remain relevant for addressing food security in smallholder populations (C. Carletto et al., 2017; G. Carletto et al., 2015b; Gillespie & van den Bold, 2017; Hawkes & Ruel, 2008; J. Hoddinott, 2012; Kadiyala et al., 2014; Koppmair et al., 2017; Qaim, 2017; Shankar et al., 2019; Sibhatu & Qaim, 2018).

The tendency to explain the direct-consumption pathway as the unfortunate byproduct of malfunctioning markets has led food security scholars to under-theorize the importance of a direct-consumption pathway for smallholders’ livelihoods and food security. Often implicit in this literature is that direct-consumption pathways are important for meeting food security needs *now*, but once market imperfections are remedied, smallholders will reorganize their production to maximize commercial profit. Fixing market imperfections therefore, is a common solution recommended by food security scholars- as this would allow farmers to make more rational production choices that would maximize their profit, and thus their food security. Besides privileging an income pathway, there are several assumptions behind such recommendations: a) that markets are missing b) that markets for smallholders can or will be “perfected” and c) that perfected markets would change smallholder participation.

Missing markets?

Smallholders' lack of commercialization and continued reliance on subsistence production is interpreted as a symptom of missing markets. This perhaps contributes to the widely-held belief that smallholders, especially in Sub-Saharan Africa, are unable to access markets for inputs and outputs. Studies of market access commonly use measurements like distance to market, share of harvest sold in market, and whether a market exists nearby (Koppmair et al., 2017; Sibhatu, Krishna, & Qaim, 2015). Yet, consistent with the reports of farmers in this study, there is evidence that a large proportion of farmers in Sub-Saharan Africa extensively use existing markets to transact labor, land, and other goods (Dillon & Barrett, 2017).

Policy responses to missing markets are different than policy responses to uncompetitive markets or to well-functioning markets that are “considered sub-optimal from a social perspective” (Dillon & Barrett, 2017). As such, it is concerning that many food security scholars continue to reproduce the idea that markets are missing in Sub-Saharan Africa and repeat the recommendations suited to situation where more market access is needed (Koppmair et al., 2017). In the absence of markets, assigning property rights, removing restrictions on certain forms of exchange, or investing in public goods that make exchange feasible (e.g., information, roads, agricultural research stations) are seen as ways to create markets and make them accessible. In the case of uncompetitive markets, policy responses include investing in physical and institutional infrastructure, as well as regulating contract enforcement and collusion. In markets operating properly, or at market-clearing prices, but at a price that is too low for households to achieve basic levels of welfare from participating, “greater attention should be paid to increasing the value *above* current market prices of the land and labor.” Some economic

policy options recommended to achieve this are subsidies, taxes and transfers to mitigate endowment inequalities (Dillon & Barrett, 2017).

Perfect-able markets?

So, like the farmers in this study, the confounding “unseparability” of farmers’ choices around market transaction and production, is not due to missing or distant markets, but is a result of the very nature of existing markets. Finding that markets in Sub-Saharan Africa are rife with market failures (indicated by violations of the separation hypothesis), a recent study explains that these market failures most likely stem from general structural barriers (Dillon & Barrett, 2017), such as weak physical infrastructure, uncertain and expensive contract enforcement, and middle-men (financial intermediation). Farmers in this study were skeptical however, of claims that general structural barriers, could be remedied at a local or national level in a way that would change the terms of their market participation.

Farmers’ incredulity that markets could be adequately reformed contrasts the optimism of food security scholars; these perceptions may be related to a difference in the definition of what a good, or perfect market, looks like. Interviewees consistently explained that a good market is one where crop prices are fair and stable. A fair price is not one set by the international market price, it is one that covers their production costs and rewards their labor. They explained that, until that reality exists, they will continue to actively distance themselves from the unfavorable market conditions that jeopardize their food security. A future of fair and predictable prices seems less likely given the policies put into place so as to “perfect” these markets, such as structural adjustment policies. In the name of stimulating economic growth and market participation,

Fig. 5. Maize prices in Malawi (2017-18)



previous policies to stabilize maize prices, such as marketing boards, price floors and ceilings, and credit systems were dismantled (Peters, 2006), and though they have been restored formally, they are not enforced (Chirwa & Chinsinga, 2014). These policies had played a role in reducing seasonal price fluctuations, which now remain the norm, especially in Malawi (Devereux, S., Sabates-Wheeler, R., Longhurst, 2013; FAO GIEWS, 2019; Gilbert, Christiaensen, & Kaminski,

2017; **Figure 5**). While a common solution to price fluctuations are macro-economic policies that increase between-country trade to reduce seasonal prices and their volatility, such as from Tanzania to Malawi (Pierre & Kaminski, 2019), smallholder farmers in this study were as perturbed by the low price of maize as by the high price of food. This returns to the classical food price bind; prices are driven down by flooding markets with imported maize, negatively affecting those farmers who were hoping to sell some part of their harvested crop (Zezza, A., Davis, B., Azzarri, C., Covarrubias, 2009). Several farmers in this study reported that market prices rose high enough to merit selling maize only during the peaks of their fluctuation. Otherwise, maize prices often remained so low that they refused to sell their surplus, instead preferring to trade it locally with community members. Given the geopolitical position of Malawi and position of smallholder farmers within national political power hierarchies, the likelihood that prices become stable and favorable is low (Bezner Kerr, R., Patel, 2014; Bezner

Kerr, 2013; Chirwa & Chinsinga, 2014) Farmers' apparent understanding of this position not only influenced the types of crops they grew, but also the types of agricultural practices that they used.

Smallholder (ir)rationality?

Finally, there is the issue of whether it is possible to assume that market failures are the only reason that smallholders continue to meet food security needs through a direct-consumption pathway. One might argue that the imperfectability of markets is related to food security scholars' underlying assumption that farmers do operate based on a profit logic. Perhaps if market dynamics were favorable for smallholders in Malawi, their approach to marketing would differ; the emphasis on subsistence and means of production would shift, and farmers would come to trust dependence on a cash economy. The hypothetical nature of this challenge leaves only the response that, for many farmers interviewed, self-reliance was an integral part of their identity- a value outside of economic gain. Food sovereignty leaders and literature explain that many smallholders, although limited by market conditions, make choices according to a different logic than the one assumed by economic models, termed a "peasant logic", where maintaining control over subsistence and the means of production for subsistence are prioritized rather than profit (van der Ploeg, 2010). The fact that "illogical" market behavior may be a deliberate choice however, is ignored in literature and models of smallholder food security (Isakson, 2009). This study provides another example of "peasant logic," what I have termed a logic of autonomy, at work in smallholder households.

In summary, market behavior should not be understood just as a result of “market imperfections,” but both an expression of farming identity (growing your own food, being autonomous), and a lived understanding of farmers’ marginal position in agricultural markets. The conventional wisdom that asserts these markets just need to be fixed has not obscured smallholders’ understanding of their inherent nature. The majority of those farmers interviewed expressed disbelief that a good market would ever exist in their villages. Reading smallholder disengagement with market-relations and capital-intensive forms of production, and their reliance on subsistence pathways to food security, as a sign of market imperfections limits the explanatory power of theorized food security pathways. The logic of autonomy behind direct-consumption pathways continues in the act of distancing production choices from market engagement. Yet the types of production practices that are consistent with a logic of autonomy have benefits for producers that are not easily quantifiable- reducing expenditures on inputs are not captured in economic models that measure welfare based on income generation and purchasing power, nor are the benefits of reinvesting labor into one’s own production rather than earning wages through *ganyu*. Indeed, reducing expenditures on food appears to be a reduction in household well-being by such indicators.

