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Dietary Power and Self-Determination among Female Farmers in Burkina Faso: A

Proposal for a Food Consumption Agency Metric

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Abstract: While food security is traditionally defined with four pillars, there are increasing calls for an additional two (agency and sustainability) so that we may more comprehensively conceptualize all dimensions of food security. However, the challenge is that it is difficult to effectively measure agency, a person's control over their food system. Measuring women's agency is especially critical in Africa South of the Sahara where women play prominent roles in farming and food preparation. This honors thesis explores the feasibility of creating a metric to measure agency within food systems and gender relations using data related to food security and dietary diversity among Burkinabé female rice farmers. First, I explore the literature on agency at a variety of scales and in different situations related to autonomy and sovereignty. Then, I develop an index based upon a subset of questions in the Household Food Insecurity Access Scale (HFIAS). I also consider how including agency as a dimension of food security can positively transform our understanding of food security. I achieve this by relating agency to the existing pillars of food security to understand how agency fills the gaps in our conceptualization of such systems. Lastly, I ask whether a connection exists between the level of agency, food security, and individual dietary diversity scores. I explore the correlation between the scores within the entire sample of interviews as well as analysing individual women as case studies. Ultimately, I conclude that agency can be quantified in a way that increases its accessibility to policymakers to create more just food systems, with the aim of expanding how we understand and approach food justice.

Key words: agency, agriculture, food security, gender, nutrition

Table of Contents

Acknowledgements (3)

Positionality Statement (4)

Chapter One: Introduction (5)

Chapter Two: Literature Review (9)

What is Food Security? (9)

What is Agency? (18)

Measurement Debate (25)

Chapter Three: Burkina Faso's Background (28)

Chapter Four: Methodology (33)

Chapter Five: Broader Findings (40)

Agency and Food Security (43)

Agency and Wealth Group (44)

Agency and Dietary Diversity (46)

Chapter Six: Case Studies of Individual Women (49)

High Agency (54)

Medium Agency (59)

Low Agency (64)

Chapter Seven: Conclusion (70)

References (81)

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Positionality Statement

In conducting this research, it is important for me to acknowledge the lenses with which I approached this topic. I fundamentally believe in upholding individual agency, especially at the expense of any harmful status quo, and so my stance on this permeates the paper. My status as a white, cis-het woman receiving a degree from a majority-white institution in the US also influences how I approached this project. I certainly cannot fit every aspect of myself into one page, but I hope this summary clarifies any concerns. Due to the COVID-19 pandemic I was unable to conduct in-person fieldwork, which further distances me from my research groups. I also understand that the discipline of geography, and the academy more broadly, has inherently colonial roots, but my aim in this paper is to assist in undoing such harm by creating avenues which amplify marginalized voices. Such research is not implicitly neutral and is instead made possible through the privilege I hold. I realize that reflexivity alone is not a panacea for these concerns, but I hope in expressing this here at the forefront of this paper, my research can be situated within the existing context, which includes my personal position within it, and that in doing so this research will be more transparent.

Chapter One: Introduction

Famine, hunger, and food insecurity remain global issues, despite decades of intervention. Current estimates suggest that nearly 690 million people or 8.9% of the world's population are hungry (SDG 2, 2020). Africa bears the brunt of this issue in terms of the prevalence of hunger. As of 2019, an estimated 234 million Africans South of the Sahara were chronically undernourished, and 250 million people, nearly 20% of the population, experienced hunger (Reid, 2021). While these figures fail to distinguish between total caloric versus nutritional deficits, there is no question that food insecurity remains a pressing issue for the continent. With these grim statistics on the rise, philanthropic and international aid measures have risen in tandem. Most notably, hoping to replicate their purported success in Latin America and Asia, the Green Revolution for Africa (GR4A) brought about many initiatives meant to decrease malnutrition and food insecurity—though sometimes with little success (Moseley, 2017; Moseley & Ouedraogo, 2021; Wise, 2020).

To better combat food security we must break it down into its intricate parts. We can think of the dimensions of food security—availability, access, utilization, stability, sustainability, and agency—as legs to a stool. All the legs must be legible if we are going to work on them individually and on food security as a whole, lest we fall off a wobbly stool. Agency as it relates to food security is important beyond agency for agency's sake because it is a critical dimension of secure food systems (Clapp et al., 2021). Given a history of under recognition, agency is a neglected leg of this stool (HLPE, 2020). This paper seeks to begin rectifying that by making it more visible to academics and policy makers alike. The fundamental right to food is outlined in the UN charter; it is essential that individuals have the power to operationalize and manage their food production and consumption, suggesting that agency is an integral component of the Right

to Food and food security (Shaw, 2007; Zhang, 2020). Furthermore, beyond its inherent value to increase empowerment, understanding different actors' agency over food systems increases our ability to create more equitable food systems (Schiavoni, 2016; Manley & Leynseele, 2019).

The High Level Panel of Experts on Food Security and Nutrition (HLPE) of the Committee on World Food Security (CFS) defined agency in this context as the capacity of individuals or groups to make their own decisions about what and how the foods they eat are produced, processed, and distributed within food systems (HLPE, 2020). It also includes their ability to engage in the processes that shape food system policies and governance (HLPE, 2020). While complete agency may not entirely eradicate food insecurity issues, it has the capacity to minimize them significantly, and as such, fostering agency should be a top priority in development models for those seeking to increase food security around the world (Donald et al., 2017; Clapp et al., 2021). While agency is increasingly viewed as a fundamental dimension of food security, only limited conceptual and methodological work has been done to measure it (SOFA, 2021). Therefore, I focus on developing a measurement of agency over food consumption in this thesis by using survey questions and the corresponding answers from the Household Food Insecurity Access Scale (HFIAS). My goal is to demonstrate that agency is measurable and relatively easy to do so.

Metrics for agency as it relates to food production already exist; however, measuring agency in the realm of food consumption has not been thoroughly considered (Vivero Pol, 2017). Currently, policies prioritize “the right to food as a legal framework that is essential for meeting FSN goals” and hold that food security encompasses four established dimensions—availability, access, utilization, and stability—and should include an additional two—agency and sustainability (HLPE, 2020). Seeing as the concept of food security has evolved significantly

over the past five decades, the need to integrate agency into it is increasingly relevant (HLPE, 2020; Maxwell, 1996; Shaw, 2007; Berry et al., 2015). “Just as agency matters for development more widely, it is also vital for ensuring food security,” (HLPE, 2020, p. 8). Because human rights are explicitly linked to personal and communal ability and freedoms, the right to food is deeply intertwined with agency (HLPE, 2020). Policy makers have neglected agency as a top priority as it is difficult to measure or concretize (Vivero Pol, 2017).

As one of the demographics lacking the most agency over their food, African women’s voices and capacities are especially important in the development of metrics for agency. Creating an agency metric could be a key step in increasing the visibility of women’s experiences and amplifying their voices and needs as it can demonstrate shortcomings in food systems, ultimately bringing these failures into the food security policy debates. Thus, I developed a metric of agency over food consumption, using questions from the HFIAS used by Dr. William Moseley and his research team in 2016-2020 to evaluate the effectiveness of certain food security programs in southwestern Burkina Faso (Moseley & Ouedraogo, 2021). Food security issues are particularly pressing in Burkina Faso. Located in West Africa, the nation faces national security problems, displacement crises, and a malnutrition catastrophe; “A total of 3.3 million people are estimated to be facing acute food insecurity” in Burkina Faso (WFP, 2019, para. 2). Certain HFIAS questions and their corresponding answers hold the key to measuring agency related to food consumption. Ultimately, I use this paper as a place to explore developing a metric and creating my own: The Food Consumption Agency Metric (FCAM). I explored this via three research questions, listed below.

- 1. How can including agency as a metric of food security transform our understanding of food security?*

2. *How can we tangibly measure agency?*
3. *How does agency influence food security and dietary diversity?*

I begin to answer the first question in Chapter Two (the Literature Review) and present my cumulative answer in my final chapter (the Conclusion). Chapters Four and Five (Methodology and Broader Findings respectively) explore my second question. Lastly, I answer the third question in Chapter Six (Case Studies of Individual Women).

In approaching these questions, I take the metric I developed and apply it to female rice farmers in Burkina Faso. As I explore the results of that analysis, I consider individuals from the sample, and use them as case studies to discuss my results to consider how agency is connected with food insecurity, income, and dietary diversity. Ultimately, I argue that it is essential to include agency as a pillar of food security in order to make food security metrics more indicative of reality. In this paper, I show how measuring agency over consumption and integrating it with other measures of food security creates a more comprehensive view of individual food security. To do this, I examine agency in the literature and explain how I translated these concepts into a metric. After that, I apply the metric to my case study, by first providing context on Burkina Faso and then presenting my findings at the sample scale and with nine individual case studies. I conclude with a findings summary, academic implications, and policy recommendations.

Chapter Two: Literature Review

This chapter contextualizes the rest of the paper by exploring and outlining key definitions in order to frame my argument as a whole. Ultimately, I answer the question: “How can including agency as a metric of food security transform our understanding of it?” I do this by breaking this chapter down into three sections. The first engages with the literature surrounding food security, lays out how agency is currently measured, and where potential gaps are. It also discusses the HLPE Report #15 on Food Security and Nutrition: Building a Global Narrative Towards 2030, which was the primary inspiration for this thesis (HLPE, 2020). The second section engages with the concept of agency itself. In trying to understand how agency manifests in food systems, I had to rely on a plethora of definitions and ultimately synthesise my own understanding before applying it to my data. Lastly, I consider the questions surrounding the ethics of creating metrics such as the one I propose. I ultimately conclude that while the argument advocating against metrics has some powerful points, the current socio political system requires metrics in order to attain the desired degree of food security and justice.

What is Food Security?

Understanding what is meant by food security, and the current factors used to assess it, are important first steps to realizing the importance of including agency as one of its key dimensions. Food security means having “physical, social, and economic access to sufficient, safe, and nutritious food to meet dietary needs for a productive and healthy life [at all times],” (UNDESA, 1996, para. 5). A person is food secure when they live in neither hunger nor fear of hunger (USAID, 2021). The number of people affected by hunger continued to increase in 2020 with the COVID-19 pandemic. After remaining virtually unchanged from 2014 to 2019, the Prevalence of Undernourishment (PoU), by population proportion, increased from 8.4 percent to around 9.9 percent between 2019 and 2020 (SOFI, 2021). The 2020 estimate ranges from 9.2 to

10.4 percent, depending upon the assumptions made to reflect the uncertainties within the assessment (SOFI, 2021). An estimated 720 to 811 million people in the world faced hunger in 2020 (SOFI, 2021).

Africa bears a disproportionate burden here. About one in five people (21% of the population) in Africa were acutely hungry in 2020—more than twice the proportion of anywhere else in the world. More than 30% of the undernourished population is in Africa (SOFI, 2021). In fact, as of 2019, about 234 million Africans south of the Sahara were chronically undernourished (Reid, 2021). Although these measures fail to distinguish between total caloric versus nutritional deficits, there is no question that food security is an urgent issue for the continent and world as a whole (FAO, 2020).

The fundamental right to food is outlined in the UN charter, and the power over food systems is intrinsically linked to this right. As such, a plethora of programs, summits, and committees exist to attempt to address the issue, and while no single set of recommendations is a panacea, international forums, especially the UN, seek to address food insecurity. Furthermore, many states have enshrined the right to food in their legal frameworks, although—as illustrated above—much remains to be done to truly achieve global food security (HLPE, 2020; Reid, 2021).

While past work has produced much progress, an evolution of the concept and the way we measure it is necessary (Clapp et al., 2021). This is where the integration of agency is essential. Currently, policies prioritize “the right to food as a legal framework that is essential for meeting FSN goals” and hold that food security encompasses four established dimensions—availability, access, utilization, and stability—and should include an additional two—agency and sustainability (HLPE, 2020, p. 5). Because human rights are directly linked to individual and communal freedom, the right to food is deeply entangled with agency (HLPE,

2020). Chronic food insecurity in the African context manifests both in the form of under- and over-nutrition, both of which increase vulnerability to COVID-19. The COVID-19 pandemic and the responses of governments in Africa and beyond have significantly increased vulnerability to food insecurity on the continent making this more pressing than ever (Moseley & Battersby, 2020).

The idea for this metric came from the High Level Panel of Experts' (HLPE) 2020 report entitled Food Security and Nutrition: Building a Global Narrative Towards 2030. The HLPE is where science and policy intersect within the Committee on World Food Security (CFS) in order to address food security and nutrition (FSN) (HLPE, 2020). According to them, "The HLPE aims to facilitate policy debates and policy making by providing independent, comprehensive and evidence-based analysis and advice, at the request of the CFS," (HLPE, 2020, p. V). Ultimately, the panel aims to work towards the elimination of hunger (Swaminathan, 2010). The 2020 report from which I drew primary inspiration sought to marry the panel's own findings with wider research. Their key messages bolster the need to consolidate and strengthen conceptual thinking surrounding FSN and the right to food (HLPE, 2020). They advocate for this to establish more effective frameworks, given that the global community continues to fail at achieving Agenda 2030 targets related to SDG 2 (zero hunger by 2030) (HLPE, 2020). All of this is even more relevant given that food systems shift perpetually (HLPE, 2020). The report calls for the integration of six dimensions of food security, rather than just the current four. With this argument in mind, I considered how agency specifically could be integrated as a metric of food security. Understanding each component of food security clarifies how agency will aid in increasing our capacity to ensure it (Jones et al., 2013).

Availability

The first codified component of food security is availability. This is defined as having the quantity and quality of food sufficient to satisfy individual dietary needs. The food must also be free from adverse substances and acceptable within a given culture (HLPE, 2020). It can be supplied through domestic production or imports (HLPE, 2020). Availability was quickly integrated as a pillar of food security as it is relatively easy to measure and understand (Global Panel, 2015). It is also consistent with the longstanding supply side approach to food security (Porter et al., 2014). Food security is often conceptualized as having adequate food availability as this allows for an emphasis on production and solutions on the supply side (Jones et al., 2013). While this focus has certainly provided some relief for food insecure areas, it is often overemphasized as a blanket solution to the crisis (Jones et al., 2013). Furthermore, this approach has been used to justify solutions which were counterproductive in the long run. For example, while delivering extra food in emergencies such as drought and political instability is necessary, these interventions can sometimes flood the market with non-local food, putting individuals working in agriculture at risk of losing employment and creating populations over-reliant on international intervention (Porter et al., 2014; Jarosz, 2015). Additionally, stressing availability has been used to justify the integration of international agricultural practices, which while useful in some contexts, have, again, created an unsafe over-reliance on international aid or widened inequality (Moseley et al., 2010).

Availability is easily quantifiable and was therefore so quickly integrated into the food security pillars (Jones et al., 2013). It has also been used as a justification for several neo-liberal policy interventions, which, while in some cases effective, can often exacerbate food insecurity issues and vulnerabilities when policy infrastructure collapses or intervention discontinues (Jarosz, 2015). These interventions may become enduring disruptions to supply chains and

agricultural practices, which do not always have the intended impact in the long run and so addressing the issues with this as the sole principle is often unwise (Clapp & Moseley, 2020).

Access

The second component is access, which includes economic, social, and physical aspects of access. Someone has adequate access to food when they have the personal or household financial means to acquire food for an adequate diet at a level that does not threaten or compromise attaining other basic needs (Sen, 1991; HLPE, 2020). Adequate food is also accessible to everyone, including vulnerable individuals and groups (HLPE, 2020). Amartya Sen's work in social choice theory, economic theories of famines, decision theory, and development economics has been instrumental in understanding food access (Burchi & De Muro, 2012). Considering the slower pace of economic reform to the immediate and pressing needs of those facing food insecurity, Sen considers how decision making and entitlements intertwine with food choice, all of which is significantly limited or expanded in the face of increased access (Drèze & Sen, 1991).

According to Sen, in each society an individual has an "entitlement" to all possible combinations of the goods and services they have access to (Sen, 1991). As such, an entitlement is a collection of alternative bundles of goods and services from which the person can choose from. For example, a resident in a refugee camp may have an entitlement consisting of exactly one bundle: a tray of food and a ration of clothes, but a rice farmer, who grows kilos of rice each year, can keep the rice to eat it or sell it and buy various combinations of other goods. All of these options constitute their particular entitlement. Sen also argues that a person's entitlement can change for a number of reasons: variations in the prices of goods and services, new rationing rules, or the disruption of food-distribution channels by pests or war (Sen, 1991). In these cases,

there is no overall shortfall in food production, but some segments of the population may succumb to hunger (Sen, 1991, Basu, 2021).

