ABSTRACT

WOOD, ALEXA LEE. Climate Vulnerability, Gender, and Decision-Making Capability within Food Insecure Households in Sudanian West Africa. (Under the direction of Dr. Louie Rivers III).

Climate change is advancing at a rapid pace, and is having disparate impacts on communities across the globe. Populations in West Africa are at particular risk to the most egregious impacts of climate change, as population changes, periods of drought, and land degradation enhance the vulnerabilities already present in these systems. Anthropogenic climate change is driving increased temperatures and less predictable rainfall across much of West Africa. These changes impact growing seasons, and have led to a shift in agricultural production. Across much of West Africa, decreasing crop yields are threatening food security. Decreased food security is particularly problematic for subsistence farmers, who rely on annual harvests to feed their households, and operate within narrow margins.

This study focuses on Southern Mali and Northern Ghana, as both regions have traditionally supported subsistence farming, but agriculture is increasingly under threat as the effects of climate change become more apparent. This work focuses on the gendered, social dimensions of climate-driven food insecurity. More specifically, this project centers on how people situated in subsistence farming households make decisions regarding food security, and how those decisions are mediated through intersecting factors like gender and age. This research utilizes Black Feminist scholarship and Feminist Political Ecology, along with existing work in West African climate change and food security literature to explore this topic.

This dissertation is organized in 3 chapters that are structured as journal articles, along with a concluding chapter that contains some ideas for future research projects. The first of these articles focuses on young women in Ghana, and how intersecting oppressions exacerbate their
vulnerability to climate change impacts. Following that is a chapter that explores how power and
decision-making responsibilities operate within women-led groups in Mali. The last article
examines how elder men in Mali perceive their households’ vulnerabilities to climate-induced
food insecurity, and how those perceptions guide their decision-making.
Climate Vulnerability, Gender, and Decision-Making Capability within Food Insecure Households in Sudanian West Africa

by
Alexa Lee Wood

A dissertation submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Forestry and Environmental Resources

Raleigh, North Carolina
2020

APPROVED BY:

_______________________________  _______________________________
Dr. Louie Rivers III  Dr. Bethany Cutts
Committee Chair

_______________________________  _______________________________
Dr. Barry Goldfarb  Dr. Erin Seekamp
DEDICATION

I dedicate this work to those without a platform to voice their concerns regarding how forces beyond their control have threatened their livelihoods.
BIOGRAPHY

Alexa Wood grew up in Naples, Florida, and has had a fascination with weather since she was a toddler. Throughout childhood, Alexa watched the Weather Channel endlessly, much to the chagrin of her younger sister. Alexa started her career in higher education as a dual-enrolled homeschooled student, and did not take long to realize that she wanted to eventually earn a PhD someday. In 2005, Alexa received an Associate in Arts degree from Edison State College, and transferred to Florida State University soon thereafter. While at Florida State University, Alexa served as a Resident Assistant, and graduated with Bachelor of Science degrees in Meteorology and Environmental Studies. Alexa’s experiences as a Resident Assistant spurred an interest in Residence Life, and she earned a Master of Science degree in Higher Education Administration from North Carolina State University in 2011. After a stint in the Department of Housing and Residential Education at the University of North Carolina at Chapel Hill, Alexa decided to explore her burgeoning curiosity in the human dimensions of climate change. In 2015, Alexa completed a Professional Science Master’s degree in Climate Change and Society at North Carolina State University, during which she developed an interest in climate change and social justice. One year later, in 2016, Alexa received an opportunity to study the intersection of food security and climate change, and returned to North Carolina State University to pursue a Doctor of Philosophy in Forestry and Environmental Resources. Alexa will continue career as a Postdoctoral Fellow in the Geosciences Future Faculty Program at Texas A&M University in its inaugural year.
ACKNOWLEDGMENTS

After 18 years in higher education, it is impossible to thank all who have shaped me into who I am today. I have so much gratitude, and realize this list is incomplete.

To begin, I express my deepest appreciation for my dissertation committee, whose support and suggestions were critical to my success. I could not have asked for a better chair; Dr. Louie Rivers’ guidance, encouragement, and constructive advice made me a better scholar and person. Dr. Bethany Cutts, Dr. Barry Goldfarb, and Dr. Erin Seekamp offered invaluable direction and insights that framed my research and professional development. I also thank my prior advisors and committee members: Dr. Frederick Semazzi, Dr. Alyssa Rockenbach, Dr. Joy Gaston Gayles, and Dr. Paul Umbach. Additionally, I thank my peers and friends in FER and beyond. Your friendship enriched my graduate experience, and your collegiality made the department feel like home.

More personally, I have deep gratitude for my parents, Alice and Terry, and sister, Tarra. I would not have reached this point without your unending support, humor, and generosity. I also want to recognize all of the friends who fed me, listened to me vent, and encouraged me over these past few years. In particular, I thank Paige Abe, Kelly Mongoven, Dr. Jason Lynch, Laurie Humphrey, Dr. Katie Bekkeli, and Carson Ledford. The support you so generously offered was essential, and I am forever grateful for you.

I will never fully be able to express my gratitude for the small and large ways in which people around the world have sustained me throughout this refining and arduous chapter of my life. Though completing a dissertation is often a solitary process, as I reflect on the past several years, I realize that so many people have carried me through this process, and I am forever thankful for these gifts.
# TABLE OF CONTENTS

LIST OF TABLES .................................................................................................................... vii
LIST OF FIGURES ................................................................................................................... viii

**Chapter 1: Introduction** ........................................................................................................ 1
  Study scope ............................................................................................................................. 2
  Relevance and importance ....................................................................................................... 4
  Overview .................................................................................................................................. 6

**Chapter 2: Examining Climate Change and Food Security in Ghana**
**Through an Intersectional Framework** ................................................................................. 9
  Introduction .............................................................................................................................. 9
  Literature Review ................................................................................................................... 11
    Climate change and vulnerability ....................................................................................... 11
    Climate change and perceptions ....................................................................................... 12
    Food security ..................................................................................................................... 13
    Intersectionality and food provisioning ........................................................................... 14
  Methods .................................................................................................................................. 17
    Mental models methods ...................................................................................................... 17
    Study area .......................................................................................................................... 19
    Data collection .................................................................................................................... 20
    Interview analysis .............................................................................................................. 22
    Model development ......................................................................................................... 22
  Results ..................................................................................................................................... 26
    Model descriptions ............................................................................................................ 26
      Responsibilities model ................................................................................................... 26
      Tasks model .................................................................................................................... 27
      Temporal model .............................................................................................................. 28
  Discussion .............................................................................................................................. 29
    Climate change as a threat to food security ..................................................................... 30
    Resource collection and food concerns ........................................................................... 34
    Intersectionality ................................................................................................................. 35
  Conclusion .............................................................................................................................. 37

**Chapter 3: Decision-Making Capacity to Address Climate-Induced Food Insecurity within Women-Led Groups in Southern Mali** ................................................................................. 39
  Introduction ........................................................................................................................... 39
  Literature Review ................................................................................................................ 39
    Climate change and farmers’ perceptions in Mali ............................................................. 39
    Food security in Mali ........................................................................................................ 41
    Feminist Political Ecology ............................................................................................... 42
  Methods .................................................................................................................................. 44
    Study area .......................................................................................................................... 44
    Data collection .................................................................................................................... 45
    Interview analysis .............................................................................................................. 46
  Results ..................................................................................................................................... 52
    Climate perceptions, past and present .............................................................................. 52
    Collaboration as adaptation .............................................................................................. 54
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2.1</td>
<td>List of interview questions</td>
<td>21</td>
</tr>
<tr>
<td>Table 2.2</td>
<td>Codes used to describe young women’s roles</td>
<td>22</td>
</tr>
<tr>
<td>Table 3.1</td>
<td>Number of interview participants</td>
<td>46</td>
</tr>
<tr>
<td>Table 3.2</td>
<td>Actions and decisions by age and sex</td>
<td>48</td>
</tr>
<tr>
<td>Table 3.3</td>
<td>Frequency of group and gendered language</td>
<td>49</td>
</tr>
<tr>
<td>Table 3.4</td>
<td>Women’s decisions</td>
<td>50</td>
</tr>
<tr>
<td>Table 3.5</td>
<td>Women’s actions</td>
<td>51</td>
</tr>
<tr>
<td>Table 4.1</td>
<td>Direction and Actor</td>
<td>78</td>
</tr>
<tr>
<td>Table 4.2</td>
<td>Perceptions of Vulnerability per Interview Group</td>
<td>78</td>
</tr>
<tr>
<td>Table 4.3</td>
<td>Frequency of Actors Identified by Interview Group</td>
<td>90</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Map of the study site</td>
<td>19</td>
</tr>
<tr>
<td>2.2</td>
<td>Responsibilities model</td>
<td>24</td>
</tr>
<tr>
<td>2.3</td>
<td>Tasks model</td>
<td>25</td>
</tr>
<tr>
<td>2.4</td>
<td>Temporal model</td>
<td>25</td>
</tr>
<tr>
<td>3.1</td>
<td>Map of the study site</td>
<td>45</td>
</tr>
<tr>
<td>4.1</td>
<td>Map of the study site</td>
<td>77</td>
</tr>
<tr>
<td>4.2</td>
<td>Household model</td>
<td>80</td>
</tr>
<tr>
<td>4.3</td>
<td>Elder men model</td>
<td>82</td>
</tr>
<tr>
<td>4.4</td>
<td>Farm tasks model</td>
<td>83</td>
</tr>
<tr>
<td>4.5</td>
<td>Food provisioning model</td>
<td>84</td>
</tr>
<tr>
<td>4.6</td>
<td>Family relationships model</td>
<td>85</td>
</tr>
<tr>
<td>4.7</td>
<td>Household support model</td>
<td>86</td>
</tr>
<tr>
<td>4.8</td>
<td>Feedback loop</td>
<td>93</td>
</tr>
</tbody>
</table>
CHAPTER 1 – INTRODUCTION

Introduction

The effects of climate change are becoming more apparent, and have disparate impacts on communities across the globe. Populations in West Africa are at particular risk to the most egregious impacts of climate change, as population changes, periods of drought, and land degradation enhance the vulnerabilities already present in these systems. Anthropogenic Climate change is driving increased temperatures and less predictable rainfall across much of West Africa. These changes impact growing seasons, and have led to a shift in agricultural production (Butt, et al. 2005; Acheampong et al., 2014). Across much of West Africa, decreasing crop yields are threatening food security. Decreased food security is particularly problematic for subsistence farmers, who rely on annual harvests to feed their households, and operate within narrow margins (Quaye, 2008; Dijoudi and Brockhaus, 2011).

This dissertation explores the connection between climate change and food security in West Africa. This work was initially part of a larger project to develop an ensemble model to explore how climate change impacted decisions to support food security. The ensemble model consisted of several smaller models, each of which explored decision-making at several scales, ranging from the individual/household scale, to regional scales, and finally to national scales. All of the data collected for this project were intended to support models to describe decisions at the individual and household scales. This study focuses on Southern Mali and Northern Ghana, as both regions have traditionally supported subsistence farming, but agriculture is increasingly under threat as climate change advances.
Scope of Study

Geography

The research sites were located in the Sudainan Zone, which crosses much of West Africa. Southern Mali and Northern Ghana are contained in this zone, which has a savanna climate. Savanna climates have high temperatures at or above 30°C for the majority of the year, and have distinct rainy and dry seasons (Rohil and Vega, 2015). Predictable rainy and dry seasons help farmers plan their yearly efforts. All of the research in Mali occurred near Koutiala City, in the Koutiala Cercle, which is located in the Sikasso Region in Southern Mali. The research site in Ghana was near Lawra, the largest town in the Lawra and Nandom Districts, both of which are located in the Upper West Region of Ghana. Koutiala City and Lawra are located 340km from one another, and are separated by Burkina Faso.

Time frame

Data were collected between 2015 and 2017. In July 2015, the research team visited 6 villages, all of which were located in the Koutiala District in the Sikasso Region of Southern Mali. A few months later, in February 2016, the research team collected data from 5 villages in the Lawra and Nandom districts in Ghana’s Upper West Region. I joined the research team in May 2016. In February 2017, after completing my initial analysis of the Ghana dataset, I visited the Lawra and Nandom Districts to perform member checks of my initial findings. A return trip to Mali was not possible, due to political instability.
Demographics

All of the study participants engaged in subsistence farming to one degree or another, and the majority of participants experienced food security during a portion of the year. Participants expressed concerns about changing environmental conditions and its impact on harvests. Households were led by elder men. Elder women and young men held less decision-making power, and young women rarely had opportunities to exercise their decision-making capabilities. However, the household structures varied widely. Interview participants in both countries were separated into one of four groups: elder men, elder women, young men, and young women.

Bambara households in Mali are large, ranging from 40-100 people, and consist of a chief, his wives, the chief’s younger brothers, their wives, adult children and their children. Forty-one interviews were conducted in Mali. In Ghana, Dagare households are smaller. Elder men have one wife, and serve as the main decision-maker. The dataset contains interviews with several widows, who become the primary decision-makers upon their husbands’ deaths. Young adults support the needs of the households. During the first trip to Ghana, 72 interviews were collected. In 2017, the research team conducted 20 focus groups as part of the effort to verify the initial data analysis.

Broad themes

The body of research on food security and climate change is broad. My work focuses on the gendered, social dimensions of these topics. More specifically, this project centers on how people situated in subsistence farming households make decisions regarding food security, and how those decisions are mediated through intersecting factors like gender and age. This research
relies heavily on prior work that has explored social vulnerability to climate change impacts, the
gender dimensions of climate change, and the food security contexts of Mali and Ghana.