Why does it matter that food security scholarship continues to operate based on these assumptions? Most scholarship has embraced different ways of addressing food security, including direct-consumption, gendered resource allocation; multifaceted approaches to addressing food security that include these pathways are the common recommendation. Yet the preferred income pathway is implicit in many of these studies, and it is this pathway that the dominant and best funded forms of agricultural development interventions continue to target

(AGRA, 2017; Denning et al., 2009b; GAFSP, 2017). As food sovereignty scholars and activists would argue, an income pathway to food security within the existing globalized, liberalized food system, would lead to more precarity and food insecurity. Small farmers everywhere, including the global North, face similarly disadvantageous market conditions as those farmers in Malawi, where their terms of participation are dictated by trade and agricultural policy that privileges monopolistic corporate interests (McMichael, 2012). Household-level or regional interventions do not alter these conditions; the food sovereignty movement holds that macro-economic change is needed to make markets fair for smallholder farmers, beginning by removing decision-making power about food and agriculture policies from global powers represented by the IMF and WTO (Corrado, 2010; Rose, 2017).

Theorized pathways in practice

In the study, several respondents had indeed improved food security through the agriculture income pathway, in a way consistent with the theorized pathway; farmers who had increased their household's income through selling a greater amount of surplus than in previous years said they had purchased a greater variety of food and more frequently than in the past. Yet the most common way in which farmers explained their improved access to purchased foods complicated the typified income pathway, as it was through a type of "mental accounting" of subsistence substitution. When farmers produced a greater amount and variety of foods for their own consumption, they reallocated income previously spent on food or other inputs (e.g. seeds, fertilizer) to new foods only available on the market, such as meat and fish. The "non-separability" of production and consumption choices might be the reason that this relationship between subsistence and food purchasing is overlooked in economic models of the household.

Subsistence pathways to food security: Crop diversity

The study examined a second pathway recognized in the literature, the direct-consumption pathway, though given its prominence for farmers in this study, its importance is often undervalued in scholarly writing. Farmers' prioritization of farm production for subsistence needs had led to observable increases in farmer food security through the direct-consumption pathway. An increase in the diversity of crops and, for some, the yield of those crops, meant greater access to more food groups, as well as a greater quantity of food. The role of crop diversity for food security comes into tension with approaches to agricultural development that promote income pathways to food security, with proponents of the latter pathway emphasizing the food security tradeoff of foregone income if land is devoted to diverse food crops instead of a cash crop with higher market value. In large part based on this argument, the importance of crop diversity for food security gains through the direct-consumption pathway has been minimized in recent papers (Koppmair et al., 2017; Sibhatu & Qaim, 2018); this study provides evidence that undervaluation of the role of crop diversity in food security should be reconsidered. The fact that farmers transitioned to food security primarily by diversifying crops intended for subsistence challenges whether the income tradeoff of crop specialization really makes the difference for food security.

While in the literature review chapter, I hypothesized that agroecology and food sovereignty targeted the direct-consumption pathway as their principal channel for increasing farmers' access to food, the results of this study indicated that this pathway was only one of the processes through which agroecology improved household food security. Notably, these pathways and logic are most consistent with pathways of transformation proposed in food sovereignty

discourse, those of altering social and ecological relations. It is important to acknowledge that the short duration of the project did not allow us to follow-up and confirm whether those participants whose stories I highlighted in the results section continued on the trajectory toward food sovereignty.

Transforming social and ecological relations of production for food security

In neoclassical economical models of decision-making, production choices, such as the means of production and what a farmer produces, matter only in so much as they turn a profit (Singh et al., 1986). Well-functioning credit markets make accessible a set of technologies and practices that can be selected by the farmer to maximize comparative advantage. In such a system, choices about crops, inputs, and outputs are decided by market prices, with improving production outputs as the principal driver. Yet farmers in this study did not always buy the inputs that might promise the greatest increases in productivity, even when they had the financial resources to do so.

Recognizing the reality of their position in markets, local or regional, many smallholders used the agroecological practices to reduce expenditures and sales in these markets; the technologies and practices they applied mattered for food security just as much as the production outputs.

Being able to subsist and guarantee future production meant reducing reliance on those markets that had jeopardized their livelihoods and food security in the past.

Beyond income and subsistence pathways, several other pathways were identified through which farmers were transitioning towards food security via the agroecological practices, pathways related principally to the condition of *stability* of food access. These improvements were linked to changes in *production relations*. Following an underlying logic of autonomy, farmers

achieved improvements in food security by shifting these foundations from factors they were less able to control to those that were more within their domain.

Social relations of production

A household's well-being is determined in large part by social relations of production (Bernstein, 2010). For many of the Malawian farmers interviewed, not owning fertilizer and seeds meant that they had less claim to their labor and harvest: they were only able to continue to farm by marketing both to meet the demand for the "tools fund", yet this created shortages of food and labor funds. Households explained that this choice led to food insecurity in the present, even as doing *ganyu* to earn money or food needed to meet basic needs reduced their capacity to reproduce the technical conditions of future farming, as they were unable to properly care for their own crops. Finally, to access nutritionally important food groups, farmers had to purchase "relish" foods from markets, often engaging in exploitative market relations to do so.

Adopting agroecological practices altered these production relations; farmers produced their own soil amendments and seeds, avoiding transactions and relations in which they had consistently lacked power. By self-provisioning key production inputs, smallholders reduced market dependency- they had greater ownership of their means of production, and through that, had greater control over how they directed their labor. The "demands" on their harvest were reduced even as their capacity to produce was expanded (via labor). With greater decision-making power over labor and farm production, most farmers interviewed chose to devote a larger portion of their cultivation and harvest to diverse food production primarily meant for feeding their families.

The ability to control food and production inputs meant that farmers could avoid exploitative market relations, and instead engage more strategically with buyers during months when prices were higher. While many farmers explained that self-provisioning allowed them to reduce expenditures, some were also able to reinvest labor and income in ways that further created conditions for economic autonomy. A condition for economic autonomy that was also critical to food security was improving the ability to deal with crises and thus control the type and terms of agricultural sales. Farmers used income from crop sales to purchase livestock, with the plan that they could sell these assets to access quick cash, thereby avoiding coping mechanism that had endangered their food security in the past, such as selling subsistence crops. With cash to buy into a savings group, they also had greater access to village savings groups, which served a similar purpose- allowing farmers to take out loans instead of resorting to more desperate coping strategies. This is consistent with other studies' findings on the impact of credit markets on smallholder crop marketing and consumption choices in relation to seasonality (Stephens & Barrett, 2011). Through leveraging the cost-saving benefits of the agroecological practices and, for some, increased income from surplus crop sales, a few interviewees had supported new or on-going diversified livelihood activities.

While many farmers deployed the benefits of the agroecological practices to reduce crop sales, a number explained that, in part by building up alternative coping mechanisms, when they had sold crops, they were able to do so more strategically. They altered their marketing strategy from previous practices by marketing a different crop, to a different person, or at a different time of the year. Most commonly, farmers reported that growing a diversity of crops allowed them to decide which crops to market in such a way that protected their future food security, such as by

selling a “relish” crop instead of their staple crop. Farmers also explained that some of the new crops had a higher value than those they had marketed in the past, increasing income generation. While a few respondents explained that, because of better present food security and reduced cash demands, they had the time and financial resources to seek out a buyer or location to sell that would give them a better price, a more frequent strategy for accessing better prices was altering the timing of crop sales. Consistent with data collected from regional markets, farmers explained that prices consistently rose by at least 50% between June and January (FAO GIEW, 2019). The ability to reserve surplus crop stores so that they could sell them at times when market prices rose was one that farmers strategically developed through reducing expenditures and building up financial and non-financial assets.

Finally, agroecological practices transformed farmers’ social support through channels of reciprocity and trust. Whereas previously many of the smallholders had been frequent recipients of food shared by more food security members of the community, the aforementioned benefits of agroecology had shifted farmers to the givers of food and seed. The subsequent improvement in social status had implications for these farmers’ future food security, as it increased the likelihood that their fellow community members would support them in a time of food scarcity. Such a change also reinforced non-market based social relations that are fundamental to the long-term food security and well-being of a community (Chinsinga, 2004; Hadley, Mulder, & Fitzherbert, 2007; Walsh-Dilley, 2013) .