Inaccessibility continues to be an issue regarding food security as enough food is produced globally, but distribution remains inequitable (Fraval et al., 2019). As such, it is given significant attention after availability among the current pillars (Global Panel, 2015). An apparent epiphany in food security literature and long-standing debate within the communities seeking to address food insecurity is the relationship between food availability and access (Bublitz et al., 2019). Understanding that the world produces enough nutritious food to be available to everyone, but that they lack access to it transformed the proposed interventions and philosophy surrounding food security (Diskin, 1994). Recognizing the links between food availability and access to consumption and nutritional status were not automatic (Bublitz et al., 2019; Diskin, 1994). Understanding how closely linked these variables are in various contexts and the important interventions affecting them is key to realizing effective food and nutrition security policy measures.

Utilization

The next pillar is utilization, which is “having an adequate diet, clean water, sanitation, and health care to reach a state of nutritional well-being where all physiological needs are met,” (HLPE, 2020). It considers whether or not individuals have the capacity and tools they need to process and prepare their food completely (Bokeloh et al., 2010). Because this pillar overlaps with many other aspects of a higher standard of living, it requires a healthy physical environment as well as adequate sanitary facilities and an awareness and implementation of proper health care, food preparation, and storage processes (Bokeloh et al., 2010; Cumming et al., 2016). The FAO defines it as “the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water, and adequate sanitation. Effective food utilization depends

on knowledge within the household of food storage and processing techniques, basic principles of nutrition and proper childcare,” (FAO, 2006). Furthermore, inadequate sanitation and water access continue to shape long-term nutritional outcomes throughout ongoing health challenges (Cumming et al., 2016). Adequate utilization is often key to combating undernourishment as it considers the resources needed to prepare food including water, sanitation, cooking fuel and supplies or facilities (Global Nutrition Report, 2020). Thus, those lacking any one of these items may face the consequences of undernourishment, most pressingly, having weaker immune systems, ultimately putting them at greater risk of severe illness (FAO, 2003; Global Nutrition Report, 2020; Moseley & Battersby, 2020).

Households continue to mitigate the food security impacts of these utilization challenges by adapting diets in response to energy poverty, inadequate water and sanitation, storage and refrigeration deficiencies by consuming foods that are easy to store or require little preparation (Moseley & Battersby, 2020). Presently, there has been a shift from traditional foods which were adapted to these living conditions—such as dried or smoked meats and fish, dried beans, and maize meal—to modern, highly processed foods, which are typically higher in sugar, fat, and salt than traditional foods as seen in the nutrition transition, part of which is line with economic transition (Drewnowski and Popkin, 1997). These substitutions are not determined by utilization issues alone but are a result of the rapidly increasing importation of these foods, marketing and advertising, and increasing time poverty as urban commutes extend in length (Moseley & Battersby, 2020; Wodon & Blackden, 2013).

Stability

The final codified pillar is stability, which is having the ability to ensure food security in the face of sudden shocks—like economic, health, or climatic crises—or cyclical events—such as seasonal food insecurity (HLPE, 2020). It pertains to the regularity of food supplies, be that

through importation or food self-sufficiency (Moseley & Battersby, 2020). Food self-sufficiency's definition is heavily debated but, "given the prevalence of trade in today's global economy, a more pragmatic understanding of food self-sufficiency is domestic food production that is equal to or exceeds 100% of a country's food consumption," (Clapp, 2017). Food self-sufficiency was the mainstay of African food policy throughout the 1970's; however, these policies were systematically dismantled in most African countries during the era of structural adjustment from the 1980's to 1990's (Moseley, Schnurr, & Kerr, 2015). These programs reduced tariff barriers and subsidies to farmers, causing a decline in domestic food production and increasing food imports. As a result, African countries both import and export more food than they did in the past as well as other types of agricultural and non-agricultural products (Moseley, Carney, & Becker, 2010). While these strategies produced fairly stable food supplies and prices in the 1980's and 1990's, global food prices became more variable beginning in the 2000's (Moseley, Carney, & Becker, 2010). Ultimately the resulting food crises, including the 2007–2008 global food crisis, hit Africa's urban areas hard (Moseley, Carney, & Becker, 2010). The destabilization of prices can seriously impact food security as is being observed in the face of the COVID-19 pandemic, which created problems for global trade and supply chains sustaining African food systems enmeshed in a global food system (Moseley & Battersby, 2020).

Sustainability

One of two additions that the HLPE and many other entities also proposed was sustainability. That is a food system that contributes to the regeneration of natural, social and economic systems in the long run and ensures the food needs of the present generations are met without compromising the future's (HLPE, 2020). Sustainability often focuses on the food system as a whole (Capone et al., 2014). Sustainable food systems have long been emphasized through programs choosing to prioritize various ecological factors, such as water conservation,

soil erosion mitigation, decreased non-organic inputs, and a whole host of other practices labeled as sustainable (Capone et al., 2014). This encompasses various elements and activities related to the production, processing, distribution, preparation, and consumption of food, as well as these activities' outputs including socioeconomic and environmental outcomes (Nelson, 2014). This framework begins to capture the complexity of the interconnected contributors within a functioning food system (HLPE, 2020).

Sustainable food systems meet each branch of food security. They produce sufficient and available food, ensure equitable access to food and livelihoods, are healthy for nutrient uptake within utilization, build resilience and stability in the face of shocks and crises, regenerate to guarantee sustainability over all the dimensions, and empower individuals to engender agency for all people, including the most vulnerable and marginalized, to exercise change in shaping that system (HLPE, 2020). The integration of this pillar is also beginning to call the promotion of productionist agricultural technology solutions into question (Lang & Barling, 2012). For proponents of its integration as a pillar of food security is vital if present policies and programmes are to both eliminate and not be the cause of increased food insecurity in the future (Berry et al., 2015).

Agency

Lastly, there is agency, the main focus of this project. Seeing as there is a gap in food policy statistics relating to food consumption patterns and trends, it is essential to bring agency into the picture (Global Panel, 2015). Agency concerns individuals or groups' capacity to make choices about what they eat and produce and how they do so (HLPE, 2020). It also involves being able to engage in the policy processes that uphold government structures which enable agency and sovereignty over their food choices (HLPE, 2020). With these pillars in mind, considering how agency specifically can multiply our understanding of food security uncovers

how individual choice and power is sometimes missing from the current food security conversation.

What is Agency?

Agency shapes the contours of various food systems; it permeates almost every dimension of food production and consumption. Picking what to grow and how to grow it, determining what to eat, where it comes from, and when we get to eat it are all essential aspects of agency. The HLPE defined agency as “the capacity of individuals or groups to make their own decisions about what foods they eat, what foods they produce, how that food is produced, processed and distributed within food systems, and their ability to engage in processes that shape food system policies and governance” (2020, p. XV). As such, it is essential that individuals have the power to operationalize and manage their food production and consumption. Agency over food is therefore an integral component of food security, an idea forwarded further by the food sovereignty movement (Ehlert & Voßemer, 2015).

Food sovereignty is the right to healthy and culturally-appropriate food produced sustainably by agriculture systems determined by the farmers themselves. The aim is to place hopes and needs of those who produce, process, and consume the food at the heart of food systems rather than the demands of corporations and markets (Declaration of Nyéléni, 2007). Often, this movement seeks to re-politicize the “how to feed the world” debate by calling for actor-oriented and informed perspectives and methods. In doing this, the aim is to overcome the observed essentialization and neglect of individual people (Ehlert & Voßemer, 2015). Such reforms will often call for increased control of food production and consumption and establish alternative food networks to support local needs in the struggle for food justice and sovereignty (Zhang, 2020). Furthermore, the food sovereignty movement has offered solutions that marry the larger political structures’ offerings with local needs and desires, again highlighting how

increasing food sovereignty can increase agency via cooperation with larger entities (Schiavoni, 2016).

Part of this movement takes a historical lens that considers how social structures and institutions transform the politics of food across time and tracks the agency of actors in order to see how food systems are evolving (Schiavoni, 2016). Additionally, this framework offers analysis of food-related agency within “people’s life-worlds,” which grounds it within different systems of knowledge over agriculture, development, and food production and consumption where each actors’ role can be better understood (Ehlert & Voßemer, 2015). These approaches make understanding agency especially strong because it tracks change over time and considers how actors impact each other within food and political systems to see how it is being upheld and can be improved upon. (Schiavoni, 2016). Seeing how entangled agency is with development politics, especially in emerging global agriculture programs further highlights its potential to reshape development programs moving forward, further substantiating its role in food systems (Manley & Leynseele, 2019).

While complete agency or perfect sovereignty may not entirely eradicate every food security issue, it has the capacity to minimize them significantly and, as such, it should be a top priority for those seeking to increase food security around the world (Donald et al., 2017). Here, I address the consumption aspect of agency. This focus complements the already existing research on agency regarding food production. In order to understand the metric I created, it is important to understand how agency manifests throughout different stages and aspects of the food system. Agency over production is a concern related to food and nutritional security that has been explored (Moragues-Faus, 2017). With production often overshadowing it, agency over consumption has received less attention (Vivero Pol, 2017). Because of its ability to highlight how different actors are impacting each other and how entrenched it is in food system

development, food-related agency must be better understood to bolster individual voices within these institutions.

Production

Agency over production in agriculture concerns itself with an individual's right to choose what to grow and how to grow it (Patel, 2009). With the continued food crises in Africa resulting in part from growing crops not for local dietary consumption, attention to this aspect of agency continues to gain priority (World Relief, 2020; Moseley & Battersby, 2020). Meant to understand the negative consequences of commercial agriculture, these programs aim to measure, increase, and empower local stakeholders in order to produce more nutritious and sustainable food that meets their individual and community dietary needs (Moseley & Battersby, 2020). They also serve as a means to grow products meant for resale and export in a more economically advantageous manner in order to decrease chances of exploitation by large agribusiness corporations and increase household income from the sale of surplus (Moseley & Battersby, 2020). Furthermore, these programs also seek to better understand the gendered division of labour among many communities.

Measures such as the Women's Empowerment in Agriculture Index (WEAI) serve this purpose (Austin-Evelyn, 2011). Meant to measure individual shareholders and marginalized population's control over food production, the metric assesses how successful other programs such as Climate Smart Agriculture (CSA) or The Green Revolution for Africa (GR4A) have been in integrating the entire community's voice (Addison et al., 2021). In fact, the GR4A is often critiqued for its marginalization of women (Wise, 2020). One of the biggest negative impacts AGRA has on women is its neglect of women's agricultural knowledge systems by focusing primarily on crop commercialization (FAO, 2005; FAO, 2016a; HLPE 6, 2013). Additionally, while male farmers typically focus on cash crop production, female farmers often practice

horticulture and farm food for local or family consumption (Austin-Evelyn, 2011). The transition to cash crops stripped many women of their agency, sovereignty, and control over food production, ultimately increasing food and nutritional insecurity (Austin-Evelyn, 2011). As innovations were initially presented to male heads of households and male tribal leaders, the traditional power structure of food production was reoriented to fit Western models, giving men the advantage (Austin-Evelyn, 2011). Women's role in agricultural production dwindled further as they continued to specialize more in horticultural practices and their male counterparts produced cash crops for income (Moseley, 2020). Over time, the buildup of these inequalities has left women and children behind, as they lose the ability to produce food or earn income to purchase it (UNICEF, 2017; Austin-Evelyn, 2011).

With food security still a major global concern and women and children being severely impacted, research on agency as a metric is more pressing than ever (Lutter et al., 2013). While agency has long been central in the food sovereignty literature, it has struggled to reach a broader audience. Although feminist political ecology frameworks have called for increasing the voices of marginalized populations for decades, this theory often fails to make its way into final adopted policies (Donald et al., 2017). This conceptual framework highlights the way socially constructed and gendered interactions with the environment change how we understand human-environment interactions (Donald et al., 2017). In the case of Burkina Faso specifically, this framework begins to explain the gendered responsibilities for nutritional supplementations. For example, women are responsible for providing sauce ingredients, the main source of micronutrients for the family (Morgan, 2020). They are also responsible for the nutrition of children; whereas men largely concern themselves with macronutrients and economic support (Morgan, 2020). These constructed roles shape the food acquisition techniques used by each gender and the social expectations they have of each other (Donald et al., 2017).

At the global level, the gender gap in the prevalence of moderate or severe food insecurity has grown even larger in the year of the COVID-19 pandemic, with the prevalence of moderate or severe food insecurity being 10 percent higher among women than men in 2020, compared with 6 percent in 2019 (SOFI, 2021). Power over food production has become more mainstream, as seen in the adoption of WEIA; however, this has not done enough to address questions of agency over food consumption (Vivero Pol, 2017). Thus, metrics such as WEAI exist to help in evaluating and eventually mitigating these gaps in agency. Women play a critical and potentially transformative role in agricultural growth in developing countries, but they face persistent obstacles and economic constraints limiting fair and equitable inclusion in agriculture (WEAI, 2021). The WEAI measures the empowerment, agency, and inclusion of women in the agriculture sector in an effort to identify ways to overcome those obstacles and constraints (WEAI, 2021). The Index is a significant innovation and measures the extent of women's engagement in the agriculture sector in five domains: decisions about agricultural production, access to and decision making power over productive resources, control over use of income, leadership in the community, and time use (WEAI, 2021). It also considers women's empowerment relative to the men within their households (WEAI, 2021). Since its implementation, it has evolved and accommodated a plethora of locations and cultures (Martinez & Seymour, 2018; WEAI, 2021). With the baseline interviews complete, the program has continued to run successfully since 2012 and has produced scores that have been used to modify programs such as Feed the Future and increase understanding surrounding the relationships among empowerment, livelihoods, and food security, as well as relationships among the various components of the index (USAID, 2020). This index is a powerful response to the inequitable systems built throughout the agricultural sector of the continent and, as such, I hope to create a similar style of metric, focusing on consumption instead of production.

Consumption

Separating consumption from production is an important step in understanding how agency can be integrated into food security metrics. Specifically in Africa, consumption is at times overlooked (Hahn, 2012).

“In history as well as in sociology and cultural anthropology, African societies have been seen as providers of globally circulating raw materials, goods, and commodities (like rubber and ivory, but also art and slaves), but rarely has the role of consumers in these societies been considered. Even during the last years, when consumption in Africa became a major topic with regard to increasing fuel consumption and emerging environmental problems, individuals and households in Africa were still marginalized; they were not considered consumers with their own agency and culturally defined patterns and preferences,” (Hahn, 2012, para. 1).

The relevance of consumption rests in the extremely wide range of needs and desires, and on the necessity to adapt the goods available to local preferences. With few exceptions—cloth and beads for example—the localization of commodities in Africa grew through the consumers’ own agency (Hahn, 2012). This agency has been consistently disregarded, such that finding ways to measure it remains pertinent and pressing.

This broader pattern of large-scale production without consideration for local consumption holds true for the agricultural sector as well, and it ultimately created the food and nutrition crisis described above. This crisis has resulted in a lack of food more generally and nutritious food more specifically (WHO, 2020). First, these agribusiness models emphasize the production of non consumable products, such as cotton in Mali or foods meant for export such as rice or peanuts in Western Africa (Moseley, 2013; George, 2020). This has resulted in both a lack of food and decreased access to the food that remains (Saad, 2013). Additionally, undernourishment remains an immense issue (Reid, 2021). More than 250 million undernourished individuals live in Africa, where the number of undernourished is growing faster than anywhere else in the world (UN Goal 2: Zero Hunger, n.d.). With the hunger and nutrition crises continuing, considering agency within food insecurity is essential as it will allow us to

understand what individuals hope to change in the system beyond adequate food (Zhang, 2020). While completing caloric requirements is undeniably a higher priority, allowing individuals to consume culturally appropriate foods and the foods they prefer is key to enacting individual agency over food consumption (Byrne, 2018).

The outcome of economic, social, and political factors operating across a range of scales has led to massive increases in rates of overweight, obesity, and diet-related non-communicable diseases in northern and southern Africa, most notably diabetes and hypertension, which is in line with patterns of consumption outlined by the nutrition transition (Global Nutrition Report, 2020; Drewnowski and Popkin, 1997). Of the 37 countries in the world with high levels of child stunting (undernutrition), anemia in women of child-bearing age (micronutrient deficiency), and adult obesity (overnutrition), 27 are in Africa (Global Nutrition Report, 2020). Obesity, diabetes, and hypertension have been found to be significant comorbidities of COVID-19, and in the African context, a high proportion of recorded deaths have had one or more of these comorbidities (Petrakis et al., 2020; IOL Reporter 2020; Moseley & Battersby, 2020). While addressing agency alone is not the magic fix for these issues, it is a key component of understanding where insecurity is arising and beginning to address it at its root.