Relevance and Importance

Current Literature

Each chapter presents a tailored literature review, but contains some broad themes.
Vulnerability to food insecurity operates within a complex socio-environmental context (Ribot, 2014). Anthropogenic climate change is enhancing vulnerability to food insecurity directly through a decrease in crop yields (Armah et al., 2011; Giannini et al., 2017). Subsistence farmers operate on thin margins, and insufficient crops restrict opportunities to acquire the entitlements needed to offset food shortages (Sen, 1981). Elder men who are heads of households are assigned the greatest amount of social power, and their decisions can influence their households’ vulnerabilities to climate change impacts (Turner, 2016). Women’s decision-making capabilities are situated in power imbalances, and often excludes them from fully participating in governance structures (Rochelau et al., 2013). Household members who occupy marginalized positions due to their sex, age, wealth, and other factors navigate a unique set of oppressions that enhance their vulnerabilities to climate change impacts (Crenshaw, 1989; Kaijser and Kronsell, 2014).

At present, much of the current literature concerning climate change and gender focuses on differences between men and women. Kaijser and Kronsell (2014) called for more research into the intersectional aspects of vulnerability to the effects of climate change. To date, there have been few attempts to explore how vulnerability to climate change impacts varies within gender, but the body of research is growing (Ravera, 2016; Djoudi et al. 2017, Nyantakyi-Frimpong, 2019). This is an important topic to study, as oppressive structures inhibit decision-
making opportunities. Decisions are not made in a vacuum, and people in positions of power are able to mitigate or enhance others’ vulnerabilities to climate-induced stresses. Turner (2016) noted the need for more qualitative research to explore the relational aspects that exacerbate vulnerability to climate change impacts. A person’s position within subsistence farming households determines who has access to the resources needed to mitigate climate-linked vulnerabilities. The work described above, along with existing research gaps helped frame the primary research aim:

*How do age and gender impact decision-making capabilities in Sudanian subsistence farming households?*

**Methods**

The research in this dissertation employs qualitative methods. All of the data were collected during the interviews between 2015-2017. During the trips to Mali and Ghana in 2015 and 2016, the research team met with participants individually to ask a series of questions about household food systems, challenges in achieving food security, and their observations of climate change. Individuals self-categorized into one of four categories: elder men, elder women, young men, and young women. Interviews ranged from 15-90 minutes. All interviews were conducted in the participants’ native languages via an interpreter. Once complete, the interviews were translated by a professional translator, and transcribed by a third-party company. After I received the Ghana data, I used the data to develop a series of brief narratives, one for each of the demographic groups. During the visit to Ghana in 2017, translators shared the narratives with focus groups as part of a member checking process. Later in 2017, after conducting a member
check with focus group participants, a secondary coder and I qualitatively coded the entire Ghana dataset. The Mali data were analyzed in a similar process in 2019, and again in 2020.

Chapters 2 and 4 use mental models to explore the age and gendered dimensions of decision-making. Mental models are visual representations of internal thought processes (Morgan et al., 2012). They utilize a series of flow diagrams to model how people perceive information, and how their perceptions impact their actions. Qualitative coding is the first step of the process, and codes are then used to identify participants’ concerns and actions. Once this portion is complete, I developed a series of models to represent thought processes. The models are revised several times before the final model is utilized in the study. Mental models can inform risk communication products, since developing an understanding of how thoughts affect actions is a critical component of effective risk communication efforts. Chapter 3 focuses on Malian women, and uses a deep coding process to discover themes (Saldaña, 2015). The themes are investigated in further detail, in order to explore how women understood their roles within single gendered groups. This knowledge is critical to understanding how power operates among less-dominant members of subsistence farming households.

Overview

This dissertation is organized in 3 chapters that are structured as journal articles, along with a concluding chapter that contains some ideas for future research projects. The first of these articles focuses on young women in Ghana, and how intersecting oppressions exacerbate their vulnerability to climate change impacts. Following that is a chapter that explores how power and decision-making responsibilities operate within women-led groups in Mali. The last article
examines how elder men in Mali perceive their households’ vulnerabilities to climate-induced food insecurity, and how those perceptions guide their decision-making.

Chapter 2, entitled *Examining climate change and food security in Ghana through an intersectional framework*, was published by the *Journal of Peasant Studies* in 2019. Subsistence farmers in Ghana are facing increased food insecurity, as irregular rainfall threatens their livelihoods. Within households, young women are expected to support all aspects of household food security, and are experiencing a more burdensome load of labor, as a dwindling stock of natural resources make daily tasks more time consuming. I use mental models to explore how the intersection of age, gender, and location inhibits young women’s decision-making responsibilities and wage-earning potential. Climate change is exacerbating this dynamic, which restricts opportunities to acquire sufficient food and places increased stress on household food systems.

In chapter 3, which is currently under review by *Climatic Change*, I explore the impacts of climate change in Mali, and its effect on food security. This is explored using Feminist Political Ecology as an analytical framework, and centers the experiences of women. Polygynous households are sites of power differences, which perpetuates food insecurity. Within households, women are often excluded from decision-making processes that help mitigate climate-stressed food production. Beyond households, options to collaborate and seek support do exist, and are successful when women are granted agency to determine how resources are used. However, these strategies are available to a minority of individuals, and access is often limited to elder women. Despite the potential of women-led groups within and outside of households, these groups are subject to unequal distribution of power. As a result, women-led networks are not yet
able to thoroughly address climate-sensitive agricultural challenges, and continue to marginalize young women, through restricting access to material resources and decision-making power.

Chapter 4 continues to explore gender, climate change, and food security, but shifts focus to Malian elder men’s perceptions. Elder men serve as the primary decision-makers within households. Their decisions have a strong influence on their household members’ actions and decisions. Reliance upon elder men’s decisions increases vulnerability to climate change impacts, as less powerful members of the household have fewer opportunities to exercise decision-making opportunities. This is most apparent in children, who have very little decision-making power, and young women, whose labor is often overlooked. Understanding how people with relatively high levels of power view their vulnerability is a critical aspect of developing appropriate climate interventions, since their decisions impact the wellbeing of other household members.

The concluding chapter of the dissertation, Avenues for Future Research, is a collection of ideas for future study. During the data analysis, I noted several interesting trends, though none were substantial enough to warrant their own chapter. Most of the ideas I discuss relate to the gendered aspects of household operation, or the ethical considerations of conducting research in marginalized communities.
CHAPTER 2 - EXAMINING CLIMATE CHANGE AND FOOD SECURITY IN GHANA
THROUGH AN INTERSECTIONAL FRAMEWORK


**Introduction**

As climate change advances, its effects will be experienced disparately across the globe. Regions of Sub-Saharan Africa will experience the most extreme effects, given current social and environmental vulnerability (Acheampong, Ozor, & Owusu, 2014). Ghana, located in West Africa, is emblematic of this climate change vulnerability, especially within rural regions of North Ghana. Largely agricultural, northern Ghana is located in the Sudanian zone, a savanna that is located between the semi-arid Sahel to the north and humid Guinean Forests to the south (Magin, 2018). Climate change is expected to create less predictable rainfall patterns, with long droughts interspersed with brief, heavy rainfall (World Bank, 2018). This will likely place farming livelihoods at risk, as traditional farming practices were developed around a predictable rainy season.

Given their reliance on rainfed agriculture, subsistence farmers across the Sudanian zone are expected to face increased food insecurity. In recent years, the three regions that comprise North Ghana have experienced higher levels of food insecurity than the seven regions located further south (Hjelm & Dasori, 2012). Households that endure food insecurity often encounter a lack of income, poor health, and lower education levels, despite the efforts undertaken by each family member to improve food security status.
Per Ghanaian culture, young women are expected to contribute to all aspects of household food security, including household tasks (cleaning, collecting firewood and water), food provisioning (meal preparation and cooking), fieldwork (sowing seeds), and childcare (feeding, bathing, etc.) (Boakye-Achampong, Osei Mensah, Aidoo, & Osei-Agyemang, 2012). Much of the work young women perform is climate-dependent. As climate change progresses, it is thought that women in these roles will experience more burdensome labor, as a dwindling stock of critical natural resources, such as firewood and clean water, will require young women to spend more time performing daily tasks (Agarwal, 1992). That said, the additional time spent performing foundational tasks will create a backlog in addressing other necessary tasks.

This study addresses a gap in understanding the age-based and gendered impacts of climate change through an intersectional lens, and further investigates the daily challenges to food security in the Sudanian zone. Intersectionality is a framework for analyzing multiple forms of marginalization. An important tool for developing interventions to address deeply rooted social problems, intersectionality allows researchers to examine the unique barriers that profoundly marginalized people face. Understanding these barriers is a critical component to uncovering pathways to achieve increased agency (Crenshaw, 1989). That said, an intersectional analysis of young women’s roles in promoting household food security is an important component of understanding and addressing the complex realities of food security in Sub-Saharan Africa (Kaijser & Krosnell, 2014). Though existing studies (Ravera Martín-López, Pascual, & Drucker, 2016) have examined intersectional aspects of climate adaptation strategies, there is a lack of exploration regarding how age and gender oppression reinforce one another to uniquely impact the experiences of young women. Furthermore, this dynamic operates in a larger context in which this vulnerability is situated in a highly marginalized, rural context (Ribot,
We employ mental models methods (Wood, Bostrom, Bridges, & Linkov 2012; von Winterfeldt & Edwards, 2007) to examine this phenomena to explore and interpret the findings. This work makes use of insights from a diverse set of literatures, climate change perceptions, Ghanaian food security, and intersectional feminism within environmental contexts.

**Literature Review**

**Climate Change and Vulnerability**

Though this study focuses on dynamics that occur within a household, developing an understanding of the link between vulnerability, rural populations, and climate change is key to understanding the larger context in which this study is situated (Sen, 1981; Adger, 2006; Ribot, 2014). Injustice is both national and transnational (Fraser, 2010). Due to anthropogenic activity, rural populations in many parts of the globe face vulnerabilities that are passed from people in positions of power. The industrial processes that enable the affluent lifestyles of a global minority, largely concentrated in western countries, has led to an increased production of carbon that is driving global climate change. Climate change is exacerbating pre-existing systematic vulnerabilities already present in global capitalist systems (Ribot, 2014). In light of this vulnerability, rural populations are excluded from decision-making that impacts their livelihoods (Fraser, 2010). Present policy initiatives from the World Bank and other related institutions are oriented toward market-based solutions, and fail to recognize the work and practices followed by peasant land holders/farmers. Neoliberal policies that fail to adequately consider the perspectives of marginalized populations will continue to prevent justice from being realized. From a neoliberal perspective, subsistence farming is rendered as “economically inefficient,” and as a result, present policy and development efforts often overlook the rights of farmers in the name of
climate justice (Borras and Franco, 2018). When implemented, well-intentioned programs intersect with climate change and pre-existing vulnerabilities to create challenges to actual adaptation in the face of environmental changes. Much of what is being done seems beneficial at first glance, but fails to capture the intricacies of the specific challenges marginalized, rural people must navigate. As a result, the divide between decision-makers and vulnerable populations continues to widen (Hunsberger et al., 2017). As part of a justice-oriented framework to strategically address climate-related threats, researchers need to thoroughly explore the perceptions and stated needs of subsistence farmers to correct past instances in which their needs have been overlooked (Fraser, 2010; Hunsberger et al., 2017; Borras and Franco, 2018).

Climate Change and Perceptions

Across Ghana, the average temperature has risen by 1 degree Celsius since 1960 (World Bank, 2018). In semi-arid northern Ghana, average temperatures have risen more rapidly. The rainy season lasts from May through November, but in recent years, rainfall patterns have become less predictable, often oscillating between droughts and floods. Rain-fed agriculture, which employs 55% of the workforce, dominates the economy, and is acutely susceptible to drought (World Bank, 2018). A severe drought in the early 1980s created extreme disruptions in the food system, providing a snapshot of possible conditions in the future. Unpredictable rainfall was found to decrease millet and sorghum production, which exacerbated social vulnerabilities among people in the northern part of the country (Acheampong et al., 2014). However, a direct link between climate change and its impacts on social vulnerability is not often made by people in the region. Drawing from Tschakert’s (2007) seminal study of Senegalese subsistence farmers,
Räsänen et al.’s (2016) review found climate change is not the sole driver of production yields, as farmers often attribute their vulnerability to social factors. A large percentage of subsistence farmers ascribed climate change to social or spiritual factors (Teye, Yaro, & Bawakyillenuo, 2014). Nyantakyi-Frimpong and Bezner-Kerr (2015) found that farmers in Upper West, Ghana were aware of climate shifts, but were largely unconcerned with the implications of increased droughts, as they had come to expect variability. However, among young women, the greatest concern was lack of access to granaries and a lack of support from male members of the household. Similarly, Antwi-Agyei et al. (2017) found Ghanaians’ concerns about climate change were secondary to social stressors across multiple scales.

**Food Security**

A central climate-driven concern focuses upon food security. Four interrelated elements are core to the analysis of food security: Availability (whether a group can produce or receive sufficient food), Access (whether a group can acquire the food that to produced or received), Utilization (whether a group can maximize food’s benefits, which includes access to clean water), and Stability (whether a group can ensure availability and access to food on a consistent basis) (FAO, 2006; Barrett, 2010). Across Sub Saharan Africa, the number and percentage of undernourished people has increased since 2014 (FAO, IFAD, UNICEF, WFP, & WHO, 2017). Consistent with this trend, food insecurity is prevalent throughout the Upper West region of Ghana (Hjelm & Dasori, 2012). Measuring levels of food insecurity is challenging, given differences in scale, definition of terms, and data collection protocols. However, household-level data can provide deeper insight into whom within a country is at the highest risk of food insecurity, and can help inform more robust policy (Hussein, 2002; Barrett, 2010).
A household survey conducted by Quaye (2008) found subsistence farmers in the Upper West region experienced food insecurity from four to six months out of the year, depending upon the crop. Farmers often exhausted the millet supply in April, and were unable to replenish their stocks until September harvests. Other important crops, including sorghum and maize were lacking from June to October. As climate change advances and forces increased desertification in the Sudanian savanna zone that spans Northern Ghana, subsistence farmers will likely experience greater decreases in yields of staple crops (Armah et al., 2011). Wossen and Berger (2015) found that climate change and variability of food prices were closely linked, resulting in higher food prices for poor households in Ghana. However, subsistence farmers who are unable to produce surplus goods are unable to participate in the market, as they lack the capital to do so. In such cases, households that primarily rely on subsistence farming become more vulnerable to food insecurity (Armah et al., 2011; Wossen & Berger, 2011).