Ecological relations of production

Consistent with findings in the literature (Ponisio et al., 2014), many farmers noted an increase in their farm productivity, both in specific crop yields and overall food production from that plot of land. However, increasing yields was rarely mentioned as a motivation for adopting the agroecological practices. Instead, farmers more often explained that many years of dependency on inorganic fertilizer had degraded their soil, and they viewed the agroecological practices as integral to restoring the soil fertility upon which their livelihoods depended. Improving resilience to climate change was an objective often deliberately pursued by farmers who decided to implement the practices, indicating an active approach to dealing with the effects of climate change. Farmers invested their labor in soil management practices that increased moisture retention, articulating that, in doing so, they could reduce crop loss to dry spells and flooding.

For many of the Malawian farmers interviewed, agroecological practices were a way for farmers to invest labor and local resources into building the ecological foundations to ensure the viability of present and future farming conditions. Agricultural practices that both increased yields in years of good weather and reduced crop loss in poor conditions held value for farmers who sought to minimize risk and uncertainty without compromising a certain level of production (one hopefully high enough to sustain household subsistence). Farmers invested their labor in agroecological soil management practices such as crop residue incorporation, legume intercropping, crop rotation, compost application, and box ridges with the aim to reduce the effects of climate change and soil degradation on their livelihoods. This meant (re)incorporating knowledge of the biological cycles that sustain their production systems- replacing external fertilizers with knowledge and labor needed to repair rifts in nutrient cycles with locally

produced inputs. Through this knowledge-intensive soil and crop management, farmers built ecological capital, enhancing the biological processes of the agroecosystem (Schneider & McMichael, 2010; Wittman, 2009). This is a form of increased control over production, as it reduces the uncertainty of production outcomes by mitigating climate change and pest outbreaks, and the risk of insufficient financial resources for purchasing inputs. Besides improving food security while working within the constraints most farmers face, these strategies also are consistent with many farmers' aspirations to become independent from market relations that they recognized as exploitative and likely to remain so, as "ecological capital, if cared for, allows for patterns of growth that are independent of the main markets for factors of production and non-factor inputs" (van der Ploeg, 2010)

Food sovereignty

If production relations are just as, if not more, important than production outputs for improving stable, adequate access to food, what does this mean for development policies and discourse? And what does it mean for how we understand farm-level pathways to food security? In theory, studies on the latter should inform the policy approaches of institutions involved in the former. The importance of production relations to household well-being might be obvious, yet food security discourse widely ignores the complex social dynamics behind production. This has implications for the metrics of evaluating agricultural development, and what agricultural paradigm shift appear most effective for tackling food insecurity. In countries like Malawi, where smallholder farmers make up the majority of the food insecure population, agricultural intensification has been promoted as a paradigm shift that would reduce hunger for farmers who

adopt these practices. Implicit in these strategies is productivity-based agriculture income pathways to food security. Yet based on the results in this study, smallholders achieve improvements in food security through transforming the social and ecological production relations, specifically by re-gaining control over the inputs and outputs of their farm, building up existing social support structures, and enhancing the ecological foundations of their farming system.

The invisibility of these pathways in food security literature is significant- it means that agricultural intensification paradigm, like sustainable intensification, are promoted in the name of food security, without acknowledging that increasing market dependency actively undermines self-provisioning and economic autonomy pathways to food security. A deeper understanding of the pathways farmers are using to improve food security can help to reframe both the problem and solution of smallholder hunger. This study added to the growing body of evidence that agroecology is effective for reducing food insecurity. Agroecology is generally ignored in development policy- a dismissal that I conjecture is related to the way that existing conceptualizations of food security pathways via agricultural interventions fail to capture the attributes of agroecology that farmers found most related to improvements in their food security.

At the same time, smallholder communities persist, navigating these issues using new and old ways; fundamental to this persistence are existing practices of social support, yet community-level analysis of agricultural pathways is often missing from this literature. The customs of social support that play an important role in mitigating risk/disaster continue to function even after agricultural interventions are introduced to a community, and should be considered as part of the

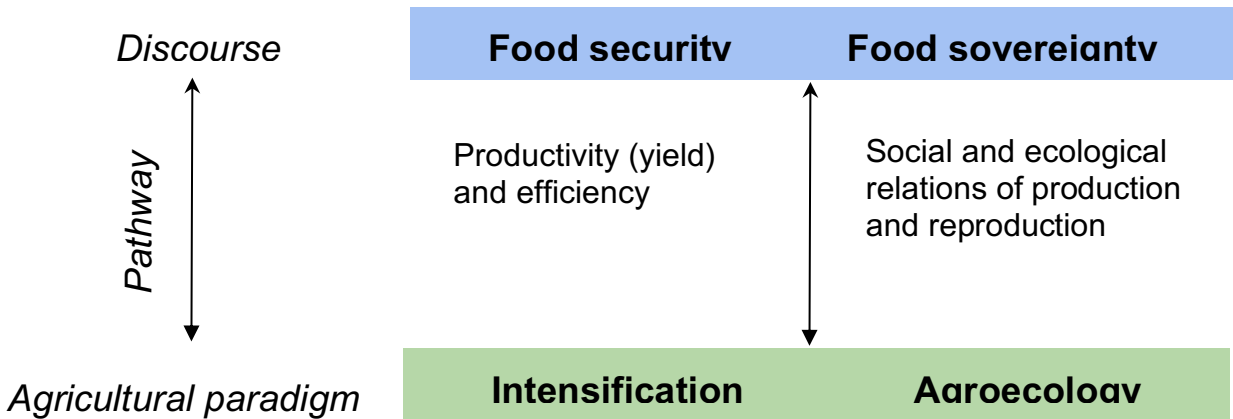
analysis of food security impacts. Notably, farmers were more likely to share locally produced inputs, like compost-manure or saved-seeds, than purchased inputs (hybrid seeds, fertilizer), which indicates that agroecological practices may have greater potential to reinforce social safety nets based on reciprocity.

This paper provided evidence of a number of pathways largely unacknowledged in both scholarly and development circles- and I suggest that this analytical inadequacy of existing literature is a symptom of the normative implications of food security, even in scientific literature that ostensibly avoids the influence of mainstream development discourse. As expressed by Kimura in her analysis of nutritionism and its complicated relationship with the science-policy nexus, “contrary to conventional understandings, science’s role is not only to provide tools to diagnose and rectify problems- in a profound way, science, and a complex relationship with other institutions, often creates the problem itself” (Kimura, 2013). The problem of food insecurity is not one that scientists invented for smallholder farmers; the farmer participants in this study in Malawi struggled to meet basic consumption needs, and they aspired to reduce the bodily and mental suffering caused by food insecurity. A scientized framing of the “hunger problem”, however, goes beyond defining the condition of food insecurity as a problem, to identifying the root of that food insecurity itself. Understanding the material reality of Malawians’ seasonal food insecurity as rooted in low productivity and market imperfections is just one of many interpretations. Yet when such an interpretation becomes truth, certain interventions then appear logical and expected (Deacon, 2000). Interventions whose primary aim is to target production outputs and market growth, like sustainable intensification, receive less resistance, and even to resist becomes a moral quandary, when that intervention is invoked in the

name of the suffering target population (Kimura, 2013). Supporters of AGRA have critiqued agroecology scientists and movement organizers of “proscribing technology and agricultural modernization in the name of social justice and working within the limits of nature, rather than giving African farmers a plausible pathway out of hunger and poverty” (Alliance for Science). In this way, scientific scholarship co-produces a food security discourse that forecloses the very critique needed to create openings for alternative solutions to hunger, such as agroecology.

The reality presented by food security scholarship includes normative assumptions about how knowledge is produced and whose voice counts in the production of this knowledge. The dearth of qualitative research to understand a question very suited to a qualitative methodology of “*how* do farmers transition to food security” is deeply linked to disciplinary power hierarchies that position quantitative research methods as more credible, both in that they deliver quantifiable measurements for results-driven development work, and in the historically constructed superiority of this type of expert knowledge. Yet questions of production relations are not easily quantifiable, and understanding them requires engaging with a different type of knowledge that is largely neglected in food security scholarship. What became clear in this study was the absence of farmer perspectives about their identities, aspirations, and their own understanding of the strengths/barriers to these aspirations in food security literature (Alexander et al., 2018; Curry, Barry, & McClenaghan, 2013; Previte, Pini, & Haslam-McKenzie, 2007).