While GR4A has been celebrated for putting agriculture back on the mainstream international development agenda, one of its biggest flaws is the neglect of women's role in the agricultural sector (Moseley, 2017; Moseley & Ouedraogo, 2021). In attempting to address food insecurity, women are struggling to have their voices represented in the policy debate (Austin-Evelyn, 2011). Furthermore, policy creators have apparently neglected agency over consumption as a top priority (Vivero Pol, 2017). As the demographic lacking the most agency over their food, their voices are especially important in the development of agency metrics, the focus of this paper. In their 2020 Food and Nutrition Report, the HLPE proposed expanding the

current metrics for food security. The benefits of this metric include the potential to increase women's experiences in food security policy creation.

At some point agency cannot account for a complete lack of resources; however, when unable to listen to hunger cues or forced to give up food for other family members' preferences, individuals run the risk of experiencing undernutrition (Waterhouse, 2007). Furthermore, ensuring culturally appropriate food will be integral to increasing access to safe food meant to combat food insecurity (Byrne, 2018). While the HFIAS questions did not explore this question of food preference, it is an important component of it, which is essential to mention (Byrne, 2018). Because increasing agency has the capacity to aid in food insecurity reduction, it is key to consider it as a component of food security; however, in doing this the question of how to establish a metric arises.

Measurement Debate

The academic community has long debated the inherent value of measuring food security (Barrett, 2010). In addressing food security two sides concerning the inherent establishment of metrics have arisen. One calls for establishment of metrics that can track changes over time to make funding easier to distribute and measure the effectiveness of sponsored programs more easily (Barrett, 2010). In establishing the pillars of food security, having ways to measure tangible change became important for policy makers (Jones et al., 2013). Many believe that our ability to understand the nature and extent of the relationships among variables of food security in detail have been hampered by a lack of information as well as by concerns over the appropriateness of the analytical approaches and indicators that have been used in empirical studies of these issues (Diskin, 1994). Additionally, proponents of this argument believe that these metrics allow us to better inform policy decisions and distribute funding to locations and communities with measurable and demonstrated needs (Jones et al., 2013).

On the other hand, many argue that this is not something we should measure but instead simply endorse and build on principle (Fouilleux et al., 2017). Most prominently, opponents of this method cite the metrics' inability to capture the processes leading to and experience of acute food insecurity in chronically food-insecure contexts, to consider some of the impacts of short-term shocks, like major floods or earthquakes especially depending upon the survey timelines, the gap in some measurements' ability to gauge the interaction between severity and frequency of food insecurity, and other sampling questions or issues that may be difficult to resolve (Lang & Barling, 2012). Beyond questions regarding metrics' shortcomings, their hyper-rational approach to individual lives are adverse to some. One of the weaknesses of metrics that they point out (that admittedly, this one does fall into) is the limitations of numbers to provide a full picture (Lang & Barling, 2012; Fouilleux et al., 2017). The number cannot capture an individual's entire situation and so I agree that FCAM has this weakness. However, in order to try and combat this vacuum effect, I try to include summary statistics and additional data on the individuals of study, a solution which many proponents of metrics advocate for in order to combat measurement's weaknesses (Jones et al., 2013).

Additionally, when it comes to food security, many opponents to metrics cite the tendency of metrics to focus on production to address inaccess and consumption issues, often creating the so-called "productionist trap," (Fouilleux et al., 2017). As a long established item on the international agenda, questions concerning production, consumption, poverty, inequalities, healthcare, and conflicts are often "resolved" with a single dominant solution: increasing agricultural production. They argue that this productionist bias is fueled by the implementation of metrics. According to them, listing production sponsored by transnational corporations or private foundations as the primary solution, is ultimately detrimental to the communities they are striving to aid (Fouilleux et al., 2017).

However, despite these critiques, there are many benefits of metrics such as WEAI. I seek to measure agency over consumption choices to better track progress on this dimension of food security. In order to include agency as a metric, policy makers require something quantifiable (Webb et al., 2006). I believe this metric is a means for making a lack of agency more visible, acquiring resources to address the situation, and appealing to policy makers. Therefore, this paper develops a way to measure agency.

In beginning to understand how much agency people have over what they eat and when, we can begin to address food security issues related to consumption. This metric aims to measure agency in a way that policies can use to concretely address these concerns, taking inspiration from other metrics such as the WEAI. Research informing policy will include this philosophy but being unable to tangibly measure agency makes adoption less likely (Robbins, 2008). The need for this metric is increasingly relevant in the face of the COVID-19 pandemic as marginalized individuals have faced even more insecurity (IOL Reporter 2020).

In the end, I agree with the principles outlined by those who do not think a measurement *should* be necessary; however, I understand that the current socio political climate makes this kind of measurement all but essential. As it stands, policy makers require some kind of metric in order to justify spending and funding (Jones et al., 2013). This metric is the tool with which to enable this support and so I believe it is an important tool in increasing agency since upholding it as a principle alone is not enough to garner adequate support.

Chapter Three: Burkina Faso's Background

This section provides critical contextual information, so that one may better understand the particularities of the study area. Burkina Faso is a Western African, landlocked country that covers an area of around 274,200 square kilometers (Wikipedia, 2021). Its capital and largest city is Ouagadougou (Wikipedia, 2021). It was a former French colony and as such the country's official language of government and business is French (Wikipedia, 2021). However, there are 59 native languages spoken in Burkina Faso, with the most common language, Mooré, spoken by roughly 50% of Burkinabé. An estimated 15% of the population actually speaks French on a regular basis (Lewis, 2009). There are numerous ethnic groups in Burkina Faso. The predominant group are the Mossi (Moore speakers), about 40% of the population (Lewis, 2009). They are mainly farmers and live in the central portions of the country as well as in the northern area of study for this paper (where some migrated following the droughts of the 1970's-80's) (Reardon et al., 1998). The Bobo people, the second largest ethnic group, are largely farmers, artisans, and metalworkers living in the southwest, also around Bobo-Dioulasso. The total population based upon the July, 2021 estimate was 21,382,659 (CIA Factbook, 2021). Citizens are known as Burkinabé or Burkinabè.

The country has a young age structure and continues to experience rapid population growth. More than 65% of the population is under the age of 25, and the population is growing at 3% annually (CIA Factbook, 2021). Most of the population is located in the center and south. Nearly one-third of the population lives in cities. The capital and largest city is Ouagadougou (Ouaga), with a population of 1.8 million. This growth continues to put increasing pressure on the country's limited arable land (CIA Factbook, 2021).

The country has a largely tropical climate with two very distinct seasons: rainy and dry. In the rainy season, the country receives between 23.6 and 35.4 inches of rainfall (Climate and

Weather, 2021). The rainy season lasts approximately four months from May or June to September. During the dry season, hot, dry wind from the Sahara blows in, minimizing rainfall. There are three climatic zones: the Sahel, the Sudan-Sahel, and the Sudan-Guinea, shown in the map below (Zampaligré et al., 2014). The case studies in this paper are situated in the Sudan-Guinea region, just outside Bobo-Dioulasso.

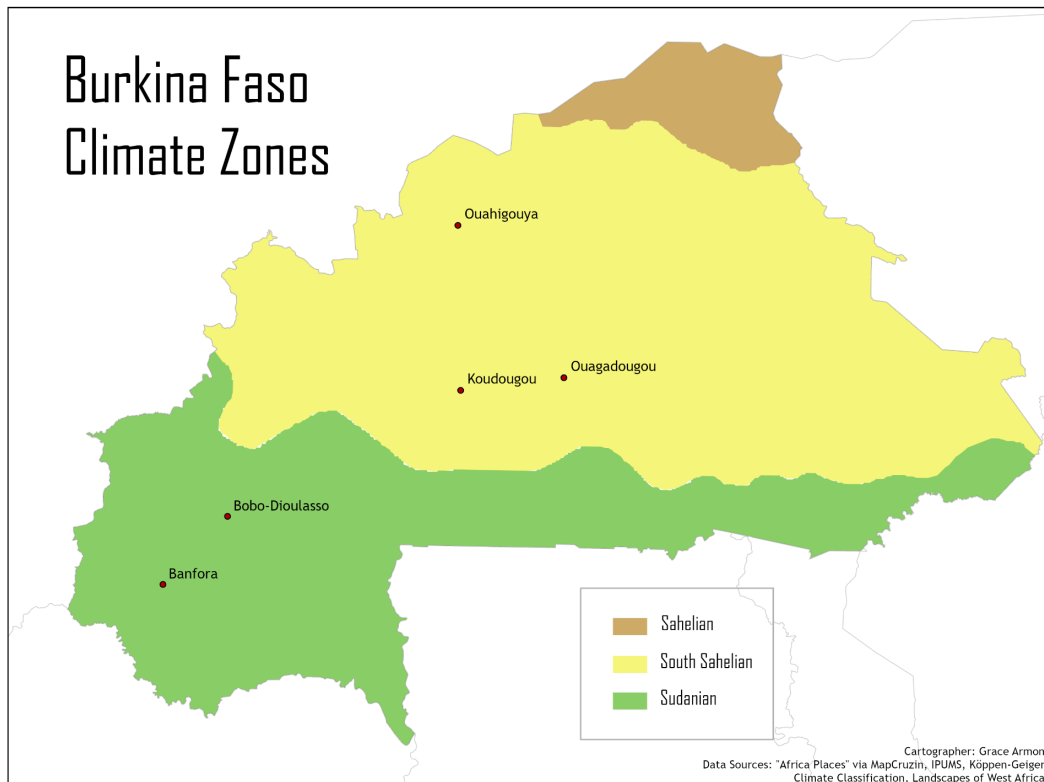


Figure 3.1: Armon, G. Burkina Faso Climate Zones. (2021).

Burkina Faso's geographic and environmental situation play a significant role in Burkina Faso's issue of food insecurity (Reardon, 1996). "A total of 3.3 million people are estimated to be facing acute food insecurity" (WFP, 2019). The Sahel region, and Burkina Faso in turn, experiences some of the most radical climatic variation in the world, ranging from severe flooding to extreme drought (Østergaard Nielsen, 2010). These unpredictable climatic shocks often result in difficulty in being able to rely on and accumulate wealth through agricultural

means (Barbier, 2009). Much of the commercial agriculture in the country stems from demand for cotton in the global north, which makes up 60% of total agricultural exports from the country (Barbier, 2009). As a result, there have been many calls to diversify agricultural production and exports (Barbier, 2009). Additionally, the upsurge in climate disasters, particularly drought as a result of the continued warming of the earth, causes serious issues for inhabitants of the nation (Sanfo et al., 2017). Being just South of the Sahara, Burkina Faso faces encroaching desertification as a result of these rising global temperatures, which threatens traditional agricultural livelihoods (Sanfo et al., 2017). Following this, there has been a large out-migration from rural, agriculture regions to major cities and mining areas (Boukaré, 2020).

That said, about 80% of the population is engaged in subsistence and cash crop farming (USAID, 2021). Not only is most of the population of Burkina Faso dependent on agriculture as a source of income, they also rely on the agricultural sector for food to directly feed the household (Reardon, 1988). Due to the vulnerability of agriculture, more and more families are having to look for other sources of non-farm income, and often have to travel outside of their regional zone to find work (Roncoli, 2001; Reardon, 1988). It is important to note here that livelihood systems changed to fit export systems. Originally, the livelihood practices engaged in, especially prior to colonial contact, were adapted to the environmental situation of the nation; however, with outsider influence, livelihood systems were molded to fit the new political economy brought on by external influence from international markets and imperial powers (Boukaré, 2020). Many of the original agricultural methods which originally eliminated large portions of the vulnerability for these populations are now moot as they produce cotton for export and use farming methods insensitive to the ecosystems they find themselves in (Roncoli, 2001). All of this is, of course, exasperated by the worsening effects of climate change, which

continues to impact Sahelian regions in the face of desertification and water shortages, among other climatological challenges (Reardon et al., 1998).

Even though agriculture is the primary source of revenue for the country, Burkina Faso is a food deficit country (WFP, 2019). More than 40% of the population live below the poverty line. In response to this development crisis, BRICOP, with funding from the Alliance for a Green Revolution in Africa (AGRA), began an initiative in 2006. Meant to address increasing food prices and decreasing food access, it aimed to increase agricultural production by promoting the use of improved seeds and farming methods. In theory, improving these factors would solve at least parts of the food access crisis. The idea behind this initiative is that upgraded methods will yield higher outcomes and ultimately higher incomes to alleviate food insecurity during the non-farming season. Whether this actually worked is still contested (Aminzade, 2014; Moseley, 2017). Policy measures to address food insecurity often aim at maximizing output. Many individuals are constrained by the physical environment and lack of agricultural resources and so they employ other cultural methods to increase food security, including foraging. These adaptations increase both security and agency over food acquisition and consumption (Schiavoni, 2016).

Cotton and gold are Burkina Faso's key exports—gold accounts for about 75% of the country's total export revenue (World Bank, 2021). Burkina Faso's economic growth and revenue depends largely on production levels and global prices for the two commodities (World Bank, 2021). The country has seen an upswing in gold exploration, production, and exports in both the artisanal and formal sectors (Boukaré, 2020). The number of migrants, both internal and cross-border, to these mining towns has grown in the past 10 years (Boukaré, 2020). While the deintensifying political crisis has allowed Burkina Faso's economy to resume positive growth, the country's fragile security situation continues to put these gains at risk (EIU, 2021). That said,

internal movement remains high as many individuals, especially young people move to the mining sectors. National trends of movement of mining sectors by young people from rural areas reflect this. The labour force itself was about 8.501 million in 2016; however, a large part of the male labor force migrates annually to neighboring countries for seasonal employment (CIA Factbook, 2021). Migration is traditional among the Burkinabé (Boukaré, 2020). Originally following seasonal migration patterns, this trend is being replaced by stints abroad for up to two years (Boukaré, 2020). Côte d'Ivoire remains the top destination (World Factbook, 2018). Under French colonization, Burkina Faso became a huge labor source for agricultural and factory work in Cote d'Ivoire (World Factbook, 2018). Burkina Faso attracts some migrants from Côte d'Ivoire, Ghana, and Mali, who often share common ethnic backgrounds with the Burkinabé (Boukaré, 2020). Despite its food shortages and high poverty rate, Burkina Faso has become a destination for refugees in recent years and hosts about 33,500 Malians as of May 2017 (World Factbook, 2018). While this is a very brief overview of the country's economic and environmental profile, this context is important to understanding the scope of my research.

Chapter Four: Methodology

This chapter outlines the process I used to create FCAM. I also discuss how the data I used was collected. This framing means I considered agency within a context of food insecurity and inadequacy in southwestern Burkina Faso as opposed to a country where food was abundant. While I hope this does not limit the efficacy of this metric in being used in other types of communities, transparency regarding the context of the metric's creation is important for understanding why I chose to do it in this manner.

Data Acquisition

In order to create FCAM, I used data collected via surveys in Burkina Faso by Bill Moseley and his research team from 2017-2020 (Moseley & Ouedraogo, 2021). This method aims to convert qualitative data into quantitative data. These surveys are part of a larger project meant to assess the effectiveness of the Project for the Commercialization of Rice in Burkina Faso (BRICOP). The questions I used are from the Household Food Insecurity and Access Scale (HFIAS). The HFIAS survey consisted of nine questions meant to assess food security of the individuals and households, and were part of a larger interview that lasted about 45 minutes. The surveys were conducted by a Macalester research team working with Burkinabé university students from the surrounding urban areas. While I only use the 2019-2020 surveys, the initial round of surveys, including the baseline survey, took place in June-August 2016 with a second round in June-August 2017. The majority of the baseline surveys took place during the first round; however, one village, Yeguere, was added during the second phase so the baseline surveys were done in tandem with follow-up surveys in 2017 (Morgan, 2018). The baseline surveys were designed to obtain basic household information on age, marital status, family size, and other

relevant demographic information. The summary statistic table 4.1 below shows their ages, wife status and number of children in the household.

Table 4.1: Whole Study Summary Statistics

		Medina	Saki	Seguere	Siniena	Yeguere	Total Sample
Age	Pre-Menopause ¹	84%	67%	86%	46%	69%	70%
	Post-Menopause	16%	33%	14%	54%	31%	30%
Wife Status	First	41%	33%	57%	25%	21%	32%
	Second	34%	39%	43%	42%	17%	32%
	Third	9%	11%	n/a	8%	5%	7%
	Fourth	6%	n/a	n/a	n/a	n/a	2%
	Monogamous	9%	17%	n/a	25%	57%	28%
Children in Household	Zero	3%	5%	n/a	21%	2%	6%
	One-two	6%	17%	21%	21%	21%	17%
	Three-five	47%	50%	50%	50%	50%	49%
	Six plus	44%	28%	29%	8%	26%	28%

Participants were invited to the study through communication with local leaders who held different roles in each particular village. All were informed that participation was completely voluntary, and that they were able to withdraw from the study or decline to answer at any point, should they wish to do so. Participants were also asked about their agricultural activity and crop sales. More information was gathered on rice production specifically to ascertain the extent to which participants used the techniques and inputs—fertilizer, insecticide, etc.—encouraged by the project. Lastly, participants were asked about the large goods that they owned both individually and within the household including forms of livestock and agricultural equipment.