**Intersectionality and Food Provisioning**

The challenges Ghanaian women face expand beyond gender binaries. As early as the 19th Century and throughout the 20th Century, members of marginalized groups began to bring attention to the unique forms of oppression faced by people who hold multiple marginalized identities (Cooper, 1892; Combahee River Collective, 2000). Crenshaw (1989) formally introduced the idea of intersectionality, that people holding multiple marginalized identities (e.g. race, gender, class, etc.) face a unique form of oppression. For example, the oppression black women in the United States encounter differs from that of white women or black men. Any attempt to isolate either race or gender from the experiences of black women fails to fully capture the forms of oppression they encounter daily (Crenshaw, 1989). Within an intersectional
framework, it is critical to understand that each form of oppression is linked by a broader aspect of social organizations (e.g. urban vs. rural, socioeconomic, etc.). Furthermore, elements of oppression are rooted in household labor, as the work women are often tasked with restricts opportunities to seek capital outside the home (McNally, 2017). Within the climate change literature, work that employs an intersectional approach represents a relatively new research frontier, as prior research on gender and climate change focuses on singular aspects of inequality. An intersectional approach can provide a more accurate depiction of the in-group pressures women face, and demonstrates how women access decision-making power within their socio-political contexts (Kaijser & Kronsell, 2014; Carr & Thompson, 2014; Djoudi et al., 2016; Thompson-Hall, Carr, & Pascual, 2016). For example, Harris, and colleagues (2017) argued for the importance of intersectional analysis within a framework of feminist political ecology in an effort to better understand how differences in gender and land ownership impacted participants’ perspectives on water collection.

Threats to food security have a unique impact upon women. Due to their close relationship with food cultivation and provisioning, women farmers in Ghana have been implementing various climate adaptation techniques for a number of years. In consideration of this, the perspectives of women are valuable in understanding household-scale impacts of climate change in an effort to better inform climate policy (Glazebrook, 2011). Rural women in Ghana support household food security through cultivating crops, preparing food, and off-farm income generation (Boakye-Achampong, et al., 2012). Chagmoka et al. (2016), found that women ameliorate food shortages through off-field labor. Young women often traveled to large cities for a defined time period. Other women would seek permission from men in the community to cultivate vegetables in addition to collecting shea nuts for processing and selling at
local markets. When compared to younger women, older women are granted more financial decision-making power with regards to how shea butter income is spent. Additionally, married women were found to have decreased financial decision-making power, largely due to the need to consult with their husbands about financial decisions (Kent, 2018).

In response to these calls for exploration of the impacts of climate change through an intersectional lens, Ravera et al. (2016) conducted a series of case studies of farmers in India. The work found that adaptation decisions varied across gender, and among women, factors such as wealth, community connections, and age impacted the strategies used to address climate-related pressures. Women who had more access to resources and absent husbands (due to migration) were found to have decision-making responsibilities regarding the farm and within the home. Older individuals had a tendency to adopt reactive strategies, and the adaptive strategies of younger people were identified as a topic for further study. In an effort to expand knowledge regarding intersectionality and climate change, this study focuses upon the experiences of young women farmers in Ghana. At the household scale, young women navigate unique climate-related pressures due to age and gender. As a group, women have less decision-making power than men, but older women possess more power than younger women (Boakye-Achampong et al., 2012; Mabokela & Mlambo, 2015; Kent, 2018). Additionally, the pressure young women experience occurs within the socio-political context of living in Upper West Region of Ghana, a rural region that is hindered by poor infrastructure, widespread poverty, and high rates of migration to southern Ghana (Hjelm & Dasori, 2012). In consideration of the multiple marginalizations assigned to young women in this system, this work focuses upon the unique challenges they face, which can be overlooked in unipolar research that focuses upon marginalizations based upon age.
or gender alone. The process we utilized to explore this issue through an intersectional lens is described in subsequent sections.

**Methods**

**Mental Models Methods**

Mental models theory and methods constitute the foundation of this study. The structure outlined by mental models methods allowed our research team to visually conceptualize the manner in which actors perceive and react to threats to food security in the Upper West Region of Ghana (Wood et al., 2012). Bartlett (1937) and Craik (1943) were among the first to develop mental models, which are grounded in cognitive sciences. Used to illustrate internal processes that relate to external actions, mental models utilize a series of influence diagrams to aid researchers in understanding how actors within a system make decisions (Wood et al., 2012).

Wong-Parodi & Bruine de Bruin (2017), note that scientists have long struggled to communicate concerns about complex risks like climate change to a wider public. Mental models help to decrease the social distance between scientists and the public, through exploring and representing how members of a community perceive and respond to complex risks. A thorough understanding of how members of a community perceive complex risks can help natural and social scientists develop tools that the community can use to address complex risks (Wong-Parodi & Bruine de Bruin 2017). Mental models have been used by researchers to explore how multiple stakeholders understand and communicate risk within a complex environment (Zaksek & Arvai, 2004). Adger, Barnett, Brown, Marshall, & O’Brien (2013) suggested that researchers use mental modeling approaches to provide a foundation for efforts to address climate change impacts. For this study, the socio-environmental factors consist of the effects of climate change...
upon subsistence agriculture in the Upper West Region of Ghana. Subsistence farmers, as individuals who contribute to a household, are the primary unit of analysis in this study. The social and environmental context described above leads to a complex set of decisions that impact their households’ food security status.

Conducting descriptive research is an essential part of the mental models approach. Descriptive research “aims to identify how people think about the topic under consideration, their concerns about it, and how they make decisions about it” (Wong-Parodi & Bruine de Bruin 2017). Mental models are informed by a collection of semi-structured, in-depth interviews with each participant. The interview protocol used in mental models methods is informed by in depth interview practices, which are often found in sociology and anthropology, but are less common in cognitive psychology, where the method originated. In this study, the questions invited participants to discuss their experiences regarding food provisioning and related challenges, along with their perceptions of climate change. This interview structure allows social scientists to understand how people perceive the myriad factors that contribute to their understanding of natural and social processes. Upon completion of the interviews, the data are coded for recurring themes, and a series of influence diagrams are developed to represent the phenomena experienced by interview participants (Wood et al., 2012; Morgan, Fischhoff, Bostrom, & Atman 2002). Multiple interviews are used to inform each mental model influence diagram. Mental models have a variety of applications. Developing an understanding of how people perceive and respond to abstract threats such as climate change or food security is a critical component of creating strategies to address complex risks. Acquiring knowledge about risk perception allows risk communicators to create materials that specifically address the perceptions and concerns that are prevalent within a community (Morgan et al. 2002).
Study Area

The interviews that informed this study were collected in the Lawra and Nandom Districts of the Upper West Region of Ghana (Figure 2.1). The Upper West Region covers an area of 18,478 km², and is home to three percent of the population (576,583). This region is home to three ethnic groups: Dagaba, Sisaala, and Wala (Government of Ghana, 2018). This study focused on the experiences of the Dagaba people. For the most part, the Dagaba live in Northwest Ghana and Southern Burkina Faso. Among the Dagaba, rain fed subsistence farming is the primary source of food and financial support. Frequently cultivated crops include millet, sorghum, maize, and rice. Ideally, farmers are able to cultivate sufficient food for their families, and sell surplus food at weekly markets.

Figure 2.1. Map of the study site

In most cases, family units consist of two parents and their children. Education of children is a priority, but households are responsible for school fees and supplies. When young women marry, they often join their husband’s household of origin to assist with household
support and farming tasks. Young women are often directed by their mothers-in-law in daily tasks (Lawrence, 2011). Each member of the family contributes to the operation of the household and farm network. The tasks assigned to young women support the functioning of all aspects of the household and farm. Many of these responsibilities are assigned to them by members of the household who have more decision-making power; elder men direct fieldwork, while elder women direct tasks within the home.

Five villages within the Lawra and Nandom Districts were included in this study. The villages were chosen by the research team, due to their relative proximity, and level of relationship with village chiefs. We think that the experiences of farmers within these villages are emblematic of the challenges faced by other subsistence farmers within the Sudanian Region of Western Africa. In February 2016, seventy-six interviews were collected. Participants consisted of 10 elder men, 26 elder women, 21 young men, and 19 young women. Before interviews were conducted, local members of the research team sought permission from the village chief. After this occurred, village chiefs helped identify interview participants, and members of the research team assisted with assigning people to the demographic groups. Each interview was conducted in Dagare, and lasted approximately 10-15 minutes.

**Data Collection**

A series of eight open-ended questions (Table 2.1) were asked of each participant. Questions focused on topics such as daily experiences with food, household/farm tasks, and the challenges they face in their roles. Open-ended questions allow for their perspectives to have some influence on the flow of the conversation, and provided researchers with a deeper understanding of the experiences of the farmers. The open-ended nature of the instrument
allowed farmers to discuss their perspectives on farming and food security, along with observations about the environment. This method also highlighted how decision-making responsibilities and responses to climate-driven food insecurity differs between members of the household.

Table 2.1. List of interview questions

- Tell us about the food you eat each day.
- What is your role in buying food?
- What is your role in cooking food?
- How have these things changed over the years?
- What is your role on the farm?
- What challenges do you face on the farm?
- What is your role in securing water for the family?
- Is there anything you would like to add? For example, something about climate change?

After the interviews were translated into English by a professional translator, they were transcribed by a third-party transcription service. After a preliminary round of coding, four narratives were developed to describe the experiences of each demographic group (elder men, elder women, young men and young women). Upon completion of the narratives, a set of questions based on the narratives were developed. In February 2017, the research team returned to the sites, in order to perform a content check of the initial analysis. A series of four focus groups, one for each demographic group, were conducted in each village, totaling 20 focus groups. As with the prior interviews, the focus groups were conducted in Dagare. Each focus group consisted of 10-30 people lasted approximately 30-45 minutes. In these focus groups, the
initial findings were confirmed. The focus groups were then professionally translated into English and transcribed.

**Interview Analysis**

The research team used NVivo software to code the interviews for recurring ideas and concepts. In total, 23 specific codes were used; the coding rubric was based on the rubric used in Rivers et al. (2018). Codes focused on the challenges faced by farmers, daily activities, and experiences concerning food. Two coders analyzed the data individually using this rubric; across all data, the coders were in agreement in 95.4% of all cases. Table 2.2 provides details about the codes relevant to young women. Sources indicates the number of interviews in which the code was identified, while the frequency of each code is indicated by references. Note the large disparity between the number of times decisions were mentioned versus the frequency with which young women’s tasks were discussed. As mentioned earlier, 19 young women were interviewed, but other members of the family discussed the roles young women perform in the household.

Table 2.2. Codes used to describe young women’s roles.

<table>
<thead>
<tr>
<th></th>
<th>Sources</th>
<th>References</th>
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<tbody>
<tr>
<td>Young Women Actions</td>
<td>38</td>
<td>223</td>
</tr>
<tr>
<td>Young Women Decisions</td>
<td>21</td>
<td>60</td>
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Model Development

Upon completion of the coding process, a series of influence diagrams were generated to represent young women’s mental models of food security. This process was based on the process outlined in Rivers et al. (2018).\(^1\) Model development was an iterative process, and took the experiences of all participants into consideration. Given that mental models seek to describe and depict a range of experiences, we did not exclude infrequently discussed experiences. The experiences of young women are highlighted due to a lack of representation in existing literature, and the additional challenges they face due to a lack of decision-making authority.

For example, one young woman said the following:

“When I wake up, my husband goes to the farm first, and I fetch water and cook some food. I take the food to him on the farm, and it's my responsibility to sow. And when it is time for us to weed, we weed together.”

During the coding process, this quote was coded as “Young Women Actions.” The process of translating coded data into mental models required a finer analysis of coded data. In consideration of this quote and the nature of tasks listed in the interviews, the above tasks were represented in nodes labeled “Collecting Water,” “Cooking,” “Sowing Seeds,” and “Weeding” (Figure 2.3). Other young women discussed tasks including cleaning, gathering firewood, and childcare, all of which were included in Figure 2.3.

Lucidchart was used by the primary coder (in consultation with the primary investigator) to develop the influence diagrams that represent the participant’s mental models. The first model represents the primary responsibilities of young women, along with the four elements of food

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\(^1\) The study authored by Rivers et al. (2018) also focuses on food security within patriarchal West African communities. Though Mali is polygynous and predominantly Muslim, the division of labor along the lines of gender and age closely parallel to what is seen in the Upper West Region of Ghana.
security (access, availability, utilization, and stability) (Figure 2.2). Each of the four responsibilities is part of a feedback loop that impacts households’ abilities to achieve food security. For example, young women are responsible for household support, which impacts food utilization, which in turn, affects childcare, which is also within the realm of young women’s responsibilities. The second model (Figure 2.3) provides a closer examination of the responsibilities described in the first model, by depicting which family members influence a given task, and how climate change impacts these tasks. The third model (Figure 2.4) provides a daily timeline of a young woman in the community. It is important to note that there are some slight variations to this model, as the timeframe in which women complete tasks differs slightly between individuals.

Figure 2.2. Responsibilities Model
Figure 2.3. Tasks Model

Figure 2.4. Temporal Model
Results

The following section contains the descriptions of the models used to illustrate the pressures young women face as a result of climate change and food insecurity. This section contains figures that demonstrate the temporal pressures young women face, along with a set of models that place these temporal pressures within the broader context of food security and climate change.

Model Descriptions

Responsibilities Model

The responsibilities model serves as the central model (Figure 2.2), and depicts the primary domains assigned to young women: household support, food provisioning, fieldwork, and childcare. Additionally, a node for alternative income is depicted. During young women’s focus groups, participants indicated a desire to earn additional income for their families, but were often prevented from doing so due to a lack of capital and associated resources. This is in contrast to other family members, who had access to off-field labor or were able to participate in the weekly market. Each of the four nodes depicting responsibilities impacts or is impacted by one of the four elements of food security: access, utilization, stability, and availability. Tasks associated with household support, such as gathering firewood and collecting water supports a family’s ability to utilize the food that is present in their households. Food provisioning also supports utilization, as women make choices regarding how food is used in the household. In contrast, food provisioning is impacted by food access and availability, as young women are only able to prepare what is present in the household. Fieldwork, which generates the household food allotment, promotes goals associated with food stability, availability, and access. Lastly, having a
source of stable food promotes desired outcomes with childcare, as food insecure families are often forced to choose between food and education for children.