Figure 6. Discourse, pathways, and paradigms



The study’s results indicated exclusion of farmers’ voices from food security discourse as clearly as food sovereignty discourse’s inclusion of farmers’ perspectives of hunger and plausible solutions. Among its definitions, food sovereignty is characterized as the ability for people to “define their own food and agricultural systems,” thereby centering the social and ecological conditions of their farming. The food sovereignty movement asserts that agroecology is the agricultural paradigm with the transformative potential to shift existing power relations of the food regime in such a way that smallholders are able to regain control of their production and food systems. While the farmers in this study were unfamiliar with the term “food sovereignty”, farmers purposively employed the advantages of agroecology in a way consistent with the tenets of food sovereignty. Pathways of self-provisioning and economic autonomy were fundamental to short and long-term livelihood well-being of the farmers interviewed, and they expressed little interest in pursuing productivity gains that were inconsistent with an underlying logic of autonomy. Farmers deployed the agroecological practices through these pathways as a deliberate strategy to expand longer-term household autonomy and well-being. Importantly, these strategies were successful in households with high initial levels of food insecurity; “poorer” farmers, who had chronically relied on food donations from more food secure neighbors, were able to reverse

this trend through adoption of agroecological practices. These stories provide evidence that food sovereignty is not some lofty ideal only accessible to middle-income farmers; the process of “food sovereigntization” is aligned with short-term goals to access a more stable and healthy diet, and agroecology has political possibility to reconfigure class dynamics (**Figure 6**).

If understanding and addressing smallholder access to food is the goal, food sovereignty as both a project and process is better suited to achieve it. This study provided evidence of how agroecology improves food security on a household and community-level, but also showed that food sovereignty’s vision of a local food system based on an embedded market is complicated by farmers’ constraints and social dynamics. Centering the aspirations and identities of farmers, participatory research can shed further light on how household-level processes of food sovereigntization translate into community-level change. Studies on food sovereignty would benefit from assessing farmers’ access to stable and adequate food- as these are issues that farmers do care about, and especially for food sovereignty scholarship, there is little understanding of how a transition to food sovereignty might occur/look like for food access at a household and community level.

Finally, this study challenges food security discourse that portrays smallholder, subsistence-oriented farming as an unlivable lifestyle that must be replaced with either urbanization and commercialization. The food sovereignty movement, consistent with many respondents’ representations of their own farming identities and aspirations, defends peasant farming as a desirable and fulfilling future, but asserts that the conditions of this livelihood have been increasingly eroded by corporate consolidation of the food system and neoliberal trade policies,

to name only the most recent forces of dispossession. Agroecology is only one pillar on which a food system “freed from oppression” rests, yet for the farmers whose stories composed this study, it served to bring that future closer.

Policy recommendations

Farmers in this study used the agroecological practices to support food security through pathways largely outside of state policy and influence. Farmers responded to agricultural and trade policies that had negatively affected their food security in the past by building their ability to self-provision and achieve economic autonomy. Policies can address food insecurity by strengthening farmers’ autonomy over the social and ecological foundations of their farming. In keeping with a food sovereignty framework, these policy changes include reinvesting in domestic food production, instituting market protections for farmers, and dismantling neoliberal trade agreements.

Using public procurement programs to support local agroecological production can create stable markets for farmers’ surplus production so that they can access capital needed to enhance and replace productive internal farm resources and assets like livestock, tools, and granaries, and continue to diversify income generation (on-farm processing, direct selling, direct-selling) (van der Ploeg, 2010). The Agricultural Development and Marketing Corporation (ADMARC), is a publicly funded institutions that has classically purchased and sold maize for the national Strategic Grain Reserve. This funding can be directed to support agroecological farming- with ADMARC purchasing not only maize crops, but also other important food crops that contribute to a diversified agricultural system, such as legumes and traditional cereal crops like sorghum

and millet. Surplus profits from ADMARC can be reinvested by the state, not into tobacco estate production and banking (as has historically been the case) (Bezner Kerr, R., Patel, 2014), but into reestablishing shorter supply chains and alternative retail infrastructure such as farmers' markets and food hubs, thereby allowing farmers to capture profits from surplus crop sales more effectively in urban markets, while providing healthier produce to consumers. In Malawi, supermarket monopolies are becoming increasingly popular among middle and upper-class urbanites. Involving urban populations in decision-making through local food policy could help to create democratic systems of governance consistent with food sovereignty principles (IPES-Food, 2016b), linking rural producers and urban consumers based on shared values and needs (environmentally-sound practices, healthy food, stable and fair prices) and circumventing food markets that further concentrate corporate power in the food system. Through these food policy counsels, more radical measures of market control such as regulation of crop sales within regional or national boundaries could be considered and potentially enforced by government institutions like ADMARC.

Consistent with demands by the food sovereignty movement to reverse neoliberal policies implemented during structural adjustment, food security achieved through economic autonomy could be promoted by reinstating market protections such as price floors and ceilings that guarantee a certain level of compensation to farmers. Restoring credit systems that allow farmers to access loans to pay for immediate demands like illness or school fees would give more farmers control over the terms of agricultural sales, like those farmers in the study who had accessed non-financial and financial assets. Land reform would play a crucial role in building farmer autonomy. Especially in the Central region, those farmers who were unable to move

substantially towards food security suffered from diminishing land size. While land in general is more limited in the Central region, redistribution of agricultural land would be critical to increasing farmers' productive capacities; it would be important for this land reform to include access to *dimba* plots. This would also help to address labor inequities, as many of the farmers with insufficient farmland were forced to rely heavily on low-wage labor at large estates; greater access to land might help to reduce exploitative conditions.

In rural communities, investing in infrastructure to store crop harvests for both seed and food would also increase farmer control and access to locally produced foods in embedded markets. Establishing cooperatively-owned equipment and machinery could reduce the drudgery of some aspects of cultivation without ensnaring farmers in the path-dependency of highly commoditized agriculture that reduces their control over production outputs. Distribution of a diversity of seeds for legume and cereal crops, as well as extension focus on the soil and human health benefits of these crops would be integral to reestablishing farmers' access to a diversity of foods through direct-consumption pathways. Extension focus on seed selection, storage, and exchange through seed fairs would reverse current policy efforts in the country to inhibit self-provisioning of local seeds, and instead build farmers' knowledge and ownership over these resources. Shifting public support towards agroecological systems requires changing current media and extension messaging that overemphasizes the superiority of hybrid maize varieties and the necessity of fertilizer for crop production to more holistically capture the benefits and trade-offs of these approaches, and the potential of low-input alternatives like agroecology. For example, consistent with government extension agents' training material for the last decades, many farmers were convinced that a good harvest was impossible without fertilizer. Current government campaigns

against the fall armyworm (*Spodoptera frugiperda*) similarly propose pesticides as the only approach to prevent maize crop loss.

Allocation of extension resources would need to be attentive to gender and other social inequities, as in some communities farmers reported elite capture of extension resources that benefited primarily wealthier male farmers. The labor-intensive nature of agroecology requires that inequitable labor relations between male and female household members be addressed in agricultural extension and trainings for all household members to effectively benefit from the practices. We found that a farmer-to-farmer model of knowledge exchange worked well to promote the adoption of agroecological practices that transform the social and ecological relations of production; in this study, knowledge-intensive practices increased farmer food security through pathways that may be strengthened if farmers feel confident in existing community knowledge and their own ability to experiment and generate solutions to their farming problems.