¹ The age chosen for menopause was 47. This is based upon Diongue et al's research on the beginning of natural menopause in women in Western African contexts (Diongue et al., 2015).

This information was used to create approximate household and individual women's wealth in West African CFA Francs based on market prices for these goods. They were then converted to USD to allow for greater understanding among a Western audience (Morgan, 2018). This resulted in three strata of wealth groups, high, middle, and low income.

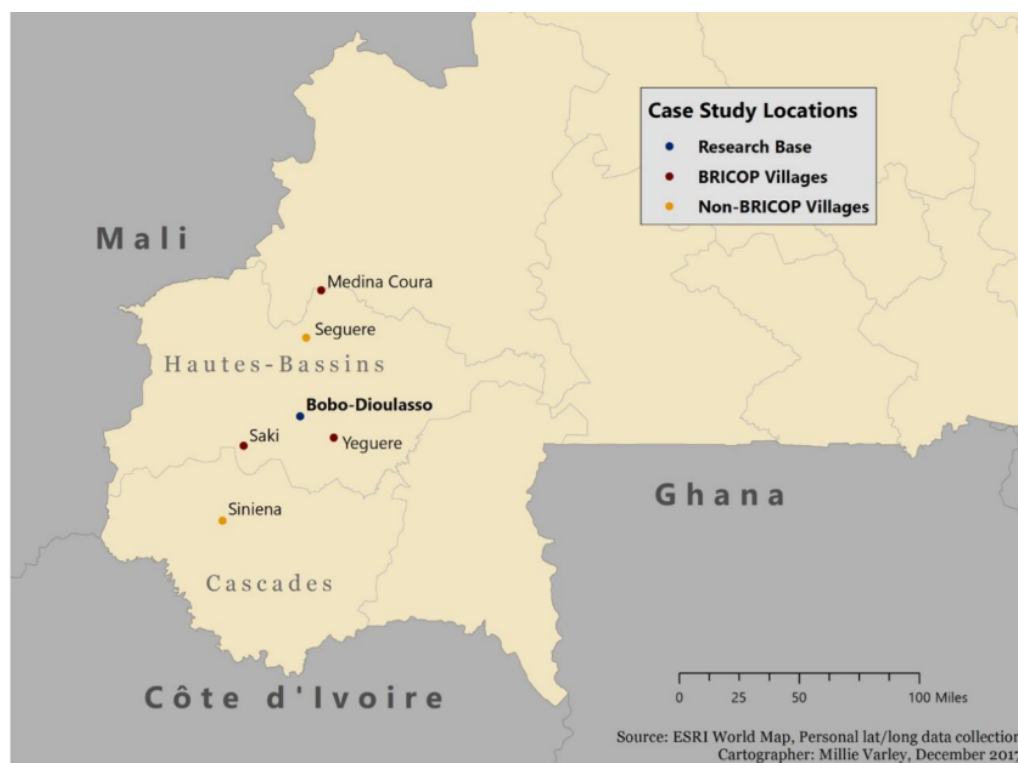


Figure 4.1:Varley, M. (2017) Case Study Locations.

The individuals were randomly selected from five different villages surrounding Bobo-Dioulasso. Three of these villages were involved in the BRICOP project, and the other two had no official involvement with the BRICOP or any other rice-cultivation project.

Furthermore, individuals throughout the survey sample were part of test and non-test groups meant to assess the effectiveness of the BRICOP measures as a rice commercialization project. This was meant to uncover whether and how the project's presence in a village may impact those who were not technically involved (Morgan, 2018). A total of 130 participants were used in the analyses. Data was missing for certain participants in certain variables, and I eliminated them

from my study if so. To estimate household and individual dietary diversity, the team used the United Nations Food and Agriculture Organization's (FAO) household dietary diversity score (HDDS) survey, which has been a useful indicator of nutrition among similar populations in Burkina Faso in the past (Savy et al., 2005). This survey asks participants to recall all of the foods they consumed over the course of the previous day, including the ingredients used in each meal. The presence and absence of foods within certain food groups—also designated by the FAO—were used to create an index for dietary diversity. It's important to note that this measure counts the number of food groups from which ingredients were eaten, not the quantity that was eaten. This survey was conducted in a similar manner to the HFIAS one, where a student and translator asked the series of questions and recorded the responses. Again, participation was completely voluntary.

Participants were then asked in the HFIAS about their own perceptions of their level of food security over the previous four weeks. This, again, was done by using a standardized set of questions developed by USAID. Questions were aimed at gathering information on uncertainty, anxiety and worry about food supply, food quality, insufficient consumption, and the associated physical discomfort.

Data Analysis

The questions I used for FCAM (p. 38 below) were asked as part of a survey administered four times to the same women over the 2017-2020 period. They indicated a score of 1-4. They were surveyed once in the rainy and dry seasons in 2017 and then again in 2019-2020. I took the answers from the rainy and dry season in 2019 and 2020 in order to test my metric. Additionally, later in the paper I consider how the agency scores align with the dietary diversity scores of each individual to see if there is any correlation between agency and dietary diversity

scores. Much like the food security surveys, the dietary diversity scores are also the results of survey questions conducted in the same manner as described above. The individual case studies are based on survey questions related to an ongoing research study there based upon responses to the HFIAS and HDDS.

I designed the FCAM to standardize how we measure individual agency and the power over food consumption. It is composed of two components: one considers preference and the other concerns worry. The metric measures agency by summing the frequency of events indicative of a lack of agency and appropriately weighting them to produce a final score. The first index related to preference is broken down into two questions, each weighted at 33%, or a third each, for a total of 66% of the final score. The aim of this subindex is to determine if the individual is able to eat what they desire and if they are being forced to eat what they do not like (Byrne, 2018). The other subindex concerns worry. This aspect of agency of consumption relates to whether or not an individual is confident that they can provide enough food for themselves (UN Goal 2: Zero Hunger, n.d.). It accounts for a third of the final score.

I chose to consider preference and worry as the main components of agency based upon how agency is typically conceived in the literature (Byrne, 2018). For example, access to culturally appropriate foods, which individuals almost always have a strong preference for, is largely considered essential to full agency over consumption (Declaration of Nyéléni, 2007; Byrne, 2018). In fact, forcing individuals to consume inappropriate foods is considered a human rights violation (Roberts, 2020).

I focused on the three following questions and their corresponding answers (because of their connection to agency).

1. *During the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?*
2. *In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?*
3. *In the past four weeks did you worry that your household would not have enough food?*

I chose these HFIAS questions because I found that they best related to food consumption and agency. The first two specifically look at food preference and the last looks at worry. Eating what one prefers is directly related to agency over consumption (Hahn, 2012). As for worry, I believe this aspect is related to agency as it considers whether or not individuals have the ability to eat when they want and how much power they feel over their food sources. More specifically, the first question references preference directly. Seeing as agency concerns one's capacity to make decisions about what they eat, the question regarding preference seems glaringly pertinent (HLPE, 2020). The second question asks about eating something that was not preferred. Again, being forced to eat something one does not want to is an indication of a lack of agency because they cannot make the decision concerning what they eat (Declaration of Nyéléni, 2007; Byrne, 2018; HLPE, 2020; Roberts, 2020). Worry is an indication to me that they may not get to eat when they want, or there is some uncertainty, and are therefore deprived of some degree of agency for whatever reason.

The numbers I used to calculate the score are numerical responses corresponding to questions selected from the Household Food and Income Accessibility Survey. Individuals were asked the 9 survey questions and their responses were recorded on a scale of one to four, where

one was “no” or “zero times,” two was “rarely” or “one or two times,” three was “sometimes” or “three to 10 times,” and four was “often” or “more than 10 times.”²

Once I had these values, in order to make FCM more intuitive, I manually changed every HFIAS 4 to an FCAM 0, HFIAS 3 to an FCAM 1, HFIAS 2 remained an FCAM 2, and each HFIAS 1 became an FCAM 3. I then averaged the converted individual numbers to produce the final FCAM scores. These numbers between 0 and 3 represent an individual's agency score over consumption by measuring how often they did not eat their preferred foods, had to eat food they did not like, and worried that they would not be able to eat when they wanted to. Next, I took these scores and interpreted them using the FCAM scale: that is a scale from 0 to 3, where zero is low agency and three is high agency. More specifically, the range is as follows: 0-1.5 is low agency, 1.5-2.5 is medium agency, and 2.5-3 is high agency.

I also chose to break the range down in this way, not along even breaks or equal intervals, because the effects of a lack of agency compound. The difference in the amount of agency between a 3 and a 2.5 are as extreme as a 0 and 1.5 as illustrated in the case studies in Chapter Six. Furthermore, the causes of agency are often highly connected and failing to consider how they compound by using natural breaks would not do justice to the experiences of each individual. Women who are not eating their preferred foods are often, as a result, eating foods they do not like, causing a lack of agency to compound quickly (Hahn, 2012). In fact, 66% of the score is determined by a lack of preference, and the answers to these questions tended to grow and shrink together, suggesting that the factors at play are connected. Seeing as the survey itself draws a connection between a lack of resources and indications of agency, I felt I could not ignore this correlation and compensated for it in the breakdown of the metric's range.

² This is the inverse of the HFIAS scale; however, in order to make reading the results more intuitive, I represented a higher agency with higher numbers. In HFIAS, higher insecurity was assigned a higher number.

Chapter Five: Findings for Survey Group

This section considers my broader findings related largely to quantitative and statistical analysis. I discuss how food security, dietary diversity, wealth group, and agency variables all interact. While I explore more minute details in the case study portion of this paper, this chapter considers what large patterns are at play within the entire dataset. Ultimately, I found that FCAM scores negatively correlated with the food insecurity scores and positively correlated with wealth group³ and dietary diversity scores. All of these were to a degree of statistical significance.

Table 5.1: Significance statistics across season and variable

	Dry Season Significance Statistic	Rainy Season Significance Statistic
Food Security	0.00054762	1.40252E-14
Economic Group	0.019461084	0.002217232
Dietary Diversity	0.001489049	7.8302E-08

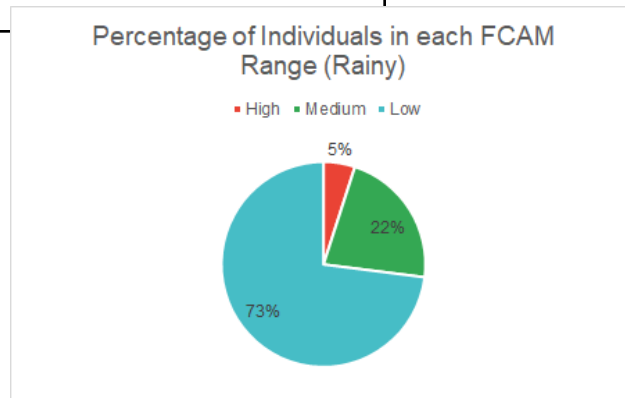
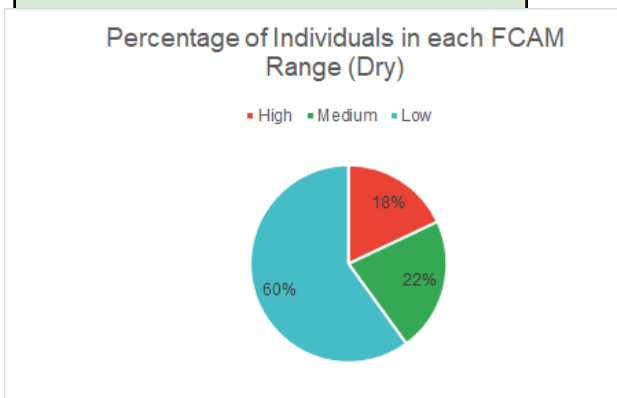
In order to understand what these agency scores can offer the food security debate, I consider how the score correlates with food security, wealth group, and dietary diversity. I considered how two factors, wealth group and dietary diversity affect agency and how agency affects food insecurity. That said, agency is not the end all be all of food security. The results showed correlations between each of these factors and are explored below. All calculations and graphs were run and created in Excel.

³ The explanation for this is explored further in the subsection of this chapter, as the negative slope may seem counterintuitive; however, the scaling of the income groups caused this, not the association between agency and income itself.

I considered these correlations and ran the regressions across seasons, the resulting r-values of which are below.

Table 5.2: R-Values across season and variable

	Dry Season R Value	Rainy Season R Value
Food Security	0.089436176	0.371536957
Economic Group	0.041915669	0.070782657
Dietary Diversity	0.076099783	0.202471247



The dry season is also known as the season of plenty, and I refer to it with dry and plenty interchangeably below. The surveys taken in Jan-Feb 2020 were during the dry season. The same is true for the rainy season, which is also known as the hungry season, which was conducted in June-July 2019. The results across the seasons varied; however, overall, the individual and average agency scores were higher during the dry season than during the wet season, with statistical significance⁴.

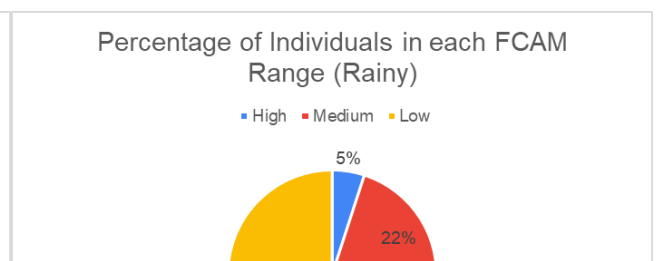
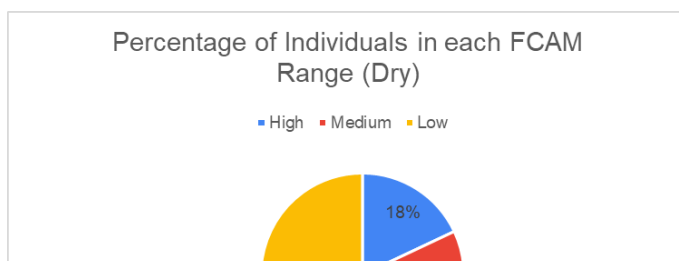


Figure 5.1: Percentage of Individuals in each FCAM Range across Season

During the dry season, the mean score was 1.63; during the rainy season, it was 1.76. The graphs below show the proportion of the total study population that fell into each agency or FCAM category. As expected, the number of people with high agency decreased in the dry season and the number with low agency increased. Interestingly, medium agency stayed the same; however, the individuals within the population often shifted agency groups.

Furthermore, as seen in the distribution histograms, the distribution of scores was less skewed during the rainy season. I did not have expectations for the distribution of scores going into the study as I expected some individuals to earn each score across each season, which is what occurred. However, when I look closer at the histograms, it is interesting to note that across the whole study, the range of scores was wider during the season of plenty suggesting there is more variability in agency. The seasonal variation may be accounted for by the increase in dietary diversity so preference is more likely to be met, even with worry up. It is important to

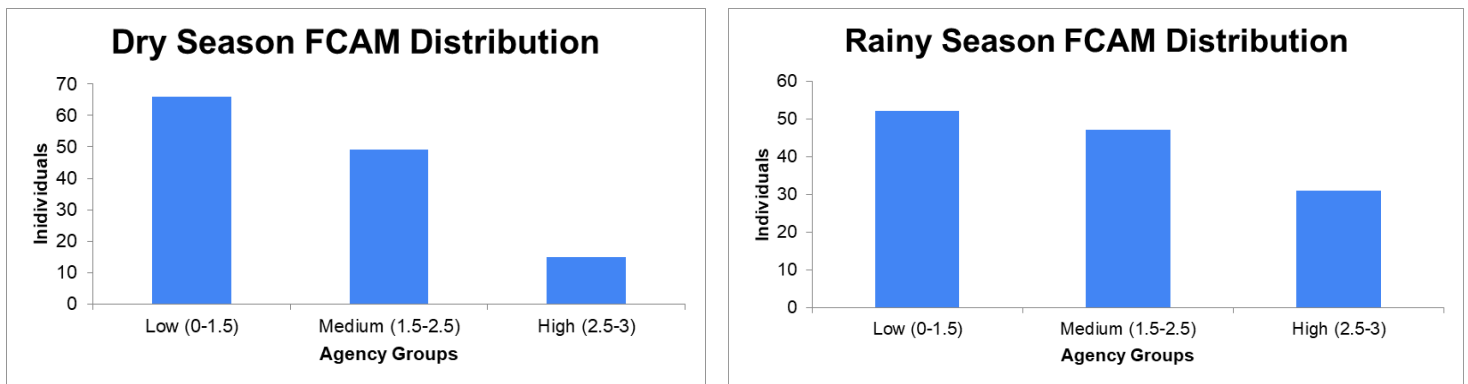


Figure 5.2: FCAM Score Distribution across Season

note here that I am not exactly sure how or which preferences were met more during the rainy season. It is not clear if people prefer a more diverse diet, enjoy those foraged foods in particular, or have more limited taste and expectations in the dry season and so have lower preference scores. This is one of the limitations of the data and where more interviews would be helpful.