*Tasks Model*

The second model (Figure 2.3) provides a more detailed look at the central model described above. This model places the four primary responsibilities within the context of the larger family structure and climate change. Household support consists of three tasks: gathering firewood, collecting water, and cleaning the home. Gathering firewood and collecting water are directly impacted by climate change, as resources are becoming more scarce due to shifting environmental conditions (Nyantakyi-Frimpong & Bezner-Kerr, 2015). In many cases, cleaning the home is directed by elder women who live in the household. Fieldwork is frequently directed by elder men in the household. Climate change affects the decisions elder men make with regard to planting and cultivation practices. Therefore, climate change has a secondary impact upon young women, as the decisions elder men make in response to climate change have an effect on sowing seeds and weeding, both of which are tasks that young women perform. As mentioned previously, elder women delegate household tasks, and are charged with equipping young women with food provisioning skills, which consist of meal preparation and cooking. Climate change has a tertiary impact on these tasks, since food preparation is dependent upon the cropping decisions of elder men. For example, during times of food stress, young women may not be able to fully meet elder women’s expectations regarding food provisioning, which can lead to intergenerational conflict. Finally, childcare is also impacted by outside factors. During the dry season, the burden of childcare shifts more heavily onto young mothers, when their husbands travel long distances to earn additional income (Wrigley-Asante & Agandin, 2015).
Oftentimes, this income is necessary to fund children’s educations. Mothers are also tasked with bathing their children as part of preparing children for school. When clean water is not available, unbathed children are not able to attend their classes. That said, clean water is partially dependent upon climate change (Nyantakyi-Frimpong & Bezner-Kerr, 2015), the inability to send children to school is a secondary impact of climate change.

**Temporal Model**

Figure 2.4 depicts what the average young woman subsistence farmer in the study region may experience on a daily basis. It is important to note that the model depicts a day in which a family receives two meals. Three meals a day is considered ideal, but in times of food stress, families are forced to scale back on the number of meals they consume daily. The model divides the tasks into three phases: morning, midday, and evening. In many cases, young women start their days by performing household cleaning tasks, such as sweeping the floors of their homes. Afterward, young women are the only family members tasked with collecting firewood and gathering water. Both items are required to cook food and promote sanitation. Once these tasks are complete, mothers of school-aged children prepare them for classes. As midday approaches, young women prepare and serve a meal for family members (often their husbands and other male relatives) who work in the field. After the meal, during the growing season, young women participate in field tasks, and spend their time sowing seeds and pulling weeds. Once fieldwork is complete, this group prepares and cooks an evening meal for their families. Before ending the day, mothers bathe their children in preparation for the next school day.
Discussion

As discussed above, during our exploration into food security, we found that young women subsistence farmers in Ghana face a unique set of climate-related pressures. Young women’s lack of decision-making power, along with the tasks they are expected to complete intensifies climate vulnerability within households. When compared to other members of the family, young women face a longer path toward mitigating the impacts of climate change. This increased vulnerability is largely due to the intersections of marginalized identities within Ghana, namely gender, age, and location within the country. In this particular case, these marginalized identities reinforce the social structures that constrain young women to a limited number of tasks (Kaijser & Kronsell, 2014). Each of these is critical to the context in which young women operate. On the broadest scale, their location in rural Ghana places young women in a complex web of socio-political constraints that oppress people across the region (Fraser, 2010; Danquah & Ohemeng, 2017). Additionally, in an extension of prior studies (Boakye-Achampong et al., 2012; Wrigley-Asante & Agandin, 2015), we found that women of all ages are expected to care for children and navigate the challenges associated with decreased food production. Lastly, within households, women’s ages are linked to power. We found that young women are the only members of the household who are responsible for each aspect of the food provisioning cycle. Much of what they do is directed by other members of the family, leaving them little time to seek ways in which they can acquire capital elsewhere or exercise agency. This lack of decision-making and earning power further marginalizes young women, and threatens household food systems.
Climate Change as a Threat to Food Security

The mental models represented by influence diagrams developed by our team illustrate the complex linkages between climate change, food security, and young women’s responses to these stressors. The tasks model (Figure 2.3) depicts the experiences of the young women who discussed their experiences with climate shifts, and the resulting impact on their lives. The following quotes from young women illustrate their direct experience with the ramifications of climate change:

“In fact, the rainfall pattern is changing. There are years we have to buy food because the rains stop early, and when it doesn't rain, we do not get enough crops, and when we do not also have money, then it's always really a problem having food to eat, especially when we do not have money and it's not also raining.”

In the dry season, we have a lot of food because it is just after harvest. But in the rainy season, it is always difficult. Generally what we eat: we eat vegetables, the leaves, fresh leaves.”

“It is no longer raining the way it used to rain. When we were children, it used to rain very well, and that was helpful. But we've been told that it is due to the acts of deforestation. So if the officials could prevent the acts of deforestation, that would help us. And also now it is very windy. There are storms that we did not experience when we were young.”
Young women were the only members of the study to express concerns about deforestation. Informal conversations among members of the research team elicited information to suggest that forest cover is linked to rainfall. Deforestation is primarily driven by young men, who clear cut trees to produce, use, and sell charcoal. However, the Upper West Region of Ghana is in the far Northwest corner of the country, whereas the capital, Accra, and most population centers are concentrated far South. As a result, there is a large disparity in services and regulation across the country, as the bulk of resources are directed to southern regions (Danquah & Ohemeng, 2017). Furthermore, as indicated in the interviews and existing literature (Quaye, 2008; Armah et al., 2011; Hjelm & Dasori, 2012), irregular rainfall patterns affect the timing of planting and the variety of crops, which often results in decreased food production, which is illustrated by the responsibilities and tasks models (Figures 2.2 and 2.3). The effects of irregular rainfall are exacerbated by poor soil quality and a lack of fertilizer, as discussed below:

“Our soil has lost its fertility now. And so we always have to apply fertilizer. Meanwhile, we do not have what it takes to buy fertilizer for our crops to yield the way they should yield.”

“Our soil has lost its fertility, and so without fertilizer, our crops do not yield well. So, during the rainy season, we have to look for fertilizer for our crops to yield well.”

Decreased rainfall and a shift in cropping patterns have not shifted the daily tasks that are often assigned to young women. As discussed above, young women are the only members of the
family who are tasked with collecting water, and gather firewood to cook meals and earn income (Figure 2.2):

“You sweep the place. You fetch water. You wash your utensils. And if it’s during the rainy season, you go to the farm. And when you come back from the farm, you prepare food.”

“You know, God created man – woman, gave her the role of securing water for the family so that especially your husband can always use the water to do things that he has to do if he has any major project.”

“As a woman, it is my responsibility to fetch water. If I do not do so, there would not be water for the family. So when I wake up, that is my responsibility.”

“My role is to – so, always fetch water to my husband – for my husband on the farm after sweeping the place at home, and after giving him water…”

“What I can also say, is that we [...] sell firewood to make money to take care of the family.”

As indicated in the temporal model (Figure 2.4), sufficient water and firewood is necessary for food preparation. Universally, providing meals to family members became part of the discussion.
Each day, young women provide two or three meals to their families, though two meals is becoming increasingly common during periods of food stress:

“You know, for preparing food, it's the responsibility of a woman, and so when I wake up in the morning, I have to make sure that members of my family have food to eat, and then also, in the evening, I try to cook some food for everybody in the family.”

“...I have to prepare some food for him, and also, I have some food for the – for my children to eat before going to school. And in the evening, I try to prepare some food again for the family to eat before going to bed.”

“Well, about food, you know, when you wake up, as a woman, you have to sweep the place, and then you have to go and fetch water. And after that, you wash your pans, and then you cover the water and you start to prepare your food. And after preparing the food, you cover it, or else it will be contaminated. And after preparing the food, the following day, you do the same things.”

The above quotes, combined with the models, reflect and expand upon the existing literature. The context of these quotes are discussed further and expanded upon in the subsequent section.
Resource Collection and Food Concerns

Given young women’s proximities to resources including wood products and water, they frequently expressed concerns about the increasing scarcity of these materials. The availability of these resources are linked to climate, which in turn, are being altered by people in the Global North (Ribot, 2014; Nyantakyi-Frimpong & Bezner-Kerr, 2015). The women in our study believed climate and environmental change were driven by natural or divine forces. Teye and colleagues (2015) discussed similar findings. As human activities further drive climate shifts, and rainfall becomes less predictable, access to water and firewood will become increasingly restricted. Assigning household tasks along gendered lines existed long before the Anthropocene; climate change exacerbates pre-existing vulnerabilities and oppression (Ribot, 2014). A decrease in firewood and water availability will require young women to spend more time seeking these resources, preventing them from tending to other household tasks. As resources become more limited, young women are faced with having to extend their workdays and navigate intrahousehold conflict (Agarwal, 1992). Though no one in the study discussed assistance from children, other studies have suggested young children sometimes help with these tasks (Wrigley-Asante & Agandin, 2015). However, this also places additional labor on young women, when there is a need to provide instruction and safety for children. In short, given their dependence upon natural resources, environmental concerns were viewed as a proxy for concerns about other aspects of household operation.

In the interviews, young women’s environmental concerns were often contextualized within the topic of food security, which is central to the lives of subsistence farmers across the region. Their roles in promoting household food security is often directed by the men in their lives. Given that agriculture in northwest Ghana is rain-fed, climate change also indirectly
impacts this aspect of young women’s lives through the lens of patriarchal systems. Women, and especially young women, are subject to the cultivation choices that men make (Ahmed, Lawson, Mensah, Gordon, & Padgham, 2016). For example, if the chief decision-maker of the household plants a crop too early, irregular drought and rainfall patterns may devastate the annual crops, making it more difficult to feed the household. When there is insufficient food for the household, few mitigating options are available, as access to the necessary funds to purchase food are unavailable to those who rely on crops to generate income. Food insecurity impacts other aspects of the household, and due to intersecting factors of age and gender, both of which are situated in a marginalized rural context, young women are often uniquely impacted, as they lack fewer options to mitigate the impacts of food shortages.

Intersectionality

In Dagare communities, a newly married woman joins her husband’s family (Lawrence, 2011). Young women receive direction from elder members in their new family, and complete tasks within the household and in the fields. That said, young women are compelled to navigate the expectations and challenges associated with insufficient or undesirable food options, meeting the expectations of their mothers-in-law, caring for children, and assisting with fieldwork.

Previous studies in which people were aggregated by gender have often lost the specific pressures stemming from categorizations within and across gender. In consideration of the underrepresentation of young rural women’s perspectives in climate change research, we chose to elevate the voices and perspectives of the women in the study (Kaijser & Kronsell, 2014; Carr & Thompson, 2014). This study demonstrates the ways in which young women are prevented from making decisions with respect to food security and climate change. Young women receive
direction from elder women in their households, who in turn receive direction from elder men, as
gender and age determine a person’s decision-making responsibilities. Though expressions of
agency among young women were limited, it does not necessarily mean that they completely
lack decision making power. For example, several young women in the focus groups discussed a
desire to start small businesses, and identified a lack of capital as the primary limiting factor.
Though we cannot overlook the impacts of large-scale, deeply rooted systems of power and
oppression in rural communities, when considering food insecurity and its root causes, the young
women in this study focused on environmental and micro-economic conditions.

The quotes in the previous section suggest that many of the tasks undertaken by young
task women are rooted in an essentialist framework. In this context, women are thought to possess a
set of skills that uniquely qualifies them to perform tasks related to water and firewood
collection. However, as women age the responsibility for these tasks is assigned to younger
women in the household. Deeply rooted age and gender-based beliefs are difficult to challenge,
especially when the scrutiny originates from people outside of Dogare communities, since
outsider values are deemed threatening (Lawrence, 2011). When developing strategies to
increase agency among women subsistence farmers, it is important to note that the path to
change will likely differ from western contexts. Marginalized people within these communities
are aware that increased access to entitlements lead to increased freedoms (Sen 1981, Ribot,
2014). For example, improving access to clean, reliable water sources may be able to alleviate
the daily time commitment directed toward collecting households’ water needs, allowing for the
potential to direct energy toward other tasks. Allowing the voices of people facing multiple
marginalizations to guide our understanding and mitigation of climate change is a critical part of
addressing the most pressing concerns of climate change. Studies that allow young women to
identify the elements that would aid in bolstering their agency are a critical piece of enhancing their decision-making and adaptation capacities.

Conclusion

At present, explicitly intersectional analyses of climate change responses are rare (Kaijser & Kronsell, 2014; Carr & Thompson, 2014; Ravera et al., 2016). Examining climate-related pressures by centering the perspectives of young, rural women addresses some of the issues prior work has overlooked. This study addresses the need to further explore, understand, and give voice to the stated needs of rural, marginalized populations (Fraser, 2010; Kaijser & Kronsell, 2014). In doing so, we explored what intersectional oppression looks like within rural Ghanaian households, and the unique pressure young women in this region must navigate as part of their efforts to provide food for their households. The intersecting oppressions associated with their rural location, gender, and age, creates a stress point in household food systems. This stress not only puts household food systems at risk, but also prevents young women from exploring outside efforts to mitigate food insecurity. Anthropogenic climate change exacerbates pre-existing vulnerabilities, as resulting environmental changes contribute to circumstances in which traditional food provision practices are no longer able to meet household needs.