References

- African Union. (2003). *Maputo Declaration on agriculture in Africa*. Maputo. Retrieved from https://www.researchgate.net/publication/326405700_AGRICULTURAL_EXPENDITURE_MAPUTO_DECLARATION_TARGET_AND_AGRICULTURAL_OUTPUT_A_CASE_STUDY_OF_NIGERIA
- AGRA. (2008). Press release: Alliance for a Green Revolution in Africa commits 180M to revive farmers' depleted soils | EurekAlert! Science News. Retrieved May 20, 2019, from https://www.eurekalert.org/pub_releases/2008-01/bc-afa012408.php
- AGRA. (2017). *Africa Agriculture Status Report: The business of smallholder agriculture in Sub-Saharan Africa*. Nairobi, Kenya. Retrieved from <https://agra.org/aasr2018/>
- Alexander, K. S., Parry, L., Thammavong, P., Sacklokham, S., Pasouvang, S., Connell, J. G., ... Case, P. (2018). Rice farming systems in Southern Lao PDR: Interpreting farmers' agricultural production decisions using Q methodology. *Agricultural Systems*, *160*, 1–10. <https://doi.org/10.1016/J.AGSY.2017.10.018>
- Alkon, A. H., & Mares, T. M. (2012). Food sovereignty in US food movements: radical visions and neoliberal constraints. *Agriculture and Human Values*, *29*(3), 347–359. <https://doi.org/10.1007/s10460-012-9356-z>
- Altieri, M. A., Funes-Monzote, F. R., & Petersen, P. (2012). Agroecologically efficient agricultural systems for smallholder farmers: contributions to food sovereignty. *Agronomy for Sustainable Development*, *32*(1), 1–13. <https://doi.org/10.1007/s13593-011-0065-6>
- Barbier, E. B., & Hochard, J. P. (2014, November 1). Poverty and the spatial distribution of rural population. Retrieved from <http://documents.worldbank.org/curated/en/849881468158378488/Poverty-and-the-spatial->

distribution-of-rural-population

- Bernard, B., & Lux, A. (2017). How to feed the world sustainably: an overview of the discourse on agroecology and sustainable intensification. *Regional Environmental Change*, 17(5), 1279–1290. <https://doi.org/10.1007/s10113-016-1027-y>
- Bernstein, H. (2010). *Class dynamics of agrarian change*. Fernwood Pub. Retrieved from https://books.google.com/books/about/Class_Dynamics_of_Agrarian_Change.html?id=joxWdg7O0tMC
- Bezner Kerr, R., Patel, R. (2014). Food security in Malawi: Disputed diagnoses, different prescriptions. In U. S. Nagothu (Ed.), *Food security and development : country case studies*. Retrieved from https://books.google.com/books/about/Food_Security_and_Development.html?id=hzxWBQAAQBAJ
- 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. <https://doi.org/10.1080/03057070500035679>
- Bezner Kerr, R. (2013). Seed struggles and food sovereignty in northern Malawi. *Journal of Peasant Studies*, 40(5), 867–897. <https://doi.org/10.1080/03066150.2013.848428>
- Bhutta, Z. A., Das, J. K., Rizvi, A., Gaffey, M. F., Walker, N., Horton, S., ... Black, R. E. (2013). Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? *The Lancet*, 382(9890), 452–477. [https://doi.org/10.1016/S0140-6736\(13\)60996-4](https://doi.org/10.1016/S0140-6736(13)60996-4)
- Borras, S. (2008). La Vía Campesina and its global campaign for agrarian reform. *Journal of Agrarian Change*, 8(2–3), 258–289. <https://doi.org/10.1111/j.1471-0366.2008.00170.x>

- Bose, S. (1998). "Instruments and idioms of colonial and national development. India's historical experience in comparative perspective,." In R. Cooper, F., Packard (Ed.), *International Development and the Social Sciences : Essays on the History and Politics of Knowledge*. Retrieved from http://web.b.ebscohost.com/ehost/ebookviewer/ebook/bmxlYmtfXzQxODY1X19BTg2?sid=75c445e2-e9a7-4d8e-8f64-1363e039a9b9@pdc-v-essmgr01&vid=0&format=EB&lpid=lp_I&rid=0
- Campbell, B. M., Beare, D. J., Bennett, E. M., Hall-Spencer, J. M., Ingram, J. S. I., Jaramillo, F., ... Shindell, D. (2017). Agriculture production as a major driver of the Earth system exceeding planetary boundaries. *Ecology and Society*, 22(4), art8. <https://doi.org/10.5751/ES-09595-220408>
- Carletto, C., Corral, P., & Guelfi, A. (2017). Agricultural commercialization and nutrition revisited: Empirical evidence from three African countries. *Food Policy*, 67, 106–118. <https://doi.org/10.1016/J.FOODPOL.2016.09.020>
- Carletto, G., Ruel, M., Winters, P., & Zezza, A. (2015a). Farm-Level Pathways to Improved Nutritional Status: Introduction to the Special Issue. *The Journal of Development Studies*, 51(8), 945–957. <https://doi.org/10.1080/00220388.2015.1018908>
- Carletto, G., Ruel, M., Winters, P., & Zezza, A. (2015b). Farm-Level Pathways to Improved Nutritional Status: Introduction to the Special Issue. *The Journal of Development Studies*, 51(8), 945–957. <https://doi.org/10.1080/00220388.2015.1018908>
- Chatterjee, P. (1994). *The nation and its fragments : colonial and postcolonial histories*. Oxford University Press. Retrieved from https://books.google.com/books/about/Nation_And_Its_Fragments_Colonial_And_Po.html?

id=evVXAAAACAAJ

- Chinsinga, B. (2004). Poverty and Food Security in Malawi: Some Policy Reflections on the Context of Crumbling Traditional Support Systems. *Canadian Journal of Development Studies/Revue Canadienne d'études Du Développement*, 25(2), 321–341.
<https://doi.org/10.1080/02255189.2004.9668978>
- Chirwa, E. W., & Chinsinga, B. (2014). The Political Economy of Food Price Policy in Malawi. In *Food Price Policy in an Era of Market Instability* (pp. 153–173). Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198718574.003.0007>
- Clapp, J. (2016). Trade and the sustainability challenge for global food governance. In *Global governance politics, climate justice & agrarian social justice: linkages and challenges*. The Hague, Netherlands: ISS. Retrieved from https://www.iss.nl/sites/corporate/files/1-ICAS_CP_Clapp.pdf
- Clapp, Jennifer. (2014). Food security and food sovereignty. *Dialogues in Human Geography*, 4(2), 206–211. <https://doi.org/10.1177/2043820614537159>
- Coates, J. (2013). Build it back better: Deconstructing food security for improved measurement and action. *Global Food Security*, 2(3), 188–194.
<https://doi.org/10.1016/J.GFS.2013.05.002>
- Coates, J., Swindale, A., & Bilinsky, P. (2007). *Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide: Version 3*. Retrieved from www.fantaproject.org
- Cornwall, A. (2008). Unpacking “participation”: models, meanings and practices. *Community Development Journal*, 43(3), 269–283. <https://doi.org/10.1093/cdj/bsn010>
- Corrado, A. (2010). New peasantries and alternative agro-food networks: The case of Réseau

- Semences Paysannes. In M. Bonanno, A., Bakker, H., Jussaume, R., Kawamura, Y., Shucksmith (Ed.), *From Community to Consumption: New and Classical Themes in Rural Sociological Research: Research in rural sociology and development* (pp. 17–30). Emerald Group Publishing Limited. [https://doi.org/10.1108/S1057-1922\(2010\)0000016005](https://doi.org/10.1108/S1057-1922(2010)0000016005)
- Cui, Z., Zhang, H., Chen, X., Zhang, C., Ma, W., Huang, C., ... Dou, Z. (2018). Pursuing sustainable productivity with millions of smallholder farmers. *Nature*, 555(7696), 363–366. <https://doi.org/10.1038/nature25785>
- Curry, R., Barry, J., & McClenaghan, A. (2013). Northern Visions? Applying Q methodology to understand stakeholder views on the environmental and resource dimensions of sustainability. *Journal of Environmental Planning and Management*, 56(5), 624–649. <https://doi.org/10.1080/09640568.2012.693453>
- Deacon, R. (2000). Theory as practice: Foucault's concept of problematization. *Telos*, 2000(118), 127–142. Retrieved from http://vp5qw4uf5x.search.serialssolutions.com/?ctx_ver=Z39.88-2004&ctx_enc=info%3Aofi%2Fenc%3AUTF-8&rft_id=info%3Asid%2Fsummon.serialssolutions.com&rft_val_fmt=info%3Aofi%2Ffmt%3Akev%3Amtx%3Ajournal&rft.genre=article&rft.atitle=Theory+as+Practice%3A+Fouca
- Dekeyser, K., Korsten, L., & Fioramonti, L. (2018). Food sovereignty: shifting debates on democratic food governance. *Food Security*, 10(1), 223–233. <https://doi.org/10.1007/s12571-017-0763-2>
- Deleuze, G., Hand, S., & Hand, S. (1988). *Foucault*. University of Minnesota Press. Retrieved from <https://www.upress.umn.edu/book-division/books/foucault>
- Denning, G., Kabambe, P., Sanchez, P., Malik, A., Flor, R., Harawa, R., ... Sachs, J. (2009a).