Originally, I expected that during the dry season, just after harvest, agency would be higher for each individual, which would lead to an increase in food security and dietary diversity. I also predicted that agency would be the highest for those in the highest economic group. I expected agency, food security, and dietary diversity to be lower in the rainy season regardless of the wealth group. Not every category aligned with these predictions, which I explore below.

Agency and Food Security

Agency score was a statistically significant predictor for food insecurity score. They were negatively correlated. This means that when agency goes up, food insecurity goes down, as shown in the trendlines below. Furthermore, while the correlation between these factors fluctuated across seasons, they were still moderately to strongly correlated. Table 5.3 shows both the correlation and variance for each regression analysis across each season. The strength of the correlation was much higher during the rainy season.

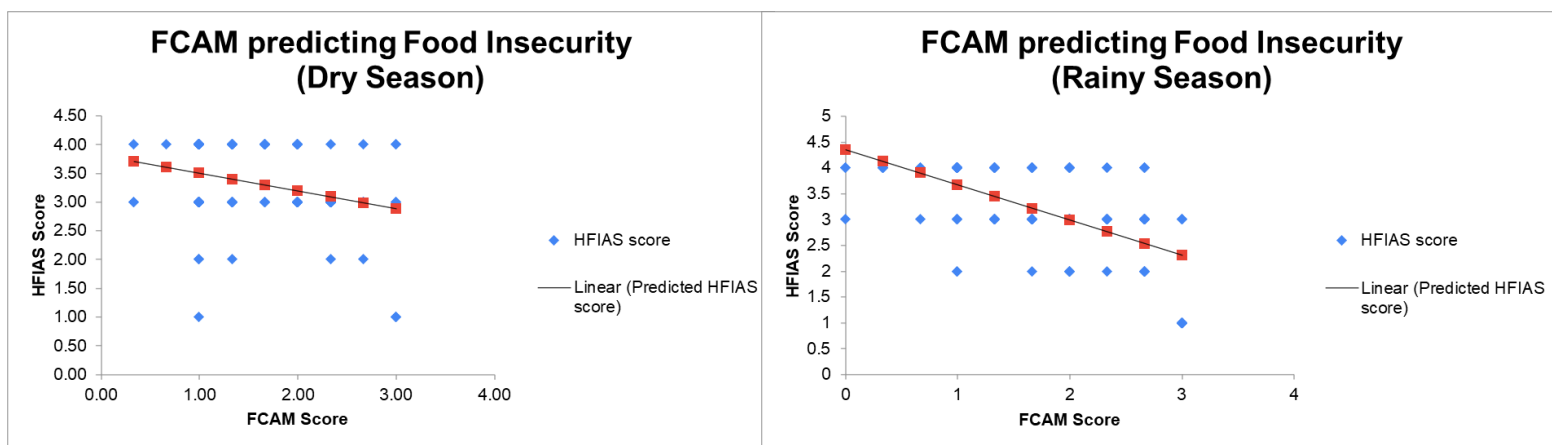


Figure 5.3: FCAM predicting Food Insecurity across Seasons

	Dry Season	Rainy Season
Correlation	29%	61%
Variance	9%	37%

Table 5.3: HFIAS Regression Summary

This result is particularly interesting to me. Now, part of these results may have to do with the design of the agency score itself. The questions used to derive the agency score were taken from the survey used to calculate the food insecurity score so at least some correlation is expected. The strength of it is what is particularly interesting to me. When I looked at the subindexes of the agency score to try and determine why, I saw that worry typically went down during the dry season, but preference was more likely to be met during the rainy season. It seems that the subindexes almost work “against” each other in determining a composite. Because I had to conduct this research remotely, I cannot say for sure that women felt their preferences were more likely to be met during the rainy season; however, that is what the subindexes seem to indicate. Because there is such a strong difference between seasons here, that leads me to believe that meeting these preferences has a significant positive impact on increasing feelings of agency.

During the dry season, which is just after the harvest, there was both higher agency and food security, which I expected given that families would in theory have both more food and disposable income to acquire food, ultimately increasing their access to food they prefer. The correlation during the rainy season was much stronger. I believe that despite increased access to preferred foods, worry increased enough to outweigh the higher representation of preferred food in the scale, leading to an overall decrease in the agency scores.⁵ Food security also decreased during this season. However, what really surprised me was the strong rate of decline. Part of this may be explained by the overlap in HFIAS and FCAM questions. Despite some overlap in the surveys, the correlation is not absolute, which is where understanding other aspects of food security become necessary. Agency alone cannot determine food security, but we can see here that it predicts a significant portion of it in this case.

Agency and Wealth Group

⁵ Again, worry only accounts for 33% of the composite; whereas preference is 66%.

While the wealth group categorization had the weakest correlation⁶ and variances across the three variables, it was the most consistent with my hypothesis. The correlation between economic groups and the agency scores were higher during the rainy season, positively correlated during each season, and were statistically significant⁷. The slope on the charts below is negative because high income is given the lower number, so as the agency score increases, the income group does too. While this seems counterintuitive, this is just a limitation of the data I had and its categorization. Essentially, as income goes down, so does agency score.

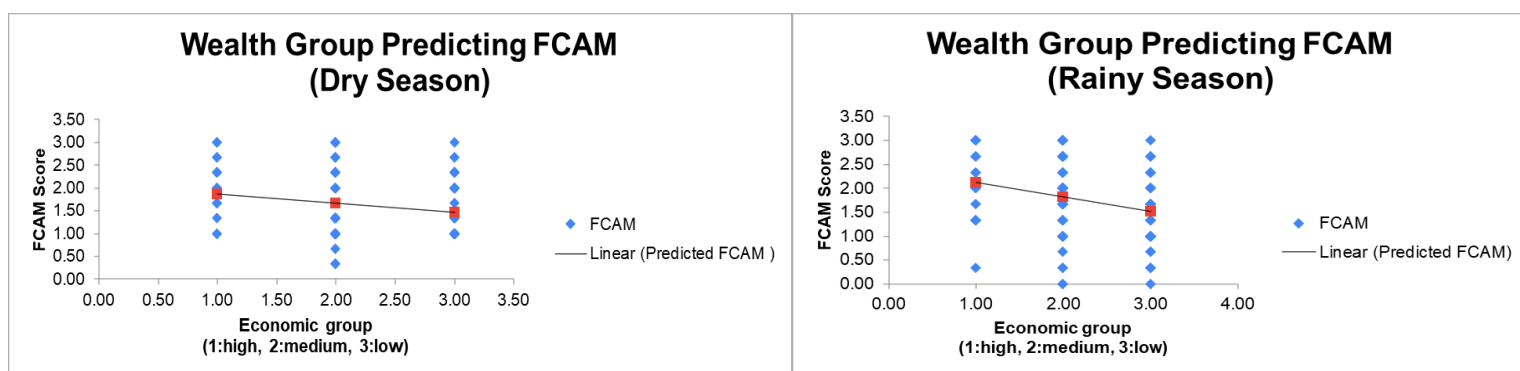


Figure 5.4: Wealth Group predicting FCAM across Season

As for the strength of correlations and variances themselves, they were, again, stronger during the rainy, hungry season, as shown in the table below. The movement across seasons was consistent with what I expected.

<i>Wealth Group</i> → <i>FCAM</i> <i>Regression Summary</i>	Dry Season	Rainy Season
Correlation	20%	27%
Variance	4%	7%

Table 5.4: Wealth Group predicting FCAM Regression Summary

During the rainy season, when grain was depleting, I believed that an individual would feel their lack of wealth more acutely, causing worry to increase and preference to decrease. I

⁶Dry season r-value: 0.042; rainy season r-value: 0.071

⁷Dry season significance stat: 0.019; rainy season significance stat: 0.002

compare this to families living paycheck to paycheck feeling more financial pressure at the end of the month. This means agency scores would decrease overall, especially for poorer women, which the statistics here reflect. This was also true for the results from the dry season. While an individual's wealth group did not shift up during harvest season, their access to both income and food was higher during this time. As I expected, the correlation between agency score and wealth group was positive during this season, and the intensity of the correlation, or lack thereof, indicates the apparent preference for food available during the dry season and decrease in worry relating to seasonal income, rather than the wealth categories individuals fell into. There were several exceptions, explored further in the case study section; however, it is important to note that a higher wealth group does not always bluntly correlate with higher agency, which contradicts my hypothesis.

Agency and Dietary Diversity

This aspect of the study had some of the most interesting results. They were also the most unexpected. Dietary diversity and agency score have moderate to strong positive correlations across both seasons. This means that as dietary diversity goes up so does agency. These results were not at all what I expected. While I do not have more specific data related to preference, I would have expected the worry scores during the rainy season to be linked to a lack of preference being met; however, with higher instances of foraging in the rainy season, this may explain why both preference and worry was higher. There would be more worry about needing to acquire food each day, but it also seems that they prefer the foods available during the rainy season. Ultimately, I think this expectation is a result of the limitations I had when conducting this research. It is not clear to me whether there is preference for food that is traditionally in bloom or foraged during the rainy season or foods that can be acquired at the market but would

require more income to obtain. That said, the variance followed a similar pattern. Again, both the correlation and variance increased in the rainy season.

Figure 5.5: Dietary Diversity prediction FCAM across Season

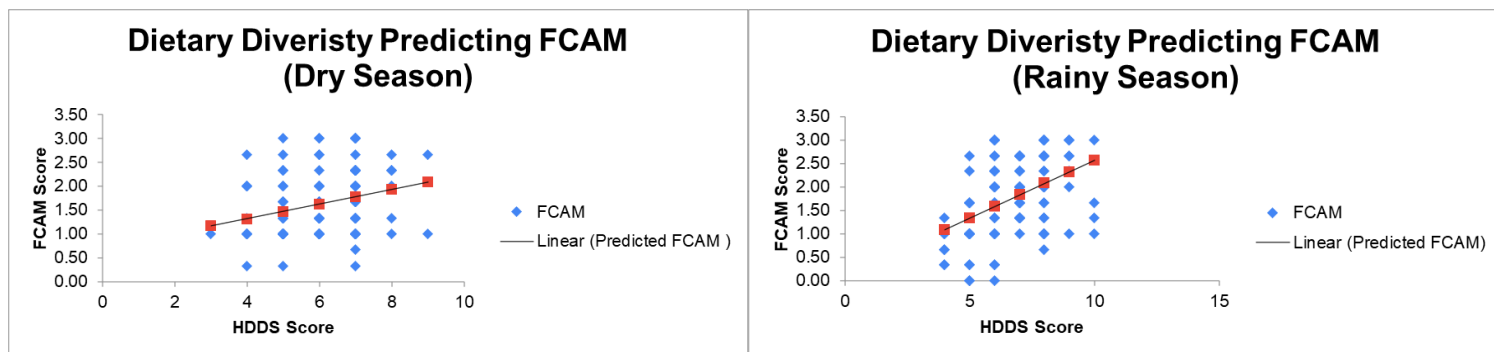


Table 5.5: HDDS predicting FCAM Summary Table

<i>HDDS</i> → <i>FCAM</i> Regression Summary	Dry Season	Rainy Season
Correlation	28%	45%
Variance	7%	20%

The subscores of the agency metric reveal even more interesting details about these results. When we examine the agency score more closely, it is interesting to note that both the preference and worry subindexes went up during the rainy season. Despite the way the subindexes seemed to work “against” each other during the two seasons, they can be explained by the food acquisition practices we see during the rainy season in particular. Agency is at its lowest during the wet season, when dietary diversity is at its highest. Dietary diversity is so high during this time because the rains result in the flourishing of much local flora. This, in turn, results in a lot of foraging and therefore higher dietary diversity, but it also indicates a high degree of worry. Even though these foraged food seem to meet the preferences of individuals who rely on it, this does not alleviate worry. Considering the dry season, there are more grains so

dietary diversity decreases, but overall there is less worry. The increased income also results in access to preferred foods from the market, although apparently not to the same extent as foraged foods. Preferences related to foods at market versus food in the wild are explored further in the case study section.

This finding itself is also very fascinating. Preference being met more during the rainy season calls assumptions about the nutrition transition into question. Part of the nutrition transition describes the shift in food and drink consumption as it coincides with economic changes (Drewnowski and Popkin, 1997). The phrase is often used for the transition in developing countries from traditional diets to more Western patterns of consumption, with diets higher in sugars, fat, and processed foods (Drewnowski and Popkin, 1997). In this instance we saw a preference for the more traditional, foraged foods. Now, it is important to note that because I was unable to conduct the interviews I am not sure if the participants were responding with seasonal variation in mind, accounting for the different seasonal menus--so to speak--but the subindex related to preference indicate that individuals would rather consume traditional foods, even in the face of increasing worry.

Discussion

The results introduce even more questions related to the utility and pragmatism of measuring agency. On one hand, it illuminates how this dimension can assist in making our understanding of food security more comprehensive, on the other it calls into question previous assumptions about wealth and food acquisition. While the baseline interviews did not include data on financial literacy, the correlation demonstrated above is consistent with findings related to higher income not necessarily correlating with every aspect related to food security. While it seems that increased income alleviated worry, that does not account for the apparent preference for non-purchased foods typically not purchased seemed to be preferred. While these other

studies had survey data built on financial literacy, the results in this case highlight that there are other factors at play beyond wealth which confound food security (Carman & Zamarro, 2016). These results do demonstrate that it is feasible to measure agency by breaking it down into preference and worry; however, it does raise questions about what other aspects of agency to include in the future, especially in light of the way these subindexes work “against” each other during some calculations.

In the meantime, these results demonstrate that agency is positively correlated with dietary diversity scores and increased income, indicating that it can add an extra dimension to our understanding of these food systems. Given that it was negatively correlated with the food insecurity score, meaning increased agency resulted in increased food security, agency does apparently have a distinct relationship to food security and food systems. Seeing as agency does not exist in a vacuum, keeping it in conversation with other aspects of food security would further elucidate this complex topic. I would be interested to see how the agency score correlates with other aspects of food security such as access and stability. I imagine that stability is correlated with the subindex of worry, but I would need to find a way to compare indicators in order to explore this further.

Chapter Six: Case Studies

This chapter explores more deeply nine individual case studies meant to demonstrate the particular nuances present for each woman. It reconciles and explains some of the patterns seen across the larger study population by engaging with the specific foods eaten. The chapter also considers how economic circumstances across each season affect the corresponding scores for the individual women. I also look closer at the details concerning food preparation and the repetition of certain meals alongside food acquisition techniques and how these factors play into each individual's agency scores. In some cases, more data would have been useful, however, due

to the COVID-19 pandemic, such data was often unattainable. In those cases, I relied on other patterns of food consumption and acquisition, and unless noted otherwise in the interviews, assumed the individual was following her peers' practices.

In order to understand the results of the case studies, some background related to traditional food consumption patterns is necessary. For the women in this study, a typical noon or evening meal would consist of some kind of grain or starch (typically maize, sorghum, or rice), which contained the macronutrients necessary for the day, and a sauce, packed with more substantial foods like vegetables and nuts, all rich in micronutrients (e.g., baobab leaves, peanut butter, hibiscus leaves, fish meal). Within the family, the men are largely expected to provide the staple grain, which can include anything from corn to maize to millet to sorghum (Morgan & Moseley, 2020). Although these case studies take place within a rice-cultivation project, rice is not typically eaten regularly. Sometimes, it is eaten on market days, by the rich, or for a special celebration such as a wedding (rice is eaten more regularly in urban areas). Besides grains, men are also responsible for providing meat for the household. This is largely chicken or fish, which can be fresh, dried, or crushed into a powder for flavour.

The women are responsible for the sauce. Whether they forage, grow, or purchase those ingredients varies. Common sauce ingredients include peanuts, cow peas, baobab leaves, and cultivated or foraged vegetables like tomatoes. These meals largely consist of toh⁸ served with a sauce. Tea and coffee may be consumed throughout the day (although mostly in the morning) or alongside meals, but for the most part, water is the dominant beverage. Western foods and beverages are also beginning to influence the traditional meals eaten. While many of these foods reduce cost and taste better, they often lack nutritional value. For example, magi⁹ bouillon cube

⁸ Toh is the typical staple dish prepared through boiling of grain flour that results in stiff porridge or polenta. It is the staple, starchy main dish and almost always eaten with a sauce.