Examining this dynamic is essential to a deeper understanding of food insecurity, and can inform materials and interventions to address this deeply entrenched problem. Mental models provide a framework for assessing the myriad of tasks young women are expected to accomplish within the context of shifting climate. A combination of mental models, developed and analyzed through an intersectional lens, is a powerful tool for understanding how marginalized people experience and respond to climate change. Further study of the ways in which vulnerable
populations access greater decision-making agency provides a starting point for informing sound policy and development efforts to mitigate the worst effects of global climate change.
CHAPTER 3 – DECISION-MAKING CAPACITY TO ADDRESS CLIMATE-INDUCED FOOD INSECURITY WITHIN WOMEN-LED GROUPS IN SOUTHERN MALI

Introduction

Each morning across rural Mali, women rise early to support the needs of their households. Daily tasks often include food provision, fieldwork, household support, childcare, and off-farm tasks. Climate change is making daily tasks more difficult, as climate-dependent crop yields decrease. Within the polygynous households that are common across Southern Mali, tasks are often assigned based on seniority. In an effort to mitigate these effects, women support one another in their efforts to sustain the needs of their families and the broader household. This research utilizes feminist political ecology to explore the power dynamics that often drive perceptions of climate change, off-farm activities, and task assignment. Though women-led collaborative efforts are a powerful tool for mitigating the effects of climate change, these efforts are rooted in unequal levels of decision-making power.

Literature Review

Climate Change and Farmers’ Perceptions in Mali

Mali is a landlocked country, and given its proximity to the equator, its climate is highly influenced by the Intertropical Convergence Zone (ITCZ), the global band at which northern and southern trade winds converge. Northern portions of the country are situated in the Sahara Desert, but much of Mali is located in the semiarid Sahel. The Southernmost portion of the country is located in the Sudanian Zone, which has a savanna climate. Southern Mali experiences distinct rainy and dry seasons (Birkel and Mayewski, 2015; UNDP, n.d.). Across West Africa, and within Mali, the Sahel region is expanding southward, and is disrupting normal weather
patterns (Wittig et al., 2007; Sylla et al. 2016). Between the 1960s and 1980s, Mali underwent a severe drought. Since that time, average rainfall has remained below the pre-drought baseline. Additionally, temperatures have increased throughout the country (Birkel and Mayewski, 2015). In portions of Southern Mali, projections estimate by the 2060s, the average temperature will be 2-3°C higher than 1990. This will likely increase evapotranspiration rates, and lead to drier soils. Increasingly semi arid conditions threaten the most productive agricultural regions of Mali (Butt et al., 2005; Sylla et al., 2016).

In light of this, Malian farmers have a long history of adapting to a challenging climate. However, an analysis suggests people across the country will be increasingly vulnerable to climate change under Representative Concentration Pathway (RCP) 4.5 and 8.5 scenarios. Factors that are thought to exacerbate this are widespread poverty, high infant mortality rates, and distance from population centers (de Sherbinin et al., 2014). This climate sensitivity has been documented previously, with specific attention to its agricultural sector. As temperatures increase, the Sikasso Region, which serves as Mali’s agricultural center, is expected to experience sharp declines in crop production in the coming decades (Butt, et al. 2005; Traore, 2013). An extension of Butt et al. (2005) confirmed the trend in crop declines (Ebi et al., 2011). Both studies emphasized the need to develop and implement adaptive practices to mitigate food insecurity (Butt et al., 2005; Ebi et al., 2011).

More recently, studies have begun to focus on West African subsistence farmers’ perceptions of climate change. Senegalese farmers have demonstrated an awareness of climate change, but often lack clear pathways to adaptation (Tschakert, 2007; Mertz et al. 2009). More recent studies conducted in Mali have focused on farmers in the Koutiala Cercle, which is located in the Sikasso Region. Villages in Koutiala Cercle are accessible to researchers and
experience challenges that are similar to neighboring regions (Traore et al., 2014; Sanogo et al., 2017; Rivers et al., 2018). Farmers who reside near parklands reported a decrease in ecosystem services, which they attribute to more frequent drought, higher wind speeds, and increased temperatures (Sanogo et al., 2017). Additionally, farmers have reported concerns regarding how climate change is affecting their livelihoods.

Food Security in Mali

Malian farmers are deeply concerned about less predictable precipitation, and its impacts on food security (Rivers et al., 2018). The Food and Agriculture Organization (FAO) defines food security as consisting of four pillars: food availability, food access, food utilization, and food stability (FAO, 2006). Since 2010, the percentage of undernourished people has been steadily increasing across West Africa (FAO, IFAD, UNICEF, WFP, and WHO 2019). Within Mali, nearly 30 percent of people are malnourished, despite the nearly 80% of Malians participate in agriculture (USAID, 2019). Conflict within and surrounding Mali has placed increased stress on food production in semi-arid regions (FAO, 2020). In light of this, aid agencies seem to overlook some aspects of the food stress that is present in less conflict-prone regions of the country (Famine Early Warning Systems Network, 2019). However, food insecurity continues to jeopardize the livelihoods of people across Mali.

Climate change is one of several factors that threaten the future of food security in Mali (Brown and Funk, 2008; Dijoudi and Brockhaus, 2011). Giannini and colleagues (2017) found that crop yields across Mali have increased in the decades following the mid 20th century drought, despite a partial recovery of pre-drought rainfall levels. However, many farmers are no longer able to afford livestock. As climate change advances, this lack of diversification increases
vulnerability to food insecurity (Giannini et al., 2017). Multiple model runs suggest that sorghum and millet sensitivity intensifies across West Africa in scenarios with at least a 2°C increase. Crops grown in Southern Mali are thought to have a greater vulnerability to such increases (Sultan et al., 2013). In a separate study of Sudanian West Africa, Faye et al. (2018) found sorghum and maize were vulnerable to a 2°C temperature increase, but millet appeared to have a higher tolerance to change. Traore and colleagues (2014) found that farmers have experienced higher temperatures, and less predictable rainfall, both of which were consistent with meteorological observations. In response to these climatic shifts, farmers have attempted to adapt their practices by delaying sowing or increasing the use of synthetic fertilizer. Both of these tactics carry risk, and necessitate more resilient adaptive practices. In Southern Mali, climate resilience is often difficult to achieve, and is often overlooked at the individual level. This is partly due to a lack of representation in the current literature (Rivers et al., 2018).

Historically, food security has been explored at the policy level, and farmers’ perspectives are often overlooked. This gap in the literature necessitates further exploration at household and individual levels (Hussein, 2002; Barret, 2010). More recent work (Traore et al., 2014; Sanogo et al., 2017; Rivers et al., 2018) has explored Malian farmers’ perspectives. However, a focus on gender needs additional attention. Gender and age drastically alters subsistence farmers’ abilities to adapt to climate change; a deeper understanding of these dynamics can support just and appropriate policy interventions (Rivers et al., 2018).

**Feminist Political Ecology**

Feminist Political Ecology provides a framework to explore women’s knowledge and experiences within environmental contexts, as part of a larger goal to open avenues for women to
express their voices and agency in environmental decision-making. This framework understands women’s roles as actors and decision-makers are impacted by factors that stretch beyond gender, including, but not limited to race, socio-economic status, and age. Understanding how gender impacts power dynamics is critical to Feminist Political Ecology; women are often subject to men’s decision-making, but often claim agency within the domains in which women are situated (Sundberg, 2017).

In their influential text, Rocheleau and colleagues (2013) identified common threads within Feminist Political Ecology scholarship, some of which include environmental protection, subsistence, and agency in a manner that allows women and their communities to thrive. More recently, Nyantakyi-Frimpong (2017; 2019) used Feminist Political Ecology to examine responses to climate stress in Ghanaian subsistence farming households. Within these households, he framed labor as a site of conflict, rather than cooperation. Women are often prevented from receiving the information and resources needed to mitigate climate-linked food insecurity. As a result, women subsistence farmers in Ghana have fewer opportunities to support their households' needs. Though Feminist Political Ecology scholarship identifies age as an important determinant of decision-making power, the formal literature that explicitly utilizes Feminist Political Ecology scholarship in West Africa is not well developed. In light of this, our study utilizes a Feminist Political Ecology perspective to explore Malian women’s responses to climate driven food systems, and describe the gendered power dynamics that determine perceptions and reactions.
Methods

Study Area

The study was conducted in the Koutualá Cercle, which is located in the Sikasso Region in Southern Mali (Figure 3.1). Koutiala Cercle is 8741 km², with a 2009 population of 575,273 (Rivers, et al. 2018). This region is located in the Sudanian Zone, which spans much of West Africa, and is bordered by the Sahel to the North, and rainforests further south. The Sudanian Zone is characterized by a savanna climate, which consists of high temperatures year-round, and distinct rainy and dry seasons (Rohli and Vega, 2015; National Meteorological Service, 2020). Many of the people in this region are subsistence farmers, and belong to the Bambara people group. The Bambara practice a form of syncretic Islam, and traditional rituals remain important. Polygyny is widely practiced, and households are large. Households can consist of 50 or more people, and contain the chief of the household, his wives, and the children of each wife. As children age into adulthood, young women marry and join their husband’s households. Within the household, young men divide into smaller family units. All members of the household contribute to the upkeep of a collective plot. Sometimes, young men and elder women are given smaller, individual plots, which are used to provide food for smaller family units or generate additional household income. Staple crops include pearl millet, maize, sorghum, and rice. Additionally, cotton is grown as a cash crop, and elder women often grow vegetables on their individual plots. Many of the challenges subsistence farmers in this study discussed are present in other countries across the Sahel (Tschakert, 2007; Wood et al. 2019).
Data Collection

In July 2016, members of the research team visited 6 villages in the Koutiala Cercle, all of which were within the 50km of the district capital, Koutiala City. This was done to ensure consistency among agricultural practices. Participant selection occurred via snowball sampling (Patton, 2002). Before interviews were conducted, we sought permission from the village chief, who then referred us to eligible participants.

The interview team divided each participant into one of 4 groups: Elder Men, Elder Women, Young Men, and Young Women. The breakdown of each group of interviews is in Table 3.1. Forty-one interviews ranged from 60-75 minutes, and were conducted in Bambara, the participants’ native language. A translator conducted the interviews, and were accompanied by a Malian researcher, along with researchers from outside of Mali. Upon reaching data saturation, we did not conduct further interviews.
Following a process outlined by Morgan et al. (2002), each interview included broad, open ended questions, such as: ‘Can you tell us about how the daily feeding is managed in your household?’ and ‘How does the food system change over the year?’ Additionally, interviews included more specific questions, which focused on the responsibilities usually assigned to the demographic group in which the participant was situated. Open ended questions allowed participants to holistically describe how they experienced household food systems. Furthermore, open ended questions allowed the interviewer to ask follow-up questions to elicit additional details regarding participant experiences.

Table 3.1 – Number of interview participants

<table>
<thead>
<tr>
<th>Group</th>
<th># of Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elder Men</td>
<td>11</td>
</tr>
<tr>
<td>Elder Women</td>
<td>12</td>
</tr>
<tr>
<td>Young Men</td>
<td>10</td>
</tr>
<tr>
<td>Young Women</td>
<td>8</td>
</tr>
</tbody>
</table>

**Interview Analysis**

In 2019, the research team translated and transcribed the interviews from Bambara to English. Upon receipt of the transcripts, two coders used NVivo software to analyze the data. Across all transcripts and codes, the coders were found to have 95.25% agreement. The coding rubric was based on rubrics used by Rivers et al. (2018) and Wood et al. (2019), and consisted of 32 specific codes. The rubric design allowed for analysis of a range of topics including household challenges and changes, and decisions around food production and consumption. The researchers and the remainder of this research focus on the actions and decisions of people in
different age and gender categories. Within this study, “actions” are defined by task performance, either by choice or at the direction of another person. “Decisions” refer to the choices participants make, with regard to resource use and directing the actions of others. Table 3.2 shows the breakdown of decisions and actions across age and gender. The coders met in person throughout the coding process to discuss any issues that arose and cross check the codes they assigned to the text.

In cases where the distinction between an action and a decision were unclear, the coders assigned the text to decisions and actions for the appropriate gender and age category. An example of this, from an elder woman, is below:

I really play a role in buying food. In our community women are more exposed to shame than men. In case of food shortage, I can support the men with solutions to avoid children in hungry situation. Also, when I have money, I contribute in buying food for the household.

This woman described purchasing food for her family using her earnings from the local market. Purchasing food involves both the decision to use her money to offset food shortages, and the act of purchasing itself.

Similarly, women from both groups often discussed actions using collective terms. Table 3.3 illustrates the words participants used most frequently to describe people and groups. “Women” was among the words used most frequently among women in both groups. In such cases, any actions that collectively involved women were coded as “elder women actions” and “young women actions,” in light of the intergenerational households contained in the study. An example of this, from a different elder woman, follows:
When the food leaves the farm, it is stocked on the granary. From the granary a quantity is picked per day and given to women. Then, women grind the food and cook it.

Since there was no mention of a delineation of activities based on age, the last sentence of this statement was coded to elder women and young women. Tables 3.4 and 3.5 provide a more detailed breakdown of elder women’s decisions and actions, along with young women’s decisions and actions.