Input Subsidies to Improve Smallholder Maize Productivity in Malawi: Toward an African Green Revolution. *PLoS Biology*, 7(1), e1000023.

<https://doi.org/10.1371/journal.pbio.1000023>

Denning, G., Kabambe, P., Sanchez, P., Malik, A., Flor, R., Harawa, R., ... Sachs, J. (2009b).

Input Subsidies to Improve Smallholder Maize Productivity in Malawi: Toward an African Green Revolution. *PLoS Biology*, 7(1), e1000023.

<https://doi.org/10.1371/journal.pbio.1000023>

Devereux, S., Sabates-Wheeler, R., Longhurst, R. (2013). *Seasonality, rural livelihoods and development*. Routledge. Retrieved from

https://books.google.com/books/about/Seasonality_Rural_Livelihoods_and_Develo.html?id=l-XGBQAAQBAJ

Dillon, B., & Barrett, C. B. (2017). Agricultural factor markets in Sub-Saharan Africa: An updated view with formal tests for market failure. *Food Policy*, 67, 64–77.

<https://doi.org/10.1016/J.FOODPOL.2016.09.015>

Ecker, O., & Qaim, M. (2011). Analyzing Nutritional Impacts of Policies: An Empirical Study for Malawi. *World Development*, 39(3), 412–428.

<https://doi.org/10.1016/j.worlddev.2010.08.002>

Famine Early Warning Systems Network. (2018). Southern Malawi to face an early start to the lean season. Retrieved April 25, 2019, from <http://fews.net/southern-africa/malawi/key-message-update/august-2018>

FAO. (1996). Rome Declaration and Plan of Action. In *World Food Summit*. Rome: FAO.

Retrieved from

<http://www.fao.org.proxy.library.cornell.edu/docrep/003/w3613e/w3613e00.htm>

- FAO. (2019a). Early action to protect and enhance the livelihoods of drought-affected smallholder farmers in Malawi against the lingering 2018/2019 El Niño event : FAO in Emergencies. Retrieved April 25, 2019, from <http://www.fao.org/emergencies/fao-in-action/stories/stories-detail/en/c/1180394/>
- FAO. (2019b). Sustainable crop production intensification (SCPI) in FAO. Retrieved May 9, 2019, from <http://www.fao.org/agriculture/crops/thematic-sitemap/theme/spi/scpi-home/framework/sustainable-intensification-in-fao/en/>
- FAO GIEWS. (2019). Country Brief on Malawi -. Retrieved May 2, 2019, from <http://www.fao.org/giews/countrybrief/country.jsp?code=MWI&lang=en>
- Ferguson, J. (1990). *The anti-politics machine: development, depoliticization, and bureaucratic power in Lesotho*. Cambridge: Cambridge University Press. Retrieved from https://books.google.com/books/about/The_Anti_politics_Machine.html?id=hgXbebnQ918C
- Fine, F., van Wamelen, A., Lund, S., Cabral, A., Taoufik, A., Dörr, N., Leke, A., Roxburgh, C., Schubert, J., Cook, P. (2012). *Africa at work: Job creation and inclusive growth*. Retrieved from <https://www.mckinsey.com/featured-insights/middle-east-and-africa/africa-at-work>
- Fontan Sers, C., & Mughal, M. (2019). From Maputo to Malabo: public agricultural spending and food security in Africa. *Applied Economics*, 1–18. <https://doi.org/10.1080/00036846.2019.1606411>
- Friedmann, H. (2000). What on earth is the modern world-system? Food-Getting and territory in the modern era and beyond. *Journal of World-System Research*, VI(2), 480–515. Retrieved from <https://auckland.rl.talis.com/items/21F72628-0B99-98E3-FD50-66BA6245CA56.html>
- GAFSP. (2017). *Empowering smallholder farmers. Annual Report*.

<https://doi.org/10.1080/13501763.2017.1334084>

Geertz, C. (1963). *Agricultural involution : the process of ecological change in Indonesia*.

University of California Press. Retrieved from

https://books.google.com/books/about/Agricultural_Involution.html?id=OYtphyz8pI0C

Gilbert, C. L., Christiaensen, L., & Kaminski, J. (2017). Food price seasonality in Africa:

Measurement and extent. *Food Policy*, *67*, 119–132.

<https://doi.org/10.1016/j.foodpol.2016.09.016>

Gillespie, S., & van den Bold, M. (2017). Agriculture, Food Systems, and Nutrition: Meeting the

Challenge. *Global Challenges*, *1*(3), 1600002. <https://doi.org/10.1002/gch2.201600002>

Godfray, H. C. J., & Garnett, T. (2014). Food security and sustainable intensification.

Philosophical Transactions of the Royal Society B: Biological Sciences, *369*(1639),

20120273–20120273. <https://doi.org/10.1098/rstb.2012.0273>

Godfray, H Charles J, & Garnett, T. (2014). Food security and sustainable intensification.

Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences,

369(1639), 20120273. <https://doi.org/10.1098/rstb.2012.0273>

Hadley, C., Mulder, M. B., & Fitzherbert, E. (2007). Seasonal food insecurity and perceived

social support in rural Tanzania. *Public Health Nutrition*, *10*(06), 544–551.

<https://doi.org/10.1017/S1368980007246725>

Harvey, D. (2007). *A brief history of neoliberalism*. Oxford University Press. Retrieved from

https://books.google.com/books/about/A_Brief_History_of_Neoliberalism.html?id=CKUiK

pWUv0YC

Hawkes, C., & Ruel, M. T. (2008). From agriculture to nutrition : Pathways, synergies and

outcomes. *Agricultural and Rural Development Notes*. Retrieved from

<https://openknowledge.worldbank.org/handle/10986/9511>

Herforth, A; Harris, J. (2014). *Understanding and applying primary pathways and principles.*

Improving nutrition through agriculture technical brief series (Vol. 382). Arlington, VA.

[https://doi.org/10.1016/S0140-6736\(13\)60716-3](https://doi.org/10.1016/S0140-6736(13)60716-3)

Herrero, M., Thornton, P. K., Power, B., Bogard, J. R., Remans, R., Fritz, S., ... Havlík, P.

(2017). Farming and the geography of nutrient production for human use: a

transdisciplinary analysis. *The Lancet Planetary Health*, 1(1), e33–e42.

[https://doi.org/10.1016/S2542-5196\(17\)30007-4](https://doi.org/10.1016/S2542-5196(17)30007-4)

HLPE. (2013). *Investing in smallholder agriculture for food security. Journal of International*

Development (Vol. 16). Rome. <https://doi.org/10.1002/jid.1157>

Hoddinott, J. (2012). Agriculture, Health, and Nutrition: Toward Conceptualizing the Linkages.

In *2020 Conference book I*. IFPRI. Retrieved from

<http://www.ifpri.org/publication/agriculture-health-and-nutrition-toward-conceptualizing-linkages>

Hoddinott, J. F. (2011). Agriculture, health, and nutrition: toward conceptualizing the linkages.