⁹ Magi is similar to bullion cubes. It is cheap and contains Monosodium glutamate. Because of its price and flavour, it is beginning to replace traditional ingredients, resulting in a loss of nutritional value for the sake of taste.

(mentioned throughout the case studies below) is added to many sauces. These kinds of foods are often bought at the market to supplement the flavour of foraged and grown foods. Additionally, some ingredients are easier to prepare or add to recipes. Magi, for example, is a seasoning packet that is simply easier to include in a sauce, especially compared to something like soumbala, which requires hours of foraging, fermenting, and processing to develop the desired flavour.

Understanding how staple and newly introduced foods are produced and consumed reveals more insight into how acquisition and consumption especially play into the food security of communities and individuals (Servin, 2021). As many individuals in this case study rely on a mixture of purchased, foraged, and grown foods in order to prepare their meals, the variety of acquisition techniques, as well as seasonal variability, can greatly affect an individual's food security. My hope is that these case studies will show how integrating agency as a factor of analysis in local food systems will illuminate aspects of increased insecurity.

The aim of this section is to see how agency can increase our understanding of food security and how it manifests itself in terms of food security and dietary diversity. To do this, I explore nine case studies of individuals, each meant to consider different facets of my test groups and how the variables interact with each other. In this section, I break down my case studies into three sections; I first consider those with the highest agency scores, then the medium agency scores, and lastly the lowest. Within these groups, I have a woman representing each wealth group. My goal is to understand how income, dietary diversity, food insecurity, and agency variables compound and fluctuate across seasons. The two tables below show which of the food categories each of the case studies ate within. For example, every woman ate cereals on both days in both seasons; therefore, cereal has a value of nine in each season, whereas, only one woman ate "other fruits" in the dry season, three of them ate other fruits in the wet season and so on.

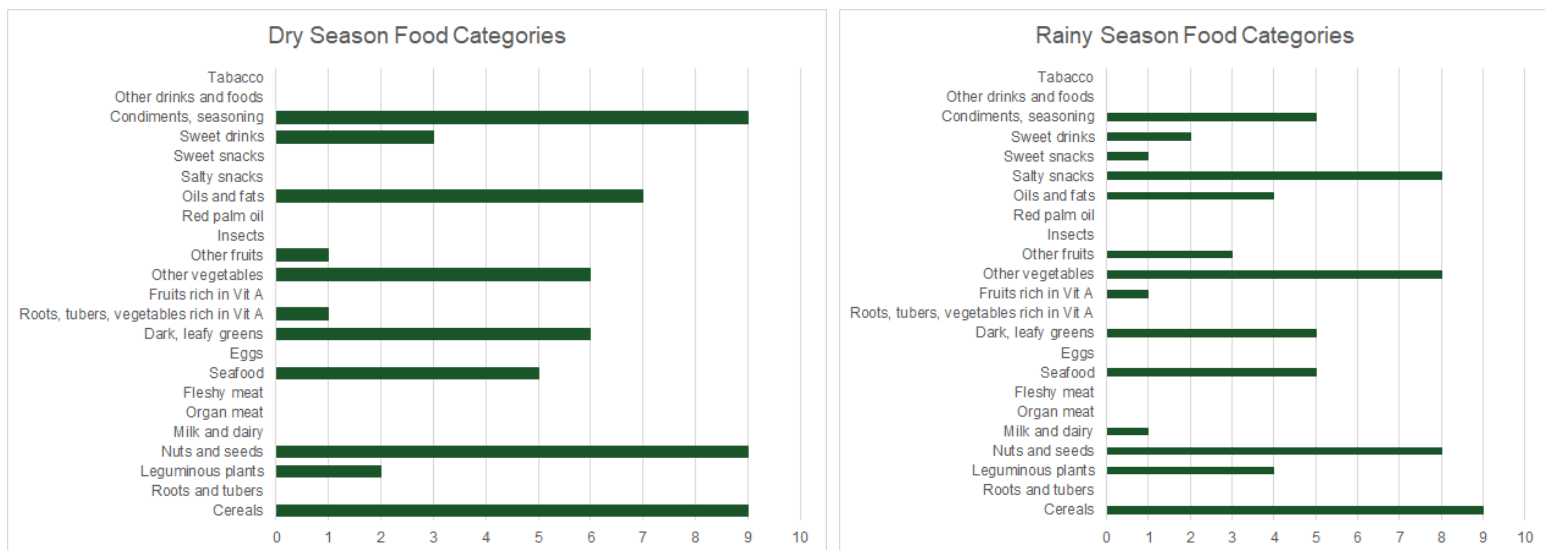


Figure 6.1: Food Categories across Season

These charts show the consumption of certain foods in each category and during each season among the nine case studies below. The charts also show exactly what could be expected: cereals being consumed by all nine women across both seasons and fruit and legume consumption increasing in the wet season, which is also when preference is met more. This aligns with my expectation that foraging is more common during the rainy season as plants are consumed more easily when in bloom. More seasoning, which is often bought at the market when income is higher post-harvest, was consumed in the dry season. Seafood was eaten evenly across both seasons; however, the individuals who consumed seafood were different across seasons. The presence of snacks, salty and sweet, was more common in the rainy season, when diets may be supplemented by more processed foods from the markets. One of the more surprising results is that one woman, Yasmine, did not eat nuts and seeds during the day of study during the wet season. Yasmine’s case (high agency and low income) is explored further below.

These tables also demonstrate which food categories were rarely eaten from—if at all. Within the nine case studies, none of the women ate eggs or used any tabacco during either season. In the entire data set, there were only a few instances of egg consumption. While several

had chickens or guinea fowl, most did not eat the eggs, instead choosing to keep them to be hatched. This also rang true for milk and dairy products. Much of this phenomenon has to do with the high cost of these specific foods and the lack of livestock maintenance among the women in the study. While almost all of these women practiced some form of horticulture, very few of them had any livestock, let alone the resulting products. For most of them, agriculture consists of plant production, which is reflected in their diets and the food categories they ate in.

Table 6.1: Case Study Score Summary

	FCAM Score Dry ¹⁰	FCAM Score Wet	Food Security Score Dry ¹¹	Food Security Score Wet	Dietary Diversity Score Dry ¹²	Dietary Diversity Score Wet
Miriam (High agency, High income)	3	3	1	3	6	10
Awa (High agency, Medium income)	3	3	1	3	7	7
Yasmine (High agency; Low income)	3	2	3	4	7	9
Aida (Medium agency, High income)	2.33	2.33	3	2	7	5
Aminata (Medium agency, Medium income)	2.33	2.67	3	3	8	8
Fatim (Medium agency, Low income)	2.33	2.33	3	3	8	8
Hema (Low agency, High income)	.33	.33	4	4	4	4
Kadi (Low agency, Medium income)	.33	.33	4	4	4	4
Toné (Low agency, Low income)	2	.33	4	4	1	3

¹⁰ The possible range of scores is 0 to 3, where 3 is high agency and 0 is low agency. The range of scores is as follows: 0-1.5 is low agency, 1.5-2.5 is medium agency, and 2.5-3 is high agency.

¹¹ The possible range of scores for the HFIAS is 1-4 where, where 1 is high food security and 4 is high food insecurity.

¹² The range of scores in the HDDS is 1 to 12 where 1 is low dietary diversity and 12 is high.

There were many reasons I chose these particular case studies, but the primary reason is I knew I wanted to consider who had the highest and lowest agency scores and why. As I ran the calculations, I was surprised to find that the wealth group was a relatively weak predictor of agency score. This led me to consider individuals within each of these respective categories (high agency & high income, high agency & medium income, high agency & low income, etc.). It is also interesting to note that agency scores changed with each season. Therefore, I opted to consider each woman's scores for a whole year, as their dietary diversity and food security also fluctuate with season.

High Agency

High Income: Miriam

Miriam is an upper income individual with no co-wives. She lives in Saki and prepares all the food for her household by herself daily. Miriam had the highest possible agency score across both seasons (scored a 3) as well as relatively high dietary diversity scores across both seasons (6 in the dry season and 10 in the wet). Her food security score was higher in the dry season, so she fits into the observed pattern of security decreasing during the wet season, while diversity grows conversely. The stability of her agency reflects that access to income helps minimize worry. It also appears that her preferences are being met across both seasons, leading to these consistently high agency scores. She is the only individual in the high income group to score the highest possible score of 3 across both seasons, which is why I picked her for analysis.

The table below—and throughout the rest of the case studies—show the dietary diversity of food groups eaten in over the example days in both the dry and rainy seasons. They do not show every food from each category over each season, rather, just on an example day. Although this is not what she ate every day, it provides a helpful snapshot into her daily nutrition.

During the dry season, she had coffee with sugar and bread for breakfast. For lunch, she had corn toh with hibiscus sauce with onion, tomatoes, and soumbala¹³, cooked with cotton oil¹⁴

and seasoned with salt. For dinner, she had spaghetti with tomato sauce, again cooked in oil and seasoned with salt and magi.

During the wet season, she reported eating rice with a peanut butter sauce containing onion and smoked fish¹⁵, seasoned with salt and magi, and drinking coffee with sugar for breakfast. For lunch, she had corn toh with baobab¹⁶ sauce, containing onion, soumbala, magi, salt, and fish powder. She ate some shea fruit¹⁷ as a snack, which is often foraged. Lastly, for dinner, she had fatty rice, which had onion, fresh fish and cabbage, and

Miriam (High Agency, High Income)		
	Dry	Wet
Cereals	Bread, corn toh, spaghetti	Rice, corn toh
Vegetables and roots rich in vitamin A	Tomatoes	
Roots and tubers		
Dark, leafy greens		Baobab sauce, cabbage
Other vegetables	Hibiscus, onion	Onion
Fruits rich in vitamin A		
Other fruits		Shea fruit
Giblets		
Fleshy meat		
Eggs		
Fish		Smoked fish, fish powder, fresh fish
Legumes, nuts, seeds	Soumbala	Peanut butter, soumbala
Milk and dairy		
Oil and fats	Cotton oil	Cotton oil
Sugar	Sugar	Sugar
Drinks, spices, condiments	Coffee, salt, magi	Coffee, salt, magi
Other foods, drinks		
Eat outside house		
HDDS	6	10
HFIAS	1	3
FCAM	3	3

Table 6.2: High Agency & High Income Food Groups

¹³ A fermented seed condiment, these seeds come from nere trees. They are foraged and then fermented for several days in a very labour intensive process. Poorer women will often sell batches at the market.

¹⁴ Cooking oil derived from the seeds of cotton.

¹⁵ Being a landlocked country, fish is often caught, dried and then sold at the market. Sometimes it is smoked before or rather than being dried and ground into a powder.

¹⁶ Plant with edible leaves, roots, fruit, and seeds rich in fiber and other micronutrients. Often foraged.

¹⁷ Largely foraged, this fruit has a rich pulp surrounding an inner kernel that can be eaten raw or cooked.

was seasoned with magi and soumbala. The presence of pasta and rice in her diet, as well as magi in her sauces, are typical of women with higher incomes.

Considering the differences between what she ate on the two days above, it is clear that she had a higher dietary diversity in the wet season, as expected. The food that increased her diversity was likely foraged (Servin, 2021). Additionally, based upon her agency scores, she frequently reported eating what she wanted when she wanted. She did not report having to eat anything she did not want. Even during the hungry season, her worry levels remained low, so she demonstrated very high agency across both seasons. As her scores are consistent across both subindexes, I believe that she is consistently able to meet her preferences with relatively low stress. When considering these results based on her food security scores, it is interesting to note that she was less food secure during the hungry season; however, she did not feel like this impacted her agency levels, and, based upon the other interview and survey data, attributes this insecurity to the inaccessibility of certain foods.

Medium Income: Awa

In the medium income group, Awa has a high agency score. She prepares most of the food for both herself and her family. She had very high agency in both seasons, with a score of 3 in both. As above, her level of agency appears to remain the same season to season, making her case interesting to investigate. She had relatively high food security during the dry season and lower during the rainy season, scoring a 1 and 3 respectively on the food security surveys. As we saw above, it is interesting to note that her scores were the inverse of most of the women, making her an interesting case study to explore. Her dietary diversity scores were consistent 7's across both seasons, but the actual food she ate did vary with each season.

Awa had cereal, multiple kinds of vegetables, fish, nuts and/or seeds, spices, oil and/or fat over the course of a day in both seasons. In the dry season, she had dark leafy greens and

different condiments. In the wet season, she had fruits rich in vitamin A, leguminous vegetables, and salty snacks. During the dry season, she described having rice with sesame sauce, fish, tomatoes, onions, and salt for breakfast, the same meal for lunch, and corn toh with cabbage sauce, peanut butter, dry fish, tomatoes, and salt for dinner. In the wet season, her day started with rice with a peanut butter sauce containing eggplants, onion, fresh fish, and salt. Again, she ate the same thing for lunch. For dinner, she described a corn toh dish with a hibiscus¹⁸ sauce, containing soubala, onion, dry fish powder, salt, and oil. For an afternoon snack, *Categories* mango, she had which was likely foraged.

Awa (High Agency, Medium Income)		
	Dry	Wet
Cereals	Rice, corn toh	Rice, corn toh
Vegetables and roots rich in vitamin A	Tomato	
Roots and tubers		
Dark, leafy greens	Cabbage	
Other vegetables	Onion	Eggplant, onion, hibiscus
Fruits rich in vitamin A		Mango
Other fruits		
Giblets		
Fleshy meat		
Eggs		
Fish	Fresh and dry fish	Fresh fish
Legumes, nuts, seeds	Sesame, peanut butter	Peanut butter, soubala
Milk and dairy		
Oil and fats		Oil
Sugar		
Drinks, spices, condiments	Salt	
Other foods, drinks		
Eat outside house		
HDDS	7	7
HFIAS	1	3
FCAM	3	3

Table 6.3: High Agency & Low Income Food

Awa’s case is interesting because she is one of the few participants to eat fish in both seasons. She is also relatively unique in that she reported eating the same dish for two meals; however, when considering the degree of food preparation she has to do, this is less surprising. In analysing her scores to see why she did not follow the trendline, the subindexes of her agency score revealed that she was eating what she wanted with little worry, similarly to Miriam. The

¹⁸ The bright magenta flower is often eaten in sauces and contains many micronutrients to supplement diets. It can also be eaten raw or boiled in tea.

only difference between their scores across seasons is the dietary diversity score. In the dry season, the wealthier individual, Miriam’s dietary diversity score is one less than Awa. While they both foraged, it appears that several of the ingredients Miriam used were purchased as opposed to Awa’s foraged ingredients.

Low Income: Yasmine

Yasmine is the only individual in the low income classification with a high agency score, making her case study especially relevant. Understanding why her scores are high may shed

some light on useful adaptations to seasonal variation and food security concerns. It is also important to note that her agency score in the wet season was medium, showing just how precarious this metric can be. Yasmine is an apparent exception to the wealth group indicator as the only woman with a high agency score in the low income bracket. She scored a 3 and 2 in the dry and wet season respectively. In the dry season, she was more food secure with a 3, and in the wet season, her score increased to 4, as I would expect. Her dietary diversity scores also followed the expected trendlines, going from a 7 to a 9 in dry and wet respectively.

Yasmine (High Agency, Low Income)		
	Dry	Wet
Cereals	Corn toh, rice	Corn toh, rice
Vegetables and roots rich in vitamin A	Tomatoes	
Roots and tubers		
Dark, leafy greens	Cabbage	Baobab
Other vegetables	Sorrel, onion,	Hibiscus
Fruits rich in vitamin A		
Other fruits		
Giblets		
Fleshy meat		
Eggs		
Fish	Dry fish, smoked fish	Dry fish, fresh fish
Legumes, nuts, seeds	Peanut butter	Soumbala, peanut butter
Milk and dairy		
Oil and fats	Oil	Cotton oil
Sugar		
Drinks, spices, condiments	Salt	Salt, potasse
Other foods, drinks		
Eat outside house		
HDDS	7	9
HFIAS	3	4
FCAM	3	2

Aside from the

Table 6.4: High Agency & Low Income Food Categories

high agency categorization, Yasmine follows the trendline closely.

While her whole household's information was unavailable, the food preparation questions indicated that there were multiple women in the household, each preparing food for themselves. In a typical day of eating during the dry season, Yasmine had leftover corn toh with tomatoes, peanut butter, dry fish, salt, and sorrel¹⁹ for breakfast. For lunch, she had something very similar: corn toh with tomatoes, peanut butter, dry fish, and sorrel again. Her dinners consisted of rice with a cabbage sauce containing onion, smoked fish, salt, and oil. During the wet season, Yasmine had corn toh with a baobab sauce, containing soumbala, dry fish, and salt for breakfast. She had rice with hibiscus sauce containing peanut butter, onion, soumbala, fish, and salt for lunch. Lastly, for dinner, she had corn toh with a hibiscus sauce again; however, this sauce had fish, potasse, soumbala, fish, and cotton oil in it.