Table 3.2 – Actions and decisions by age and sex

<table>
<thead>
<tr>
<th></th>
<th># of Interviews</th>
<th>Code Frequency</th>
<th># of Interviews</th>
<th>Code Frequency</th>
</tr>
</thead>
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<td>26</td>
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<tr>
<td>Elder Women Decisions</td>
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<td>68</td>
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<tr>
<td>Young Men Decisions</td>
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<td>20</td>
<td>106</td>
</tr>
<tr>
<td>Young Women Decisions</td>
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<td>37</td>
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<td>Elder Men Actions</td>
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<td>27</td>
<td>92</td>
</tr>
<tr>
<td>Elder Women Actions</td>
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<td>128</td>
<td>25</td>
<td>137</td>
</tr>
<tr>
<td>Young Men Actions</td>
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<td>121</td>
<td>25</td>
<td>117</td>
</tr>
<tr>
<td>Young Women Actions</td>
<td>27</td>
<td>195</td>
<td>20</td>
<td>149</td>
</tr>
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</table>
Table 3.3 – Frequency of group and gendered language

<table>
<thead>
<tr>
<th></th>
<th>Elder Women</th>
<th>Young Women</th>
<th>Elder Men</th>
<th>Young Men</th>
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<tbody>
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<td>Household*</td>
<td>128</td>
<td>Household*</td>
<td>117</td>
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<tr>
<td>Children</td>
<td>65</td>
<td>Women 31</td>
<td>Children 122</td>
<td>People 70</td>
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<td>Women</td>
<td>49</td>
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<td>People 29</td>
<td>Farmers 40</td>
<td>Children 62</td>
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<td>Chief</td>
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<td>Farmer 34</td>
<td>Chief 39</td>
</tr>
<tr>
<td>Men</td>
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<td>Husband 28</td>
<td>Chief 32</td>
<td>Farmers 23</td>
</tr>
<tr>
<td>People</td>
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<td>Woman 17</td>
<td>Members 32</td>
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<td>Farmers</td>
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<td>Mother 17</td>
<td>Brothers 26</td>
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<td>Chief 13</td>
<td>Parents** 21</td>
<td>Laborers 21</td>
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<td>16</td>
<td>Uncle 9</td>
<td>Women 20</td>
<td>Brothers 16</td>
</tr>
</tbody>
</table>

* The interviewer also said this frequently

** 12 references from 1 person (6 people in total)
Table 3.4 – Women’s decisions

<table>
<thead>
<tr>
<th>Elder Women Decisions</th>
<th>Frequency</th>
<th>Young Women Decisions</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
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<td><strong>Fieldwork</strong></td>
<td></td>
</tr>
<tr>
<td>Food Processing</td>
<td>4</td>
<td>Cropping</td>
<td>11</td>
</tr>
<tr>
<td>Meal Selection</td>
<td>22</td>
<td>Tilling</td>
<td>4</td>
</tr>
<tr>
<td>Meal Preparation</td>
<td>12</td>
<td>Sowing</td>
<td>4</td>
</tr>
<tr>
<td>Seasonings</td>
<td>22</td>
<td>Weeding</td>
<td>4</td>
</tr>
<tr>
<td>Purchasing Food</td>
<td>18</td>
<td>Harvesting</td>
<td>6</td>
</tr>
<tr>
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<td>Gardening</td>
<td>5</td>
</tr>
<tr>
<td>Cropping</td>
<td></td>
<td>Hiring Labor</td>
<td>3</td>
</tr>
<tr>
<td><strong>Household Support</strong></td>
<td></td>
<td><strong>Household Support</strong></td>
<td></td>
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<tr>
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<tr>
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<td>Collecting Firewood</td>
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</tr>
<tr>
<td>Gathering Water</td>
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</tr>
<tr>
<td>Collecting Shea Nuts</td>
<td>3</td>
<td>Collecting Shea Nuts</td>
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</tr>
<tr>
<td><strong>Family Life</strong></td>
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<td><strong>Family Life</strong></td>
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<tr>
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<td>Community Support</td>
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Table 3.5 – Women’s actions

<table>
<thead>
<tr>
<th>Elder Women Actions</th>
<th>Frequency</th>
<th>Young Women Actions</th>
<th>Frequency</th>
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</thead>
<tbody>
<tr>
<td><strong>Food Provisioning</strong></td>
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<tr>
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Throughout the coding process, three dominant themes emerged from the codes: 1) Climate Perceptions, Past and Present, 2) Collaboration as Adaptation, 3) Labor Disparities. Drawing these themes from codes allows the team to draw further insights from the data (Saldaña, 2015). These themes became apparent as we explored the codes that were particular to women. We focus on women’s responses to climate change due to the paucity of literature that examines access to power and decision making within groups of women. Across all participants, climate change is mentioned frequently, yet there is a distinct difference between what young women’s present realities and the climate memories of elder women. That said, young women feel as though they are navigating a set of challenges their mothers did not face. On a daily basis, women often work together, and support all aspects of food provisioning efforts. Additionally, a subset of elder women enthusiastically describe participating in agricultural collectives as part of a climate adaptation strategy. However, there are distinct differences in how labor is allocated, and who has access to the allocation decisions. Each of the themes are discussed in greater detail below.

**Climate Perceptions, Past and Present**

Elder adults were asked to discuss past challenges, and we find differentiation between men and women. For the most part, elder men describe a range of challenges they faced in the past. However, elder women do not recall the environmental challenges that occurred during the mid 20th Century. Their responses focus on reliable rainfall in past years, and abundant access to food. Two comments that focus on rain included:
The rain shortage, farmers are facing today, was not existed in the past.

There is a big change in rainfall. When we were young, the rain started earlier before sowing time is reached. But, now the rain is getting more and more lately.

In the rare cases in which women discuss challenges, they reference a lack of equipment or human capital as the primary barriers to sufficient food production. One woman said:

Farming technology is always the same. But, the rainfall was better in the past than now.

Whereas other elder women elaborated further:

Yes, they have changed. In the past, we made good yield. But, now there is no yield. Also, in the past before we start farm works, it rained properly. Nowadays, equipments are necessary to produce, without equipments, the farm works are always slow down. In the past, we were not faced these challenges. It rained well, we had cows to produce. But, now we are facing a rain shortage and we do not have cows.

No, there is a difference. The yield we made in past, we do not make that yield today. This is due to rainfall and manure issue. In the past, we could get manure easily and applied it on our farm. But, now it is easy to get the manure and apply it. Lands poverty is also a challenge. Children spend all dry season to bring the manure on the farm. But, the part of the farm that receive manure gives little production. Without fertilizers, we can’t
make better production. Also, the fertilizers are expensive. The money we make from cotton is not enough to reimburse the fertilizers and support cereals farms.

The comments above provide insight into the present food security challenges subsistence households must navigate as rainfall patterns become less predictable. Much of the climate-driven stress is manifested in crop shortages, yet women in both age categories have limited decision-making authority to alter farming strategies (Table 3.2 and the Fieldwork category in Table 3.4). Despite this, women (especially younger women) are expected to perform actions to mitigate the impacts of climate change (Table 3.5). Though many of the tasks women are expected to perform existed prior to the intensification of the effects associated with climate change, these daily tasks have become more burdensome and time consuming. That said, elder women employ adaptation strategies that went unmentioned by other household members.

**Collaboration as Adaptation**

In light of the above comments, elder women are acutely aware of climate change, and its impacts on food production. On family farms, women are subject to the decisions elder men made, but have other pathways to make decisions about food consumption. Table 3.3 shows the most frequently used words to describe the people and groups with whom the participants interacted. For women of all ages, when they discuss men, the discussion is centered around receiving directions from men (usually the chief of the household).

The chief of the household or the woman cooker notice that the food quantity cooked is fully consumed. Then, chief requests to reduce the quantity. [...] The chief of the
household decides which food to cook. He may decide to consume a given food for a while and then move to another food.

Elder women who participate in community-based agricultural associations have the opportunity to exercise more decision-making power. However, participation in community associations is discussed in 3 interviews. Despite the relatively few interviews in which associations are discussed, the intensity and detail elder women provided is notable (Tables 3.4 and 3.5, “Off-field tasks”, Table 3.3, “Association”).

We are an association of small traders. We held meetings and come to a common agreement. We all have rice field on which we produce. During the dry [season] our main activities is to sell: rice, fruits, milk, vegetables and clothes.

The association has many benefits for its members. During the association meetings, we identify challenges members are facing and come up with an agreement to address the challenges. Also, in the community, a member may have some important social event, the association’s members support the member to achieving the event.

Another woman belongs to an association that grew and sold peanuts. As a group, the members use the proceeds for the following:

Projects provide us with a machine which operates on people farm and makes money. The money it makes is used for the maintenance of the machine. Last year with the
support of the machine, we produced beans on the health of the association. After harvesting, we sold the beans.

Profits are used to generate loans for members of the association, usually for less than 5000XOF (about $8.50USD), but larger loans are granted on a case-by-case basis. Elder women who participate in these associations emphasize the collective decision-making power they had, along with the ability to have a substantial impact on their communities.

We were facing water shortage to water our vegetable. We produced our vegetables in October, by December there no water. We were obliged to fetch a water in the surroundings of the garden to water our crops. Following to that situation, we reflected and decided to go to Koutiala to make a request for training from an organization on the vegetable produce. We thought that after receiving the training, maybe we can be supported to have water. The organization that was supposed to support us, require us to produce rice also. We say there is no problem, we are farmers and are living in farming zone. This is how we organized ourselves into women’s association. When the organization promised to support us, we reached the chief of the village and explained the situation to him. He provided us with land. We cleaned the land by cutting trees, then we plough the land by hand, since we did not have a tractor. After ploughing we sowed rice and applied manure.

Across all interviews, elder women express appreciation for their peers, both within and outside of their households. However, elder women are concerned that younger family members lack a
desire to continue farming. None of the young women discuss involvement in agricultural associations (Tables 3.4 and 3.5), nor did they express an interest in said associations, even when the organizations were present in their villages.

Young women’s collaborative efforts are more focused on household needs. Unmarried women and junior wives work with and take direction from the elder women in their households. This is reflected in the frequency with which young women use “mother” in their interviews (Table 3.5). Tasks rotate according to a schedule, and young women also assist with farm labor and raising children.

My husband first wife is no longer cooking. Me and three other girls from household shift cooking as follows: If I cook today, another girl will cook tomorrow and so on.

When I wake up in the morning, I heat water and put it in my mother’s washroom. I clean the house and cook breakfast. By midday, I cook lunch. In the afternoon I wash up kitchenware. Then, I cook the dinner.

When I wake up in the morning I greet my parents first. Second, I fulfill the small household tasks and finally I go to the farm. In the evening I cook dinner.

We are many women in the household, so we decide to collect Shea nut in the household field through a rotation process. If one woman goes to collect today, another woman will go to collect tomorrow and so on.
Though these forms of labor are critical to operate households, the distribution of this labor is at the direction of household members who hold more power.

**Labor Disparities**

The interviews reflect a wide disparity of labor between young women and elder women. Across all responsibility areas, young women perform more activities than elder women (Table 3.5). These disparities are most pronounced in tasks related to Food Provisioning, whereas more parity was found in Off-Farm Tasks.

Despite participating in fewer interviews, young women mention their roles in meal preparation over twice as many times as elder women (Table 3.5, Food Provisioning). This accounts for instances in which elder and young women’s actions are difficult to parse (refer to section 3.3). All of the young women described their roles in meal preparation. Some examples of young women’s contributions are below:

Yes, when my mother is supposed to cook, I cook.

I sometimes assist my mother in law when she is cooking. However, I have not yet started cooking in the household.

Women of all ages discuss off-farm tasks, and did so in several ways. Elder women produce and sell items locally or participate in agricultural associations. In contrast, 3 young women are employed off-farm. Young women also sell items at the market.
We produce vegetable. After harvesting and selling onion, hot pepper and okra. We provide the half of our income to men to contribute in buying food.

We sell Sumbala and make small income that we save.

I make money in delivering health services and feed myself from that money. I was hired by Save the Children to deliver health services in this village. I receive a payment by the end of each month. Also, the people of the village provide me with food.

When I am here I produce. In Bamako, I dye clothing materials and do small trade.

Young women’s earnings from the marketplace or employment are often controlled by elder women. Unmarried women often give their earnings to their mothers, who then decide how the money is used to support household needs. In many cases, money earned is used to buy seasonings for meals.

I sell cakes. [...] I give the money to my mother.

I am not producing, but I process Parkia Biglobosa seeds into Sumbala which I sell. The money I make in selling Sumbala, is given to my son to buy food. Also, I am in charge to buy seasonings. In our village, men do not buy seasonings.
Across the interviews, this division of labor is discussed in a straight-forward manner (Table 3.5). Despite this, there is little evidence of frustration between young and elder women. In the subsequent section, we further explore these findings and discuss their impacts on food security within a climate change regime.

**Discussion**

**Climate Perceptions, Past and Present**

Many of the above quotes are particularly interesting in light of the drought and famine that was observed in Mali during much of the late 20th century. Elder women report that in the past, food was plentiful, and rainfall was predictable, but as noted earlier, much of Mali experienced drought and famine during a large portion of the late 20th century (Birkel and Mayewski, 2015; Giannini et al., 2017). In contrast, 4 of the young women in our study describe food shortages, despite reports that suggest crop yields are on the rise across Mali, and the Koutiala region is relatively food secure (Giannini et al., 2017, Famine Early Warning Systems Network, 2019). Though these reports may conflict with observed and reported data, we do not want to discount either group’s observations and perceptions. In an effort to conduct research that honors the perspectives and experiences of the population under study, we avoid prioritizing one way of knowing over another. Rather, we suggest there may be reasons for this apparent discrepancy, which could be explained through a perspective shaped by Feminist Political Ecology.

In the interviews, elder women, and to a lesser extent, young women, draw a tight link between rainfall and abundant food stores. Given that elder women report having enough food in years past, it may overshadow their memories of a lack of rainfall. Conflict over resource
production and allocation may be able to explain the seeming idealization of the past over the struggle of the present. Young women in the past and present are directed by their mothers or co-mothers, and are somewhat removed from older men, who hold the most decision-making power. That said, the relative social distance from their fathers may prevent them from becoming aware of the power imbalances within households. As young women receive direction from the elder women in their households, they view this direction as a necessary part of preparing for adulthood. Upon reaching adulthood, forming marital relationships, and leaving their families of origin, their social position becomes more proximal to the primary decision-makers of the household. Though age confers more decision-making power, notable inequalities remain. In many cases, elder men, who are tasked with the broadest levels of decision-making, choose what type of and how much food to allot to elder women. Upon receiving the daily allotment, elder women then decide how the food is utilized. Younger women then receive the food for cooking. Given that young women are more distant from decisions regarding food allotment, they may be less aware of the food shortages that elder adults attribute to climate change. This is not to say that young women are unaware of climate-linked food insecurity. Rather, young women are not included in household food-related decisions, and are prevented from seeing how climate shifts impact food production. Despite this, young women are expected to support household needs, through cooking, cleaning, childcare, and collecting water. As these tasks become more burdensome due to environmental changes, young women continue to be marginalized, even within single-gender groups.
Collaboration as Adaptation

As mentioned previously, some of the elder women participate in agricultural collectives. Though elder women describe their groups as consisting entirely of women, none of the young women discuss the existence of such groups. This is notable in light of the work done by Sidbe et al. (2018), which explored the role of agricultural cooperatives, and their support of food security goals. The study highlighted that these collectives, which are also located in the Koutiala Cercle, are organized by gender, age, and occupation can be sources of conflict and distrust among its members. Despite these challenges, agricultural collectives were identified as an important source of support for food security as climate change advances (Sidbe et al. 2018).