In *2020 Conference*. Retrieved from

<http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/127118>

IPBES. (2019). *Summary for policymakers of the global assessment report on biodiversity and*

ecosystem services. Retrieved from

<https://www.dropbox.com/sh/yd8l2v0u4jqptp3/AACpraYjOYWpTxAFv5H-2vrKa/1>

Global Assessment Summary for

Policymakers?dl=0&preview=Summary+for+Policymakers+IPBES+Global+Assessment.pdf&subfolder_nav_tracking=1

- IPES-Food. (2016a). *From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems*. Louvain-la-Neuve (Belgium): IPES. Retrieved from <https://cgspace.cgiar.org/handle/10568/75659>
- IPES-Food. (2016b). *Uniformity Diversity From Uniformity: A paradigm shift from industrial agriculture to diversified agroecological systems*. <https://doi.org/IPES-Food>.
- Isakson, S. R. (2009). No hay ganancia en la milpa : the agrarian question, food sovereignty, and the on-farm conservation of agrobiodiversity in the Guatemalan highlands. *The Journal of Peasant Studies*, 36(4), 725–759. <https://doi.org/10.1080/03066150903353876>
- Jackson, L. E., Pulleman, M. M., Brussaard, L., Bawa, K. S., Brown, G. G., Cardoso, I. M., ... Van Noordwijk, M. (2012). Social-ecological and regional adaptation of agrobiodiversity management across a global set of research regions. *Global Environmental Change*, 22(3), 623–639. <https://doi.org/10.1016/J.GLOENVCHA.2012.05.002>
- Jarosz, L. (2014). Comparing food security and food sovereignty discourses. *Dialogues in Human Geography*, 4(2), 168–181. <https://doi.org/10.1177/2043820614537161>
- Javdani, M. (2012). Malawi's agricultural input subsidy: study of a Green Revolution-style strategy for food security. *International Journal of Agricultural Sustainability*, 10(2), 150–163. <https://doi.org/10.1080/14735903.2012.675731>
- Kadiyala, S., Harris, J., Headey, D., Yosef, S., & Gillespie, S. (2014). Agriculture and nutrition in India: mapping evidence to pathways. *Annals of the New York Academy of Sciences*, 1331(1), 43–56. <https://doi.org/10.1111/nyas.12477>
- Kangmennaang, J., Kerr, R. B., Lupafya, E., Dakishoni, L., Katundu, M., & Luginaah, I. (2017). Impact of a participatory agroecological development project on household wealth and food security in Malawi. *Food Security*, 9(3), 561–576. <https://doi.org/10.1007/s12571-017->

0669-z

- Kankwamba, H., Mapila, M. A., & Pauw, K. (2013). Determinants and spatiotemporal dimensions of crop diversification in Malawi. In *Agricultural policy and welfare changes in Malawi: 2005-2010*. Lilongwe. <https://doi.org/10.13140/2.1.2455.2964>
- Kimura, A. H. (2013). *Hidden hunger : gender and the politics of smarter foods*. Cornell University Press. Retrieved from https://books.google.com/books?id=BiFJ1p1kekAC&dq=kimura+hidden+hunger&lr=&source=gbs_navlinks_s
- Koppmair, S., Kassie, M., & Qaim, M. (2017). Farm production, market access and dietary diversity in Malawi. *Public Health Nutrition*, 20(02), 325–335. <https://doi.org/10.1017/S1368980016002135>
- La Via Campesina. (2007). Declaration of Nyéléni. Retrieved May 9, 2019, from <https://nyeleni.org/spip.php?article290>
- La Via Campesina. (2008). An answer to the global food crisis: Peasants and small farmers can feed the world! Retrieved May 20, 2019, from <https://viacampesina.org/en/an-answer-to-the-global-food-crisis-peasants-and-small-farmers-can-feed-the-world/>
- Lee, R. P. (2013). The politics of international agri-food policy: discourses of trade-oriented food security and food sovereignty. *Environmental Politics*, 22(2), 216–234. <https://doi.org/10.1080/09644016.2012.730266>
- Lentz, E. C. (2018). Complicating narratives of women’s food and nutrition insecurity: Domestic violence in rural Bangladesh. *World Development*, 104, 271–280. <https://doi.org/10.1016/J.WORLDDEV.2017.11.019>
- Masset, E., Haddad, L., Cornelius, A., & Isaza-Castro, J. (2012). Effectiveness of agricultural

- interventions that aim to improve nutritional status of children: systematic review. *BMJ*, 344. Retrieved from <http://www.bmj.com/content/344/bmj.d8222>
- Maxwell, J. A. (2005). *Qualitative research design : an interactive approach*. Sage Publications. Retrieved from https://books.google.com/books/about/Qualitative_Research_Design.html?id=XqaJP-iehskC
- McKittrick, K. (2013). Plantation Futures. *Small Axe: A Caribbean Journal of Criticism*, 17(3), 1–15. <https://doi.org/10.1215/07990537-2378892>
- McMichael, P. (2010). Globalization: Myths and realities. *Rural Sociology*, 61(1), 25–55. <https://doi.org/10.1111/j.1549-0831.1996.tb00609.x>
- McMichael, P. (2012). The land grab and corporate food regime restructuring. *The Journal of Peasant Studies*, 39(3–4), 681–701. <https://doi.org/10.1080/03066150.2012.661369>
- Méndez, V. E., Bacon, C. M., Cohen, R., & Gliessman, S. R. (2013). *Agroecology : a transdisciplinary, participatory and action-oriented approach*.
- Messina, J. P., Peter, B. G., & Snapp, S. S. (2017). Re-evaluating the Malawian Farm Input Subsidy Programme. *Nature Plants*, 3(17013). <https://doi.org/10.1038/nplants.2017.13>
- Ministry of agriculture, irrigation, and water development. (2018). *National seed policy*. Lilongwe. Retrieved from <http://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=16514>
- Moyo, B. H. Z. (2014). *Agriculture and environment for developing countries*. Mzuni Press. Retrieved from <http://www.africanbookscollective.com/books/agriculture-and-environment-for-developing-countries>
- National Statistics Office (NSO) and ICF. (2017). *2015-16 Malawi Demographic and Health*

- Survey Key Findings*. Zomba, Malawi and Rockville, Maryland, USA. Retrieved from <https://dhsprogram.com/pubs/pdf/SR237/SR237.pdf>
- Ngonghala, C. N., De Leo, G. A., Pascual, M. M., Keenan, D. C., Dobson, A. P., & Bonds, M. H. (2017). General ecological models for human subsistence, health and poverty. *Nature Ecology & Evolution*, *1*(8), 1153–1159. <https://doi.org/10.1038/s41559-017-0221-8>
- OECD. (2013). *Global food security: Challenges for the food and agricultural system*. Paris: OECD. <https://doi.org/10.1787/9789264195363-en>
- Patel, R. (2013). The Long Green Revolution. *Journal of Peasant Studies*, *40*(1), 1–63. <https://doi.org/10.1080/03066150.2012.719224>
- Paul, H., Steinbrecher, R. (2015). *African agricultural growth corridors and the New Alliance for Food Security and Nutrition: Who benefits, who loses?* Retrieved from https://www.researchgate.net/publication/271701897_African_Agricultural_Growth_Corridors_and_the_New_Alliance_for_Food_Security_and_Nutrition_Who_benefits_who_loses
- Peck, J., & Tickell, A. (2002). Neoliberalizing space. *Antipode*, *34*(3), 380–404. <https://doi.org/10.1111/1467-8330.00247>
- Peters, P. E. (2006). Rural income and poverty in a time of radical change in Malawi. *Journal of Development Studies*, *42*(2), 322–345. <https://doi.org/10.1080/00220380500405568>
- Pierre, G., & Kaminski, J. (2019). Cross country maize market linkages in Africa: integration and price transmission across local and global markets. *Agricultural Economics*, *50*(1), 79–90. <https://doi.org/10.1111/agec.12467>
- Ponisio, L. C., M’Gonigle, L. K., Mace, K. C., Palomino, J., de Valpine, P., & Kremen, C. (2014). Diversification practices reduce organic to conventional yield gap. *Proceedings of the Royal Society of London B: Biological Sciences*, *282*(1799). Retrieved from