Yasmine's scores in tandem with her meal descriptions highlight the inequality present among those with less income. Her food categories changed only during the wet season when she was foraging more. Additionally, her agency score itself dropped during the hungry season. Considering her subindex scores, she was more worried during the hungry season as expected, but she also was frequently not eating what she wanted : more than 10 times in the past and having to eat what she did not want a few times that month. Part of the decrease in her agency levels can be explained largely by her preferences not being met during the rainy season and her worry score increasing slightly.

Medium Agency

High Income: Aida

Moving onto those who had medium agency scores, Aida is in the medium bracket but has a high income. She prepares food for her children without rotation; however, sometimes her

¹⁹ A lemony herb that was likely foraged.

daughters help if appropriate. She scored a 2.33 in both seasons on the agency metric, with her subindexes remaining the same across each season. During the wet season, however, her food security was lower. The survey data shows that she sold less rice during that season, leading to a worsened economic situation. Surprisingly, her dietary diversity was higher during the dry season; however, when considering her circumstances, including declining rice sales and her economic situation, this is less surprising.

The food groups she ate from were lower than her counterparts with higher agency scores. She had cereal, other vegetables, nuts and/or seeds, and spices during both seasons. During the dry season, she also had fish, oil and/or fat, and sugary, sweet drinks, and in the wet season, she ate salty snacks. When it came to typical day of eating, she had millet porridge with sugar for breakfast, corn toh with a black plum leaf sauce containing peanut butter, dry fish, soumabal, and salt, served with bissop juice²⁰ for lunch.

Aida (Medium Agency, High Income)		
	Dry	Wet
Cereals	Millet porridge, corn toh	Corn toh
Vegetables and roots rich in vitamin A	Tomatoes	
Roots and tubers		
Dark, leafy greens	Black plum leaves, lettuce	
Other vegetables	Onion	Onion
Fruits rich in vitamin A		
Other fruits	Bissop juice	Hibiscus
Giblets		
Fleshy meat		
Eggs		
Fish	Dry fish	
Legumes, nuts, seeds	Peanut butter, soumabala	Soumabala
Milk and dairy		
Oil and fats	Cotton oil	
Sugar	Sugar	
Drinks, spices, condiments	Salt	Salt, potasse, magi
Other foods, drinks		
Eat outside house		
HDHS	7	5
HFIAS	3	2
FCAM	2.33	2.33

Table 6.5: Medium Agency & High Income Food Categories

²⁰ A kind of hibiscus juice

Her dinner was more complicated; it consisted largely of what she had eaten for lunch and the makings of a salad. During the wet season, she had corn toh with a hibiscus sauce containing soumbala, magi seasoning, onion, salt, and potasse. Leftovers from breakfast served as her lunch, and dinner was the same meal but prepared freshly again.

Her worsening economic situation in the hungry season is made obvious by the lack of variety in her diet; however, her agency score shows that her preferences were being met to the same degree in each season, and her worry levels stayed the same. Aida is interesting because there appears to be some external factor affecting her movement away from the trendline, but that factor is not identifiable because of a lack of data. More details on her situation would be helpful in assessing how this impacts agency, but that is not available at this time.

Medium Income: Aminata

Our next case study, Aminata, had medium levels of agency and medium income. She did the food preparation by herself five days a week on rotation during the dry season, but had help from her co-wife in the wet season during her rotations. The kitchen is described as shared and women may cook outside of their rotation if they desire. Aminata's agency was higher in the dry season than the wet, scoring a 2.33 and a 2.67 respectively, following the pattern of the whole group. Her food insecurity and dietary diversity stayed relatively high, with a 3 and an 8, respectively, across both seasons. While these fluctuated less than expected, they were at the degree I expected for her wealth group and agency score classifications.

Her food categories align with what I would expect given the foraging practiced in the region. For breakfast during the dry season, she had rice porridge with shea butter. For lunch, she ate corn toh with a dried baobab sauce, soumbala, dried fish, salt, hot peppers, and potasse. For dinner, she had leftovers from lunch with an additional sesame sauce containing dried fish and

salt. She had cashew apples²¹ as snacks in the morning and afternoon. As a morning snack, she had bambara²² with shea butter. During the wet season, she ate corn toh with kirikiri²³ sauce containing peanut butter, magi, salt, and piment potasse, with wheat bread, and drank Lipton tea with sugar. For lunch, she had rice with a peanut butter sauce containing onion, magi, salt, and dry fish. Finally, for dinner she ate corn toh with baobab sauce, containing dry fish, magi, piment²⁴, onion, soumbalm salt, and potasse.

Aminata’s case is relatively unsurprising. Her scores and the foods she ate align well with what I would expect an individual in her position to experience. She has a high proportion of

foraged foods in her diet, which is reflected in her relatively high dietary diversity score as well as her worry subindex. Furthermore, her worry score increased during the rainy season, as we expect that someone would forage more during the hungry season. It is interesting to note that she preferred the food she ate in the wet seasons; her preference score was higher in the dry season, suggesting she was

Aminata (Medium Agency, Medium Income)		
	Dry	Wet
Cereals	Rice porridge, corn toh	Corn toh, wheat bread, rice
Vegetables and roots rich in vitamin A		
Roots and tubers		
Dark, leafy greens	Dried baobab leaves	Baobab
Other vegetables		Kirikiri, onion
Fruits rich in vitamin A		
Other fruits	Cashew apples	
Giblets		
Fleshy meat		
Eggs		
Fish	Dry fish	Dry fish
Legumes, nuts, seeds	Soumbala, sesame	Peanut butter, soumbala
Milk and dairy		
Oil and fats	Shea butter	Shea butter
Sugar		Sugar
Drinks, spices, condiments	Salt, hot peppers, potasse	Magi, salt, piment, potasse, Lipton tea
Other foods, drinks		
Eat outside house		
HDDS	8	8
HFIAS	3	3
FCAM	2.33	2.67

Table 6.6: Medium Agency & Medium Income Food Categories

²¹ The fruit which produces cashew nuts. It is highly perishable and often foraged.

²² Kind of pea native to Mali

²³ An edible weed

²⁴ Hot pepper, fresh or maybe ground spice

not able to eat what she wanted to as frequently during the dry season, like the majority of the study population.

Low Income: Fatim

Lastly, we have Fatim, who had medium agency scores and was in the lowest income bracket. She lives with her daughter who is also married, and both women prepare food for themselves and their children.

Fatim had higher agency in the dry season than the wet as I expected. Her food security was low and consistent across each season at a 2.33, and her dietary diversity was high and consistent with 8's across both seasons. Her agency score fluctuated along the trendline as expected.

Her food groups are of particular interest and part of the reason I chose her to represent her cohort. During both seasons, she ate cereal, other vegetables, oil and/or fat, nuts and/or seeds, and fish. In the dry season, she had

Fatim (Medium Agency, Low Income)		
	Dry	Wet
Cereals	Rice, corn toh	Millet porridge, rice, corn toh
Vegetables and roots rich in vitamin A	Tomato,	
Roots and tubers		
Dark, leafy greens	Cabbage, baobab leaves	
Other vegetables	Onion, zucchini	Hibiscus, onion, cow peas, cotton
Fruits rich in vitamin A		
Other fruits		
Giblets		
Fleshy meat		
Eggs		
Fish	Smoked fish	Dry fish
Legumes, nuts, seeds	Soumbala	Soumbala
Milk and dairy		Sugar
Oil and fats	Cotton oil	Cotton oil
Sugar		
Drinks, spices, condiments	Potasse, salt	
Other foods, drinks		
Eat outside house		
HDSD	8	8
HFIAS	3	3
FCAM	2.33	2.33

Table 6.7: Medium Agency & Low Income Food Categories

vegetables rich in vitamin A, dark leafy greens, spices, condiments, and roots and tubers, which was a rare food group throughout the study. This is not the only unique food category she fell into. During the wet season, she had leguminous plants, sweet snacks, and milk and/or dairy. The presence of roots and tubers, as well as milk and dairy is very interesting for this individual, especially since she is in the poorer economic bracket. I am curious where Fatim obtained these foods and how frequently she ate them, which I sadly do not have access to at this time.

A day of typical eating in the dry season included rice with a cabbage sauce containing onion, zucchini, tomato, smoked fish, and cotton oil. For lunch, she had corn toh with a dry baobab leaf sauce, soumbala, potasse, and salt. For dinner, she had what she ate for breakfast, although freshly prepared again. In the wet season, she had millet porridge with sugar and milk for breakfast, and rice with a hibiscus sauce containing onion, soumbala, cotton oil, and dry fish. For dinner, she had corn toh with the same hibiscus sauce as lunch. Cowpeas, cotton, and cotton oil made up her afternoon snack.

Fatim's food groups were fascinating in that she had some foods that very few other participants were consuming, especially those in the lower economic bracket. Further research would need to be conducted to understand why. As for her scores, they were consistent with her classification and followed the predicted trendline very well.

Low Agency

High Income: Hema

For the last agency classification, we have individuals who had low agency scores. The first of these is Hema, who had low agency but a high income. She scored a .33 in both seasons for agency. She also experienced high food insecurity, with a 4 in each season and had a less diverse diet, scoring another 4 across both seasons. Hema appears to be an exception to rich women, and she offers an interesting case study. It is important to note that the wealth group was

the weakest predictor of agency, so this is not too surprising. The consistency of the low scores is why I find this particular example worthy of investigation.

For food preparation, she had help from her daughter-in-law during the dry seasons and worked alone during the wet season. During both seasons she ate cereals, dark leafy greens,

legumes, nuts and/or seeds, and spices. During the dry season, the only additional foods were condiments, and during the wet, it was just a salty snack. We can already see a significant decrease in the number of food groups Hema is eating. Her daily eating habits also reflect this. For breakfast, lunch, and dinner in the dry season, she ate the same thing: corn toh and a dried baobab leaf sauce with soumbala and salt. During the wet season, her meals were also identical, although the baobab sauce was not from dried leaves, rather fresh ones, which I would expect to see during the rainy season when more plants

Hema (Low Agency, High Income)		
	Dry	Wet
Cereals	Corn toh	Corn toh, corn flour couscous
Vegetables and roots rich in vitamin A		
Roots and tubers		
Dark, leafy greens	Baobab leaves (dry)	Baobab leaves (fresh)
Other vegetables		
Fruits rich in vitamin A		
Other fruits		
Giblets		
Fleshy meat		
Eggs		
Fish		
Legumes, nuts, seeds	Soumbala	Soumbala
Milk and dairy		
Oil and fats		
Sugar		
Drinks, spices, condiments	Salt	Salt
Other foods, drinks		
Eat outside house		
HDDS	4	4
HFIAS	4	4
FCAM	.33	.33

Table 6.8: Low Agency & High Income Food Categories

are available for foraging. One interview noted that she had corn flour couscous instead of corn toh sometimes.

Hema's food consumption reflects potential issues related to food security. Given the low degree of agency, it is possible that one of the factors affecting her food insecurity is her lack of agency itself. Her subindexes indicate the highest possible degree of worry and a complete lack of preference. She reported not eating the foods she wanted and even eating foods she disliked frequently due to lack of resources. While I cannot conclusively determine if this is because of her income level or some other factor, it is clear that for some reason she is suffering from lower agency, food security, and dietary diversity. I would assume that if her food preferences were met, her dietary diversity would go up, as she would probably not be eating the same dish for each meal everyday. Additionally, her high worry score indicated that she is feeling the pressure of food insecurity and concerned that she or her family will go hungry.

Medium Income: Kadi

Our next case study concerns Kadi, a medium income individual with a low agency score. She does all of the food preparation by herself. Kadi also had consistently low agency, food security, and dietary diversity. She scored a .33 for agency and 4's in food security and dietary diversity in the dry and rainy season. Her stagnant numbers may be indicative of something else related to income fluctuation or a lack thereof or some other external factors that have not been identified yet.

Similar to Hema, Kadi did not have very many food categories. For breakfast during the dry season, she only had Lipton tea with sugar. For lunch and dinner, she had corn toh with a dry baobab leaf sauce, soumbala, salt, and potasse. During the wet season, she was able to actually eat breakfast, having corn toh with an okra sauce containing soumbala, onion, magi, salt, and potasse. For lunch, she had something very similar: again, there was corn toh, but the sauce was

baobab-based instead of okra. Beyond that, the seasonings were the same. For dinner, she had corn toh with a bean leaf sauce (the type of bean was not specified), containing salt, shea butter, peanut powder, and magi.

Kadi’s scores and food groups are consistent with many of the individuals with low agency scores. The correlation between dietary diversity and agency is consistent in this study. Her worry scores were at the maximum, both at 0. She was not eating the foods she preferred, again scoring 0’s during both seasons. However, she did not have as many foods that she did not like, as those scores were both 3 for each season.

Kadi (Low Agency, Medium Income)		
	Dry	Wet
Cereals	Corn toh	Corn toh
Vegetables and roots rich in vitamin A		
Roots and tubers		
Dark, leafy greens	Baobab leaves (dry)	Baobab, bean leaves
Other vegetables		Okra, onion
Fruits rich in vitamin A		
Other fruits		
Giblets		
Fleshy meat		
Eggs		
Fish		
Legumes, nuts, seeds	Soumbala	Peanut powder
Milk and dairy		
Oil and fats		Shea butter
Sugar	Sugar	
Drinks, spices, condiments	Lipton tea, salt, potasse	Magi, salt, potasse
Other foods, drinks		
Eat outside house		
HDDS	4	4
HFIAS	4	4
FCAM	.33	.33

Table 6.9: Low Agency & Medium Income Food Categorizations

This is consistent with what I would expect to see for many of the individuals represented by Kadi’s case study.

Low Income: Toné

The final case study I consider is that of Toné, who had low agency and was one of two individuals in the poorest economic bracket. Her food preparation cycle is every two days and she is one of three women in her household. Interestingly enough, her agency score during the dry season was 2, which is higher than Kadi, discussed above; however, she is one of the few

individuals to have a score of .33, which was during the wet season. This fluctuation is consistent with the trendline. As for her food security scores, she had a 4 during each season, and her dietary diversity scores were also low, with a 1 during the dry season and 3 during the wet season.

Her typical day of eating in the dry season started off with a breakfast of cowpeas with rice, salt, and vegetable oil. Her lunch was corn toh with a dried okra sauce constraining soubala, magi, salt, and potasse. Dinner was corn toh with a similar orka sauce, containing salt, magi, and

potasse. During the wet season, she had a millet porridge with something similar to lime (the name of the exact fruit was lost in translation). Lunch was beans, millet and salt, and dinner was corn toh with a hibiscus sauce and salt. For dinner, she had corn toh with a hibiscus sauce, seasoned with salt.

Toné’s case is consistent with what I expected to see across seasons and income bracket. Her subindexes reveal an interesting explanation for her agency scores. During the dry seasons, she had very little worry and was not eating what she wanted. However, during the wet season, she had a significantly higher worry score of three, the same as not getting a preferred food

Tone (Low Agency, Low Income)		
	Dry	Wet
Cereals	Rice, corn toh	Millet porridge, corn toh
Vegetables and roots rich in vitamin A		
Roots and tubers		
Dark, leafy greens		
Other vegetables	Cowpeas, okra (dry and fresh)	Hibiscus
Fruits rich in vitamin A		
Other fruits		Lime
Giblets		
Fleshy meat		
Eggs		
Fish		
Legumes, nuts, seeds		Beans
Milk and dairy		
Oil and fats	Vegetable oil	
Sugar		
Drinks, spices, condiments	Salt, magi, potasse	Salt
Other foods, drinks		
Eat outside house		
HDSD	1	3
HFIAS	4	4
FCAM	2	.33

Table 6.10: Low Agency & Low Income Food Categorization

score, and perhaps, most interestingly, a very high score of 0 for being forced to eat what she did not want. While it is not feasible to determine why this final subindex is so much higher in the wet season, I assume that what she enjoys is more available during the dry season, and when she is foraging during the wet season, other foods are not as appealing to her.

Discussion:

As I consider these case studies, especially in tandem with the results from the larger study, I realize that these case studies elucidate the impact of income on levels of worry. First, while wealth was only a moderate indicator mathematically, it was typically true that higher wealth indicated higher agency, as seen in the wealthy and even medium income individuals in the study. Only one woman in the low income group had a high agency score, and even then, her agency score was in the medium category during the wet season. Additionally, Hema²⁵ was one of two women who fell into this category, and she was one of the few women to repeat the same meals over the same day. That said, wealth does not explain everything.