The elder women in our study who participate in agricultural collectives (or associations) discuss these organizations as sources of support and opportunities in which to exercise decision making power (Table 3.5). In agrarian societies across the world, women generally have less access to land, when compared to men. Men decide who receives access to access land and resources, and women are often excluded from this decision making process (Rocheleau, et al. 2013; Carr and Thompson, 2014). However, this effect was dampened in these women-only collectives. Many of the decisions the elder women make center around what crops to cultivate, tending said crops, selling the harvest, and utilizing the profits. Within households, elder men are often tasked with these decisions and actions. In the absence of their husbands, the women in these women-only organizations exercise their power collectively, and in ways to benefit the goals of the group. In several cases, the profits are offered as loans to more vulnerable members. This is an example in which agency can be reclaimed from the men in their communities, and allows elder women to choose the ways in which they and their peers seek to mitigate the food and social insecurity that is exacerbated by climate change.
However, women-led decision-making strategies operate differently within households. Women of all ages often describe women as existing as part of a collective group (Table 3.5). When doing so, they describe rotating cooking tasks, and collecting shea nuts and water. The data strongly suggest that women see the need to work together to meet household needs. This may be due to the nature of polygynous households, but also suggests a tendency to view food provisioning and climate adaptation as a group project. However, the collective nature of decision-making and task allocation seems to break down across age groups. Young women frequently refer to their mothers and mother figures, and describe taking direction from their mothers. However, elder women rarely use language that specifically refers to young women. The horizontal hierarchy that exists within women-led groups shifts to a more vertically aligned hierarchy within households. Though women continue to work together, the allocation of labor and resources shifts within intergenerational contexts.

**Division of Labor**

This work suggests that young and elder women perform separate sets of tasks at differing rates. In many cases, the tasks young women perform are directed by elder women. This is consistent with findings from previous studies (Turner, 2016; Dijoudi, et al. 2016; Wood et. al, 2019).

Though in some cases, household and field tasks limit young women’s off farm opportunities, several of the young women report having the time to generate additional income. However, the agency gained by off-farm employment is diminished by the elder women in their households, when young women are expected to give their earnings to senior members of their households. Though this presents the perception of an age-based power imbalance, the money
earned is often redirected to the household, and is used to buy food, seasonings, and other items to support household needs. Adherence to collectivist values may be able to explain the lack of apparent conflict with this arrangement. The data suggest that young women have an understanding that their wages were meant to support the needs of their family unit, and provide additional stability in the face of food insecurity.

In addition to sharing their earnings, young women are responsible for the majority of food preparation tasks. In much of rural West Africa, food preparation is strenuous, and often requires manual labor to perform (Agarwal, 1992; Dijoudi and Brockhaus, 2011). That said, elder women describe taking a more directive role in food preparation efforts. This system allows both young and elder women to create opportunities to best utilize available food, and identify shortages. Purchasing food to offset shortages does not always occur across clearly gendered lines, but elder women are the only members of households tasked with purchasing and utilizing seasonings, such as sumbala.

Crop insufficiency, which participants often attributed to climate and environmental change threatens food supplies. However, collaborative networks of women may help mitigate some of the most dire impacts of climate change. Opportunities to mitigate food insecurity exist for women, both within and beyond their households. Though these opportunities remain situated in power imbalances, women-led networks to mitigate the effects of climate change deserve additional attention in the literature.

**Conclusion**

Our work in Mali suggests that there are pathways to climate resilience, and the labor of women of all ages is essential to mitigating the harms posed by climate-linked food insecurity.
However, pathways to resilience are situated within power structures. Young women are presently navigating a climate landscape that did not exist in previous generations, and are particularly vulnerable, due to their separation from decision-makers. Though women-led collaborative efforts suggest that more egalitarian power arrangements are possible, these collectives have limited access points. Furthermore, young women are expected to perform most of the daily household tasks, often at the direction of elder women. This suggests that elder women and young women are navigating different climate-linked realities, despite occupying the same spaces. Continued attention to these inequalities is key to developing equitable and appropriate strategies to mitigate climate-linked threats. Our research findings emerge from data that focused on entire households. Research that centers women, especially young women, from the outset, can provide additional insight into women-led networks and the drivers of inequality that exist within multiply marginalized groups. A deeper knowledge of how cooperation and power imbalances operate within groups of women is needed to advance understanding of the drivers that exacerbate food insecurity, and inform interventions to address inequality as climate change places further stress on food supplies.
CHAPTER 4 – ELDER MEN’S PERCEPTIONS OF RELATIONAL VULNERABILITY TO CLIMATE-INDUCED FOOD INSECURITY IN MALI

Introduction

The impacts of climate change will vary greatly across regions worldwide, and vulnerability to climate change impacts are often situated in environmental and social contexts (Adger, 2006; Ribot, 2014). Countries in West Africa are at particular risk to the effects of climate change. Within Mali, a landlocked country in West Africa, a myriad of factors exacerbate its populations’ vulnerability to climate change impacts. A largely rural country, much of northern Mali is located in the Sahara desert. Subsistence farming is practiced widely throughout the country. Due to relatively higher amounts of rainfall, Southern Mali generates the majority of Mali’s agricultural products (Ollenburger et al. 2016). However, farming has become more burdensome in recent years, as changes in climate patterns is increasing the amount of labor needed to cultivate sufficient crops (Ebi et al. 2011). Insufficient crops are a primary driver of food insecurity among subsistence farming households, as subsistence farmers often lack other avenues through which they can acquire enough produced capital to offset food shortages (Giannini et al., 2017).

The eldest male, or chief, of the household occupies a relationally complex role within subsistence farming households located in Southern Mali. Households consist of the chief, his wives, his younger brothers, their wives, along with adult sons and daughters, their spouses, and children. Within subsistence farming households, the chief is the primary decision-maker, and has a heavy influence on farming practices, food provisioning, family relationships, and household operations. The decisions chiefs and elder men navigate are situated in a relational context, as they provide direction to less powerful members of the household. Elder men are
grant a high degree of social power within households, and their decisions have implications for all members of the household. Reliance upon a sole decision-maker escalates household vulnerability to climate impacts (Turner, 2016). Concentrated decision-making capabilities restrict opportunities to mitigate the impacts of climate change, and threaten household food systems.

Much of the current literature that explores the dynamics of climate change, food security, and gender in West Africa either focuses on women’s perspectives or on comparisons of men and women. However, there is a gap in the literature regarding how elder men perceive their households’ vulnerabilities to climate change, and how those perceptions impact their decision-making. Elder men possess a wide range of concerns about their households, ranging from their children’s futures to the interconnectedness of climate change and crop insufficiencies. A holistic understanding of how gender and vulnerability influence one another is critical to developing climate change adaptation strategies that are just and appropriate.

Exploring how those who possess the most social power in a household can also support a better understanding of how power and decision-making responsibilities are transferred among other, less powerful, household members. This work explores how reliance upon Malian elder men’s perceptions and decisions impact households’ vulnerabilities to climate-driven food insecurity.

**Literature Review**

**Climate Change and Vulnerability**

The households in this study are situated in a larger context, as climate change enhances vulnerabilities that existed prior to present conditions (Sen, 1981; Ribot, 2006). Mali is a rural country, and the study site in Southern Mali is reflective of the challenges subsistence farmers
must navigate. Within rural communities, access to decision-making processes is burdensome, and rural perspectives are often overlooked in policy processes (Ribot, 2006). Though many development plans are intended to benefit the needs of rural populations, programs developed by large multinational organizations often overlook the needs of farmers, and perpetuate inequality (Borras and Franco, 2018). Rather than promoting plans which prioritize neoliberal policies, justice-based frameworks center the perspectives of rural populations. Climate change is contributing to conditions that make these inequalities more apparent (Hunsberger et al. 2017). Developing an understanding of marginalized populations’ perceptions of climate change and its impacts is critical to expanding just and appropriate interventions.

The study site, located in the Koutiala Cercle in the Sikasso Region of Southern Mali, is located in the Sudanian Zone, a savanna that stretches across much of West Africa. Given its proximity to the Equator, weather conditions in the Koutiala Cercle are highly impacted by the Intertropical Convergence Zone (ITCZ), and has historically experienced distinct dry and rainy seasons (Birkel and Mayewski, 2015). Climate models predict that temperatures across the Sudanian Zone will rise rapidly, which will contribute to irregular rainfall patterns (Butt et al., 2005; Sylla et al. 2016). During the latter half of the 20th Century, countries within the Sudanian Zone experienced prolonged droughts (van der Geest, 2011; Birkel and Mayewski, 2015). The extreme drought contributed to widespread and severe food insecurity, and may serve as a harbinger of future conditions as the region becomes hotter and drier.

Though subsistence farming has traditionally been well-suited to adapt to changing conditions, farmers are increasingly concerned about the rate of environmental change, and a lack of resources to adapt. Existing research has shown that Malian farmers are concerned about the impacts of climate change (Sanogo et al., 2017; Rivers et al., 2018). Farmers have noticed a
decrease in crop yields as rainfall increases in variability (Acheampong, Ozor, and Owusu, 2014). This enhances food insecurity, as subsistence farmers have few options to offset crop losses (Rivers et al., 2018; Wood et al., 2019).

**Food Security and Vulnerability**

A decrease in food security is one of the primary harms that is linked to climate change (IPCC, 2018). These concerns are particularly relevant to subsistence farmers, who are often marginalized by their locations and lack of access to entitlements, such as access to money and trade, that support food security during times of climate stress (Sen, 1981; Ribot, 2014). Traditionally, the Sudanian Zone has supported stable food supplies, due to predictable rainfall cycles (Sivakumar, 1988). More specifically, Southern Mali has been the center of agricultural production in Mali (Ebi, 2011; Generoso, 2015).

However, food insecurity is present throughout Southern Mali, partly due to climate change. Subsistence farmers have reported increasingly lower yields (Giannini et al., 2017). Projections also indicate that crop yields in both countries are likely to decrease as climate change intensifies (Butt et al. 2005). Options to mitigate these challenges have mixed outcomes. In Northern Mali, though children of nomadic pastoralists had better access to food than children of stationary farmers, acquiring the capital needed to raise and tend to livestock was difficult to obtain (Pederson and Benjaminson, 2008). In the second half of the 20th Century, traditional cereals such as sorghum, millet, and maize were switched out for cotton, which was viewed as a more lucrative venture. However in recent decades, the market for cotton has collapsed, along with prices for cereal grains (Vitale and Sanders, 2005). As a result, many farmers in Mali lack the financial capital needed to enter marketplaces and acquire food (Generoso, 2015). Malian
subsistence farmers’ perspectives on changes in environmental and farm conditions has been documented in recent literature, and have overlapping concerns (Traore et al., 2014; Sanogo et al., 2017; Rivers et al., 2018). In Mali, farmers have observed climate shifts and subsequent decreased crop yields; yet adaptive practices to enhance yields are often inaccessible (Traore et al., 2014; Sanogo et al., 2017).

**Gender and Vulnerability**

Adaptations to mitigate decreases in crop yields is often determined by gender. Several studies have explored how vulnerability to the impacts of climate change is impacted by gender and age. Malian men in subsistence farming communities often have greater access to elements that build resilience against climate change impacts, but gender norms are gradually shifting (Djoudi and Brockhaus, 2011; Rao et al. 2020). In other West African nations, when less powerful household members have access to produced capital, social vulnerabilities remain. Wealth can provide some degree of resilience, but when powerful people restrict access to wealth and other resources, all household members remain vulnerable to climate change damages (Turner, 2016). Deeply entrenched social norms that determine gender-based resource allocation intensifies vulnerability to climate change impacts (Arora-Jonsson, 2011; Rao et al., 2020). Much of the research that explores gender and climate change focuses on women exclusively, or examines the differences that exist between men and women. To date, there is a lack of research that focuses on male attitudes and decisions around climate change. This gap poses a problem, given elder men’s roles as the primary decision maker within households, and their control over assets (Djoudi and Brockhaus, 2011; Aberman et al., 2015). This research examines how elder men in Malian subsistence farming communities perceive their vulnerability
to the impacts of climate change and the decisions they make to mitigate vulnerabilities to climate-induced stress. Our work addresses Turner’s (2016) call for a deeper, qualitative, understanding of how household relationships impact vulnerability to climate change impacts.

Methods

Study Area

Interview data were collected in the Koutiala Cercle, located in the Sikasso region of Southeast Mali (Figure 4.1). The study site is located in the Sudanian Zone, a savanna which stretches across West Africa, and is situated between coastal rainforests and the semi-arid Sahel. This region experiences daily high temperatures in excess of 30°C year round, and has distinct rainy and dry seasons. Subsistence farmers in this region of Africa depend on predictable rainfall patterns in order to grow and maintain their crops.

Figure 4.1 – Map of study area
The Bambara People are one of the largest people groups in Mali, and largely reside in the Southern portion of the country. Many of the Bambara People are subsistence farmers, and cultivate crops such as millet, maize, rice and vegetables. In the 1950’s cotton production in Mali began to increase to meet global demand after cotton crops failed in the United States. Though cotton proved to be a valuable cash crop, there are some concerns that cotton crops have contributed to soil degradation (Benjaminsen et al. 2010). As climate change advances, traditional crops and subsidized crops will become more difficult to cultivate, which threatens livelihoods.