<http://rspb.royalsocietypublishing.org/content/282/1799/20141396>

- Previte, J., Pini, B., & Haslam-McKenzie, F. (2007). Q Methodology and Rural Research. *Sociologia Ruralis*, 47(2), 135–147. <https://doi.org/10.1111/j.1467-9523.2007.00433.x>
- Qaim, M. (2017). Globalisation of agrifood systems and sustainable nutrition. *Proceedings of the Nutrition Society*, 76(01), 12–21. <https://doi.org/10.1017/S0029665116000598>
- Radchenko, N., & Corral, P. (2018). Agricultural commercialisation and food security in rural economies: Malawian experience. *The Journal of Development Studies*, 54(2), 256–270. <https://doi.org/10.1080/00220388.2017.1283014>
- Ricciardi, V., Ramankutty, N., Mehrabi, Z., Jarvis, L., & Chookolingo, B. (2018). How much of the world's food do smallholders produce? *Global Food Security*, 17, 64–72. <https://doi.org/10.1016/J.GFS.2018.05.002>
- Rose, N. (2017). Food Sovereignty: A new societal paradigm for the 21st century? In *Food sovereignty and sustainable agriculture forum*. East Java. Retrieved from https://www.researchgate.net/publication/331249469_Food_Sovereignty_A_new_societal_paradigm_for_the_21st_century
- Rosset, P. (2003). Food sovereignty: Global rallying cry of farmer movements. *Food First Backgrounder*, 9(4). Retrieved from <https://foodfirst.org/publication/food-sovereignty-global-rallying-cry-of-farmer-movements/>
- Rosset, P. M., & Martínez-Torres, M. E. (2012). Rural social movements and agroecology: Context, theory, and process. *Ecology and Society*, 17(3), art17. <https://doi.org/10.5751/ES-05000-170317>
- Rosset, Peter. (2009). Agrofuels, food sovereignty, and the contemporary food crisis. *Bulletin of Science, Technology & Society*, 29(3), 189–193. <https://doi.org/10.1177/0270467609333733>

- Samberg, L. H., Gerber, J. S., Ramankutty, N., Herrero, M., & West, P. C. (2016). Subnational distribution of average farm size and smallholder contributions to global food production. *Environmental Research Letters*, *11*(12), 124010. <https://doi.org/10.1088/1748-9326/11/12/124010>
- Schanbacher, W. D. (2010). *The politics of food : the global conflict between food security and food sovereignty*. Praeger Security International. Retrieved from https://books.google.com/books/about/The_Politics_of_Food.html?id=v7gbM_rrqrAC
- Schiavoni, C. M. (2017). The contested terrain of food sovereignty construction: toward a historical, relational and interactive approach. *The Journal of Peasant Studies*, *44*(1), 1–32. <https://doi.org/10.1080/03066150.2016.1234455>
- Schneider, M., & McMichael, P. (2010). Deepening, and repairing, the metabolic rift. *The Journal of Peasant Studies*, *37*(3), 461–484. <https://doi.org/10.1080/03066150.2010.494371>
- Selener, D., Chenier, J., & Zelaya, R. (. (1997). *Farmer-to-farmer extension: lessons from the field*. *Farmer-to-farmer extension: lessons from the field*. Quito: International Institute of Rural Reconstruction (IIRR). Retrieved from <https://www.cabdirect.org/cabdirect/abstract/19991805617>
- Sen, A. (1981). *Poverty and famines : an essay on entitlement and deprivation*. Clarendon Press. Retrieved from https://books.google.com/books/about/Poverty_and_Famines.html?id=FVC9eqGkMr8C
- Shankar, B., Poole, N., & Bird, F. A. (2019). Agricultural inputs and nutrition in South Asia. *Food Policy*, *82*, 28–38. <https://doi.org/10.1016/J.FOODPOL.2018.10.011>
- Sibhatu, K. T., Krishna, V. V., & Qaim, M. (2015). Production diversity and dietary diversity in smallholder farm households. *Proceedings of the National Academy of Sciences of the*

- United States of America*, 112(34), 10657–10662. <https://doi.org/10.1073/pnas.1510982112>
- Sibhatu, K. T., & Qaim, M. (2018). Review: Meta-analysis of the association between production diversity, diets, and nutrition in smallholder farm households. *Food Policy*, 77, 1–18. <https://doi.org/10.1016/J.FOODPOL.2018.04.013>
- Singh, I., Squire, L., Strauss, J., & World Bank. (1986). *Agricultural household models : extensions, applications, and policy*. Johns Hopkins University Press. Retrieved from https://books.google.com/books/about/Agricultural_Household_Models.html?id=jKK4AAAAIAAJ
- Stephens, E. C., & Barrett, C. B. (2011). Incomplete Credit Markets and Commodity Marketing Behaviour. *Journal of Agricultural Economics*, 62(1), 1–24. <https://doi.org/10.1111/j.1477-9552.2010.00274.x>
- Stephenson, N. (2003). Interrupting Neo-liberal Subjectivities. *Continuum*, 17(2), 135–146. <https://doi.org/10.1080/10304310302746>
- Torrance, H. (2012). Triangulation, respondent validation, and democratic participation in mixed methods research. *Journal of Mixed Methods Research*, 6(2), 111–123. <https://doi.org/10.1177/1558689812437185>
- Vaitla, B., Coates, J., & Maxwell, D. (2015). *Comparing Household Food Consumption Indicators to Inform Acute Food Insecurity Phase Classification*. Washington, DC. Retrieved from www.fantaproject.org
- van der Ploeg, J. (2010). The peasantries of the twenty-first century: the commoditisation debate revisited. *The Journal of Peasant Studies*, 37(1), 1–30. <https://doi.org/10.1080/03066150903498721>
- Walsh-Dilley, M. (2013). Negotiating hybridity in highland Bolivia: indigenous moral economy

- and the expanding market for quinoa. *Journal of Peasant Studies*, 40(4), 659–682.
<https://doi.org/10.1080/03066150.2013.825770>
- Webb, P., & Kennedy, E. (2014). Impacts of agriculture on nutrition. *Food and Nutrition Bulletin*, 35(1), 126–132. Retrieved from
<http://journals.sagepub.com/doi/pdf/10.1177/156482651403500113>
- Weiler, A. M., Hergesheimer, C., Brisbois, B., Wittman, H., Yassi, A., & Spiegel, J. M. (2015). Food sovereignty, food security and health equity: a meta-narrative mapping exercise. *Health Policy and Planning*, 30(8), 1078–1092. <https://doi.org/10.1093/heapol/czu109>
- Weis, A. J. (2007). *The global food economy : the battle for the future of farming*. Zed Books.
 Retrieved from
https://books.google.com/books/about/The_Global_Food_Economy.html?id=yxLblqMoBiEC
- Wezel, A., Bellon, S., Doré, T., Francis, C., Vallod, D., & David, C. (2009). Agroecology as a science, a movement and a practice. A review. *Agronomy for Sustainable Development*, 29(4), 503–515. Retrieved from <https://hal.archives-ouvertes.fr/hal-00886499/document>
- Williamson, J. (1990). What Washington means by policy reform. In J. Williamson (Ed.), *Latin American adjustment: How much has happened?* Peterson Institute for International Economics. Retrieved from <https://piie.com/commentary/speeches-papers/what-washington-means-policy-reform>
- Wittman, H. (2009). Reworking the metabolic rift: La Vía Campesina, agrarian citizenship, and food sovereignty. *The Journal of Peasant Studies*, 36(4), 805–826.
<https://doi.org/10.1080/03066150903353991>
- World Bank. (1986). *Poverty and hunger: Issues and options for food security in developing*

- countries*. World Bank. Washington, DC. <https://doi.org/10.4038/jccpsl.v19i2.7580>
- World Bank. (2007). *World Development Report 2008: Agriculture for Development*. The World Bank. <https://doi.org/10.1596/978-0-8213-6807-7>
- World Bank. (2014). Malawi | Data. Retrieved June 21, 2017, from <http://data.worldbank.org.proxy.library.cornell.edu/country/malawi>
- Zeza, A., Davis, B., Azzarri, C., Covarrubias, K. (2009). The impact of rising food prices on the poor. In *International Association of Agricultural Economists*. Beijing. Retrieved from https://www.researchgate.net/publication/46435435_The_Impact_of_Rising_Food_Prices_on_the_Poor
- Zhang, W., Cao, G., Li, X., Zhang, H., Wang, C., Liu, Q., ... Dou, Z. (2016). Closing yield gaps in China by empowering smallholder farmers. *Nature*, 537(7622), 671–674. <https://doi.org/10.1038/nature19368>