What I found most interesting about these results was the role of worry, a subindex of the FCAM score. I am interested in exploring this concept further in the future, but for now, I can see that worry has the potential to dramatically affect the outcome of the agency questions. I am curious what factors would alleviate this. For example, does an increase in wealth alleviate worry? The case studies seem to suggest so. Since wealth in an increasingly monetized economy can provide greater certainty over when one's next meal is coming, food self-sufficiency in a subsistence economy relies heavily on money to increase security (Moseley, 2010). For the three women in the high income bracket, they all indicated low worry across their agency scores and if the scores decreased, it was linked to preference not being met. Again, there is a gap in the data here demonstrating their specific tastes, but the larger trends demonstrate that they prefer foods

²⁵ High agency and low income

acquired in the rainy season. This raises interesting questions about how preference does or does not change as wealth increases.

Another interesting piece of this puzzle is related to the role of preference when the preferred foods decrease dietary diversity. For example, magi, a seasoning substitute packed with MSG, is becoming commonplace seasoning, but it lacks many of the micronutrients found in traditional seasonings. That said, it tastes better for many of these women, and they prefer to use it. Understanding how always meeting preference could be detrimental to nutritional health complicates the role of total agency. On the other hand, many of these options, like magi, are cheaper and/or labour saving, which alleviate worry, as well as make more income available for other products.

Chapter Seven: Conclusion

This paper explored the feasibility of measuring agency as a dimension of food security. To do this, I first developed a metric from components of the HFIAS surveys, then applied it to a larger case study in Burkina Faso, and finally considered the implications on a smaller scale using nine individual case studies. This study was guided by three research questions:

- 1. How can including agency as a metric of food security transform our understanding of food security?*
- 2. How can we tangibly measure agency?*
- 3. How does agency influence food security and dietary diversity?*

I first found that including agency as a pillar of food security offers a more comprehensive understanding of it. Secondly, I confirm that it is possible to tangibly measure agency—and doing so has the potential to make known problems faced by marginalized populations in the ongoing conversation of local decision-making related to food consumption

and preparation. Lastly, I found that the correlation between dietary diversity, income and food security with individual agency illustrates how this phenomenon is intricately entangled with other factors at play in food systems, including but not limited to the variables explored in this paper. Furthermore, these correlations raise questions about contemporary development narratives and food security solutions.

While I explored my findings in depth in Chapters Five and Six, there are two important findings I want to return to here as I conclude. In the case of this first finding, I found that preference was met significantly more during the rainy season despite higher instances of scarcity and lower degrees of agency. Concerning the second, wealth was only weakly correlated with agency, raising questions about the efficacy of increasing income in order to produce more food security. Both of these results have significant impacts on the academic implications and policy recommendations associated with my work because they challenge the typical agricultural development solutions typically presented (Lam et al., 2021). Ultimately, they push forward the intrinsic value of integrating agency into food security by calling some international development programs and their motivations into question.

In understanding how agency manifests in food systems, we can begin to push policymakers to be more equitable, fair, and just. Agency is an essential component of food security that has been deprioritized for too long. Furthermore, using metrics for agency makes this dimension of food security more visible, helping policymakers better design programs that better account for the needs of marginalized groups. Agency is the ability to choose what to eat, when, and how that food is acquired. In enabling greater agency over food consumption and not only production, we can create the substantial change necessary to decrease food insecurity on a wide range of scales, by increasing individual input of food systems as whole, which would

integrate local and insider knowledge, ultimately increasing food security (Ibnouf, 2012; Kamwendo, 2017; Oniang'o, et al., 2006).

I learned that it is both possible and crucial to measure agency in the realm of consumption. First and foremost, I have demonstrated that agency over food consumption is ultimately quantifiable. In order to do this, I chose to prioritize preference and worry in defining agency. Despite philosophical arguments against measurement, the current socio-political climate makes a metric for agency almost necessary in order to protect the right. As such, I cannot eliminate this factor from my final understanding of how agency manifests itself and a lack of agency should be addressed. Returning to the stool metaphor from the introduction, creating FCAM allows us to make that leg of food security more visible, in the hope of creating a more reliable conception of food security.

Academic Implications

Scholars continue to debate whether or not we can feasibly integrate agency as a pillar of food security (Clapp et al. 2021). Furthermore, even if integrated, opponents to this idea question its utility (Lang & Barling, 2012). Another camp understands that agency is something to be upheld on moral principle and forcing it into a metric diminishes the complexity of it as a concept (Fouilleux et al., 2017). Ultimately, I conclude that agency should be included as a pillar of food security and there are reasonable ways to measure it. However, I understand the arguments put forth by those inherently opposed to metrics and sympathize with their thoughts, especially concerning the potential loss of nuance in reducing someone's agency down to a number (Fouilleux et al., 2017). I agree that in an ideal world, the need for metrics would dissolve; however, given this project and the other research I considered, I believe that this metric is the best way to integrate agency on the food security debate. Policymakers call for

metrics to justify funding food security programs and believe that it is ultimately the goal we all share: to alleviate hunger globally. For many, if something is not measurable, then it does not matter (Jones et al., 2013). FCAM produced results associated with preference being met more during times of scarcity. The very nature of this result has significant academic implications in that it questions previous assumptions about what indicates effective development methods. Furthermore, the fact that it contradicts previous academic assumptions deepens the implications of this study.

It is essential to recognize that agency is not static; no one solution will work (Ehlert & Voßemer, 2015). As seen in the literature on agency and in my own results, agency fluctuates seasonally, meaning that the female farmers interviewed felt more in control of their food supply and choices during some times of the year as compared to others.. This is a critical aspect for understanding how agency should be strengthened (HLPE, 2020). The role of external factors and the ensuing variability is related to the other important academic implications of this research. Agency is deeply entangled with a plethora of external factors and cannot be isolated (Manley & Leynseele, 2019). As shown in this study, dietary diversity, income, and seasonal variation all affected how agency manifested itself in food systems meaning that the fluid and entwined nature of agency cannot be ignored. Both the changing and entangled nature of agency contribute to its complexity in food systems (Schiavoni, 2016). This complexity must be quantified if we are going to establish more just food systems (Manley & Leynseele, 2019).

The typical pattern we see in the nutrition transition shows a preference for packaged and processed foods as income increases (Popkin 1993). However, we saw in this case that even those in the higher wealth category still had their preferences met more frequently during the rainy season when foraged foods were more available, suggesting that a taste for traditional

foods may be stickier than Popkin predicted (Popkin, 1993). To be more specific, one of the components of food consumption that this metric uncovered was that food preference was met more frequently during the rainy season when food security is generally worse. This is a somewhat paradoxical finding. Nutrition transition theory posits that as income increases, people tend to consume more processed foods (Drewnowski and Popkin, 1997). Specifically, it considers the social shift in food acquisition and consumption within patterns of economic growth. It often refers to the shift from traditional diets to Western consumption habits in developing nations (Drewnowski and Popkin, 1997). This finding challenges present understandings of nutrition transition and calls assumptions about preference evolving with income into question (Drewnowski and Popkin, 1997). It appears that there was a preference for more traditional foods in general, even among wealthier groups. During the dry season, the ability of a woman to acquire food sufficient for survival is higher. Furthermore, her ability to acquire foods at the market as opposed to foods foraged from necessity are higher. For example, we see this with consumption of magi, which is a processed seasoning, but also likely more flavourful and labour-saving especially compared to traditional seasoning methods. However, beyond this seasoning, it was rare to see women eat foods in the salty and sweet snacks categories. It seems that most of the time, they were not eating processed or packaged foods, rather relying on foraged and grown foods to meet their preferences. The way preference is met more during the rainy season also raises some interesting questions about how income relates to preference and taste (Drewnowski, 1997).

Policy Recommendations

This leads me to my policy recommendations. In light of the low correlation between wealth and agency, increasing income alone is not the answer, which contradicts typical policy recommendations in the region (Lam et al., 2021). Typically, recommendations would call for

more agricultural production to increase what farmers can sell in order to accrue more income (Lam et al., 2021; Starr, 2019). The fragility of these models has been made clear in the face of COVID-19 ((Moseley & Battersby, 2020). The goal is to find a steady supply of healthy food, but income is not necessarily the only means of achieving that goal.

The final results concerning how wealth played into individual agency and the role agency has on nutrition were especially interesting to me and challenged my original expectations. This leads me to wonder what it was about their cases that created these circumstances. While I was unable to conduct this research in person and ask participants myself or see their livelihoods in situ, these results inform my thinking in two major ways. First, I wonder how the low correlation between wealth and agency should inform policy recommendations and implications. Second, it leads me to question whether higher agency will always result in good nutrition. These considerations both play into my ultimate recommendations and questions moving forward. As I consider these factors, I am also aware of the role traditional agriculture practices and development narratives have on these conditions (Moseley, 2017). On one hand, traditional practices sustained these populations until international intervention and climate change largely induced by the Global North forced them to re-adapt. Further complicating what may or may not work are the broader development narratives perpetuated by varying actors.

First, FCAM can and should be used as a test for development programs. While FCAM is not the be-all-end-all of agency metrics, it is one of the first metrics meant to measure agency over food consumption. I believe that it and other similar metrics need to be standardized and applied in other contexts. Given that FCAM is developed from standard questions asked in HFIAS surveys (which are applied all over the world), this metric could be calculated in any place HFIAS surveys are administered.

It is important to acknowledge here that the two subindexes of FCAM are often working against each other in this study. As worry is higher, so are instances of preference being met. On one hand, providing more income or money seemed to slightly alleviate worry pertaining to food systems in this case, but not as strongly as pushed for by proponents of the theory of change and advocates for the GR4A (Lam et al., 2021; Moseley & Ouedraogo, 2021; Starr, 2019). Opposed to their development narrative is not only the weak correlation, but also the fact that preference is apparently more difficult to meet even when access to income is increased.

Here, I chose to weight preference at 66% and worry only at 33%. If I were to do this again, I would want to weigh these variables at 50% each. Even in the rainy season, when preference was met more, the worry variable, accounting for only a third of the score, was able to trump the preference subindex and decrease agency scores over all. With that in mind, I chose to focus my recommendations on approaching worry first. Even with its lower weight, it is clear that feelings of worry trump one's preference when considering agency.

The Burkina Faso case study is based upon female farmers in the southwestern part of the country. Using this data to see if certain factors beyond season, wealth, and dietary diversity affect agency makes me question if these variables can further positively transform our understanding of food systems. In focusing on worry, increasing access to enough food should be the priority; although, it does not seem that increasing income is the most sure fire way of accomplishing this. Rather, it seems that increasing available food by optimizing farming programs for food not for market or export would be more effective at better ensuring accessible food. Rather, we need an agricultural development approach accessible to even the poor which involves decreasing purchased input. I believe that households will worry less and eat foods they prefer if they are actually growing gmo food crops that they want to eat themselves. The benefits

of development like this are twofold. On one hand, it decreases the likelihood of debt from purchasing expensive inputs, like seeds and fertilizers. It also increases their personal feelings of empowerment as they produce this food.

Now, I recognize that this approach requires adequate access to land they can farm in a sustainable way. This is where methods found within agroecology could become increasingly viable. Admittedly, they are the most appealing solution I have come across. It would allow households to produce food that they prefer and alleviate worry in a sustainable manner. Given that even wealthier individuals had a higher preference for foraged and traditional foods, agroecology methods could be the key to unlocking the agency question. That said, I still think it is a more appropriate response especially in light of the weak correlation between wealth and agency.

I believe that the answer is not as simple as providing more income or increasing purchasing power, an approach that would support the theory of change behind initiatives like the GR4A (Lam et al., 2021). Wealth's low correlation with increasing agency and in turn decreasing food insecurity calls into question previous assumptions about how we can combat food insecurity. Part of the GR4A theory of change relates to development being primarily associated with economic advancement and ultimately an increase in income (Lam et al., 2021; Starr, 2019). However, my findings seem to contradict this assumption. Increasing income was only weakly correlated with increasing agency. While wealth can alleviate some lack of agency, it does not account for nutritional needs and deficiencies or preference in this case. If the aim is to alleviate worry, I believe those policies could involve increasing income or the purchasing power of individuals and households, but this should not be the end-all solution, especially given the variability of markets. However, the interplay between agency and nutrition and agency and preference needs to be better understood before I can offer concrete policy recommendations.

related to appropriate food distribution policies or agricultural programs that could potentially meet these preferences.

Because of this, policies need to account for local perspectives and empower communities and demographics most in need of increased agency. Furthermore, the initiatives that may eventually stem from using this metric to gauge agency levels and expand them should account for nutritional and dietary needs so as to not just feed individuals what they want but what they need for a healthy lifestyle. Understanding agency in this way allows us to consider it as an ever-evolving concept permeating every aspect of individual life. When considering development initiatives, it is vital to minimize processes and programs that disenfranchise individuals broadly, but especially when it comes to something as fundamental as food consumption. With this in mind, I believe the next step to realizing global food security includes measuring agency tangibly and prioritizing, protecting, and expanding this right.

In light of these recommendations, I believe their implications are ultimately positive and will improve food security. This has been made abundantly clear especially in urban contexts where less expensive local grains and stabilizing the supply markets has had marked enhancements of food security (Moseley et al., 2010). Additionally, I believe programs that guarantee caloric needs are met would at least serve in alleviating worry, as seen in India's food security law (Sengupta & Mukhopadhyay, 2016). Taking agency more seriously by increasing avenues of empowerment is the key to protecting this vital aspect of food security. However, increasing income can only do so much for agency as a whole. As we saw, even when income was lower during the rainy season, their preference was more likely to be met, and based upon their HDDS scores, they had more nutritious diets because of the variety of plant material consumed.

Policies which increase access to preferred foods will need to account for nutritional needs if they are truly going to address unjust food systems (UN Goal 2: Zero Hunger, n.d.). Additionally, understanding the way socially constructed gender norms play out in human-environment interactions further informs this. The need for culturally sensitive and ecologically aware policies cannot be removed from this equation (Declaration of Nyéléni, 2007; Byrne, 2018). In the case of Burkina Faso, beyond simply throwing money at the problem, finding ways to increase access to preferred foods during the dry season and more desirable substitutes during the rainy season has the potential to meet food preferences and account for nutrition needs. This could potentially alleviate the worry we see increasing in the wet season, but it does not guarantee it. While the growing tendency for market-based solutions to poverty currently spearheads the process of agrarian modernization, this finding seems to suggest that it is not as impactful as once thought (Manley & Leynseele, 2019). Increased income does not necessarily equate to increased access so even if income were to remain stable or increase for these women across both seasons, it is not likely that this would produce the desired effects on the agency scores, unless the availability of those preferred foods also increased. How to increase those foods will vary case by case. It could be imports, more growing, or finding ample substitutes, such as magi; however, this ultimately highlights the significance of the low correlation between wealth and agency.

Moving Forward

Moving forward, I would be interested to see this method applied to other locations to first test the feasibility of the metric and then to compare the results across different regions of the world. The seasonal variance in this case had a statistically significant impact on the results and so I am hopeful that this method may be applied in other regions to see if that pattern carries

over or if it was unique to savanna zone rainfed farming. I call for integration and further codification of this pillar into food security literature and law. Only then can the gaps in food systems begin to be filled. What we are presently doing is not effective enough. This change is one that has the potential to make significant improvement to a broken system. Ultimately, I conclude that agency should be included as a pillar of food security because it has the potential to fill some of the gaps in our current understanding of food security. Furthermore, creating this metric, which measures agency over food consumption, has the potential to track change in individual agency over time in order to assess the efficacy of policies meant to increase agency and empowerment as well as find patterns in dietary variation, with the aim to determine what to target when alleviating food insecurity.

I would also like to see the metric applied to other demographics. For example, I would like to see how agency over food consumption plays out for different age groups or in countries typically considered food secure. Given that this thesis explores a case study that had to be conducted remotely, I would like to conduct a pilot study to compare the feasibility of this metric in another location, starting with more marginalized populations to limit too many confounding variables before shifting to application in cases that are almost entirely different from those explored here.

Regardless of whether or not this metric takes hold, my hope is that this research can contribute to the body aiming to create more just and equitable food systems long term. Agency over food consumption can no longer be neglected in the scholarly or political debates. Not only is it intrinsically important to our conception of food security, it is an essential component to understanding food sovereignty, a framework which will become ever more pressing in the face of growing global populations and climate change. In the end, if this paper can bring that fact to the attention of a broader audience, then I can know that it was a step, even if a small one, in

reconciling reality and morality in food systems, not just for academics, but for those hoping to enact more change and expand their influence over them.

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