Households within Bambara communities are large, as polygynous relationships are common. In our study, household sizes ranged from 40-100 people. An elder man serves as chief of the household, and his tasks include making decisions that impact the entire household. The chief is often supported by his wives, younger brothers, and their wives. Additionally, the chief apportions parcels of land to younger brothers and sons, and maintains a common plot shared by all members of the household. Fieldwork is determined by the chief through assigning tasks directly to children and young men. At times, task assignment is delegated to the oldest son, who assigns tasks to younger members of the household. The chief of the household also determines the daily allotment of food, and provides it to the lead wife, who then assigns food preparation tasks to junior wives and daughters. In some households, women also assist with fieldwork, but women’s involvement in fieldwork is at the discretion of the household chief. Additionally, young women assist with household support tasks including firewood collection and gathering water. Elder women direct tasks related to processing spices and shea nut collection, both of which are important aspects of household support. Providing instruction and food to children is a primary concern to elder men and women, respectively. Developing a deep understanding of
household members’ perceptions of their roles in supporting food security and reactions to climate change is critical to this study. To that end, the research team utilized methods centered on the participants’ interpretations of their contributions to household food systems.

**Mental Models Methods**

This study utilizes mental models theory and methods. Mental models allow the research team to visually conceptualize how Malian elder men understand their roles within their households, their responses to the effects of climate change, and how those factors intersect to impact food security within their households (Wood et al., 2012). Mental models were developed in the cognitive sciences, and have been utilized since the first half of the 20th Century (Bartlett, 1937; Craik, 1943). These models utilize influence diagrams to demonstrate how internal processes, such as thoughts, values, and concerns, inform decisions and actions to address external stimuli (Wood et al., 2012).

Mental models rely heavily on in-depth, semi-structured interviews, and are necessarily descriptive. This approach allows researchers to understand participants’ experiences and perceptions on participants’ terms, leading to a deeper understanding of the processes involved in decision-making (Wong-Parodi and Bruine de Bruin, 2017). Though the mental models method originated in cognitive sciences, it relies on semi-structured interview data collection techniques that were developed in anthropology and sociology. Semi-structured interviews provide participants with the opportunity to discuss the factors that are most relevant to their experiences. Once data collection concludes, interviews are qualitatively coded. Emergent themes are used to create influence diagrams, which provide a visual representation of participants’ understanding of the topic under study (Morgan et al. 2002; Wood et al. 2012). Each model relies on the
collective experience of participants, as mental models are meant to represent the holistic experiences of a given population. Mental models have a range of applications, but are often used to describe how people understand complex risks, which allows risk communicators to develop communication materials that meet the needs of a community that is subject to a risk (Morgan et al. 2002).

Global, abstract threats are difficult to explain to the public (Wong-Parodi and Bruine de Bruin, 2017). Adger and colleagues (2013) advocated for the use of mental models as part of a toolkit for addressing the threats linked to climate change. Mental models help researchers explain how members of the public perceive and respond to complex threats. Having this information equips researchers and policy makers with knowledge to develop strategies to address threats such as climate change, through creating an organized representation of the factors that are of greatest concern to stakeholders (Zaksek and Arvai 2004; Wong-Parodi and Bruine de Bruin, 2017). This study focuses on the perceptions, actions, and decisions of subsistence farmers in the Sikasso Region of Mali. Farmers in this region are situated in a complex socio-environmental context. Decision-making processes to support food security are often difficult, as farmers navigate a set of recursive challenges that are enhanced by social and environmental stressors.

Data Collection

The research team visited the Koutialia Cercle Mali in July 2016, but was unable to return to Mali due to political instability. Data collected consisted of in-depth, semi-structured interviews with individuals. Each participant was divided into one of four groups: elder men, elder women, young men, and young women. In a process outlined by Morgan et al. (2002), the
interview team asked participants a series of open ended questions about their experiences regarding food production, food consumption, daily activities, and perceptions of climate change. The interview protocol focused on the ways in which climate change has impacted their daily operations and food consumption practices. The open-ended nature of the interview protocol encouraged participants to elaborate on the topics that were most pertinent to their experiences, and to allow the interview to proceed on their own terms.

In Mali, the research team visited 6 villages, all of which were within 50km of Koutiala City, the capital of the Cercle. This was done to pursue consistency in data collection, and explore similar experiences of farmers. In total, 41 interviews were conducted, each lasting 60-75 minutes. The dataset consists of interviews from 11 elder men, 12 elder women, 10 young men, and 8 young women. Before conducting the interviews, the research team sought permission from the village chief, who selected the interview participants, all of whom were adults. All of the interviews were conducted in Bambara via an interpreter, who was also accompanied by Malian and non-Malian researchers. Data collection concluded upon reaching data saturation. The interviews were translated from Bambara to English by a professional translator, then transcribed by a third-party company.

**Data Analysis**

In 2020, 2 members of the research team coded the transcripts using NVivo software. The coding rubric was developed based on vulnerabilities identified in Rivers et al., (2018) and the notion of vulnerability as occurring within relational contexts (Turner, 2016). Additional codes were added as they emerged in the data. In total, 85 codes were used to identify actions and conditions that enhance vulnerability. In a coding comparison between all files and nodes, there
was 99.4% agreement between the coders. Many activities, though part of daily life, are subject to social vulnerability, especially in cases when people in positions of power make decisions that impact the actions and well-being of less powerful household members.

**Model Development**

The analyzed data were used to develop a series of influence diagrams to represent the elder men’s mental models of vulnerability to food insecurity through the lens of household relationships. Our process followed techniques described by Morgan et al. (2012), and prior work (Rivers et al., 2018; Wood et al., 2019). Creating mental models is an iterative process. As stated previously, mental models represent a range of experiences and options. That said, we do not set minimum thresholds for inclusion in the models. Our models focus on the experiences of elder men, as a specific focus on elder men’s perceptions on their own roles within households is a key to understanding how household relationships amplify or mitigate harms caused by food insecurity.

Consider the following quote from an elder man. He was one of two elder men who were interviewed in Konseguela, a village in the Koutiala Cercle:

“Oh, Children are here today in order to substitute us one day. For that reason, I attend the farm every day to supervise children while farming. Sometimes, there are some activities such as ridging that need to be implemented in a given day. But children do not know. So, I tell them, today or tomorrow is the ridging day.”

-Elder Man 1, Konseguela
This quote was coded to multiple codes. First, it identified an actor. Since the elder man was talking about himself, this quote was assigned to the code “Actor - Elder Men.” Since he also discussed his children, the quote was also assigned to the “Actor - Children” code. And finally, since this participant mentioned providing direction to his children, this was coded under “Vulnerabilities - Relational - Direction from Elder Men.” Assigning multiple codes allowed the research team to explore what is most important to a participant, and develop an understanding of how their relationships with other household members are navigated within the context of their concerns. The above example demonstrates that the elder male sees himself as the primary decision-maker with respect to farm work, and views children as an important part of supporting farm operation. Elsewhere in the interview, this participant discussed that his farm output was vulnerable to damages due to a lack of equipment and irregular rainfall, both of which were coded under the domains of “Vulnerabilities - Farm Resources” and “Vulnerabilities - Environmental,” respectively. However, children’s lack of knowledge was not identified as a vulnerability, as it is unrealistic to expect children to have the same level of farming knowledge as a man with several decades of farming experience. Perceptions of vulnerabilities varied among household members (Table 4.1). For example, across all domains, when compared to other household members, elder men identified more aspects that enhanced vulnerabilities to food insecurity.
Once this part of the coding was complete, the primary coder revisited the codes that identified instances in which elder men, elder women, young men, and young women provided direction, and coded each directive to one of the following domains: family, farm resources, food, household support, and sociocultural (Table 4.2). Doing so allowed the research team to explore the domains in which household members exercised more decision-making capacity.

Table 4.2 – Perceptions of Vulnerability per Interview Group

<table>
<thead>
<tr>
<th></th>
<th>Environmental</th>
<th>Family</th>
<th>Farm Resources</th>
<th>Food</th>
<th>Sociocultural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elder Men</td>
<td>77</td>
<td>53</td>
<td>121</td>
<td>68</td>
<td>67</td>
</tr>
<tr>
<td>Elder Women</td>
<td>45</td>
<td>16</td>
<td>62</td>
<td>48</td>
<td>12</td>
</tr>
<tr>
<td>Young Men</td>
<td>49</td>
<td>25</td>
<td>130</td>
<td>58</td>
<td>35</td>
</tr>
<tr>
<td>Young Women</td>
<td>34</td>
<td>11</td>
<td>21</td>
<td>34</td>
<td>4</td>
</tr>
</tbody>
</table>

The primary coder developed the models using Lucidchart. Initially, a model to represent the perspectives of all participants was created to understand how decision-making with regard to food security impacts actions of other household members. This model is broken down further
to focus on elder men, and their conceptualization of their roles within their households, and how they delegate tasks. The elder male model is also explored in greater detail, focusing on their perceptions of farming, family, and food. Sociocultural sub-tasks (e.g. acquiring loans, selling items) that pertained to household support were included in the model, while actions that pertained to decisions that impacted communities and people who were not affiliated with the households of the participants were excluded.

**Results**

Each of the models are described in further detail in the subsequent section. Though the models focus on decision-makers and tasks, all of the decisions occur within the context of a changing climate. Many of the tasks household members perform are impacted by climate change, though these actions are impacted to varying degrees.
**Household Model**

The household model is an amalgamation model (Figure 4.2). It identifies the decision-makers within the household (elder men, elder women, young men, young women). Lines flow from the decision-maker to the portion of the model that represents the tasks and responsibility areas that the participants identified. Each of the tasks and responsibilities are grouped within one of the following four domains:

1. Farm Tasks: Duties that pertain to farming (ex. sowing, weeding, harvesting, and seed selection).
2. Family Relationships: Decisions that impact family members (ex. child care, school support, and healthcare).
3. Food Provisioning: Tasks which relate to feeding the household (ex. buying food, selecting food, cooking).


Tasks and responsibilities that participants directly or indirectly identified as climate-sensitive are shaded. From that point, the model flows from the identified tasks and responsibilities to the actors, who either perform a task at the direction of another household member, or are impacted by a household member’s decisions. Elder men, who serve as the primary decision-makers, have many lines, as they direct much of the activity on their household farms. Many of these activities are assigned to others either at the household level, or to smaller groups, such as the young men or children of the household (Table 4.1). In contrast, young women hold less decision-making power, and as a result, have fewer opportunities to assign tasks. In the limited instances in which they are able to assign tasks, said tasks support the entire household. Young men and elder women’s level of decision-making responsibilities lie between that of elder men and young women.
A deeper focus on the decision-making patterns of elder men provides additional insight into how households navigate food security (Figure 4.3). Elder men make decisions that impact all of the household domains, but focus on farming tasks and food provisioning. At times, elder men described providing direction to the entire household, and at others, elder men discussed the direction they provide to sub-groups within the household. Of particular note is the level of direction provided to young men and children. Though the data show that children receive slightly more direction than young men (Table 4.1), the tasks children implement are less diverse than the tasks assigned to young men. Women of all ages contribute to food provisioning and household support tasks, and are directed to assist with fieldwork. Each of the domains (farm
tasks, family relationships, food provisioning, and household support) are explored further below.

Figure 4.4 – Farm tasks model

**Farm Tasks Model**

Elder men guide nearly every aspect of household farms (Figure 4.4). As discussed previously, some elder men focus on providing direction to the household unit, whereas others talked about the differences between the labor expectations of young men and children. For example, elder men may encourage their adult sons to manage the day-to-day operating tasks while elder men provide guidance to the household’s children on how to implement tasks like tilling, weeding and sowing. Women are still expected to contribute, but to a lesser extent, due to the arduous nature of farm work and commitment to household tasks, including food provisioning.
Food Provisioning Model

Though elder men do not cook for their households, they are involved with all other aspects of the food provisioning process, even once crops have been harvested (Figure 4.5). In many cases, elder men select the daily food allotment, and give it to the lead wife, who chooses the food preparation process. Elder men also purchase food for their households during periods of food insecurity, or delegate another member of the household to do so. Throughout interviews with elder men, young women’s food provisioning labor was overlooked, though based on interviews with women of all ages, food provisioning tasks are often the primary domain of young women. Though elder men did not discuss purchasing food for children specifically, during meals, elder men eat with children, while other household members eat with people who are of the same sex and similar in age.
In the interviews, elder men devoted time to discussing the concerns they had for their entire households, and to a greater extent than other household members (Table 4.2, Figure 4.6). Elder men are particularly concerned about migration among younger members of households. According to elder men’s perspectives, young men are responsible for household conflict or sending remittances to the household. Beyond their concerns for young adult men in their households, elder men also feel responsible for providing clothing and educational access to younger family members.
Household Support Model

To a lesser extent, elder men direct the affairs of the household. While elder women direct the labor performed to support household operations, elder men manage the household’s financial capital. Figure 4.7 shows that elder men are involved with tasks that relate to labor, generating income, and managing money on behalf of the entire household. Note that elder men are not involved with selling items. This is often the domain of women in the household, as women generate income through selling items at local markets. Elder men generate income through off-farm trades and through selling livestock (Figure 4.4). As with food provisioning, elder men do not focus on the household labor young women perform.
Discussion

Vulnerability to Climate Change Impacts

Across the primary domains of analysis, elder men frequently discussed factors that enhanced their households’ vulnerabilities to climate change impacts and food insecurity (Table 4.2). Though elder men are often perceived as being less vulnerable to climate change impacts, the data provide additional nuance to this assumption.

For example, elder men viewed environmental challenges as the primary drivers of crop insufficiency, which intensifies food insecurity.

“Some year rainfall is good; another year, it gets challenging. But if there is no rainfall, there is no production.”

-Elder Man 1, Molobala

“Crops also do not make good production because of rainfall issue. If it does not rain properly, our crops won’t make yield [...] during the last few years, we faced food shortage till we buy food.”

-Elder Man 2, Konseguela

“But the production that we could make in the past, we can’t make that production nowadays because the lands became poor. In the past, we changed lands and kept some as fallow lands. That is not possible today. We can’t have new lands, and we are obliged to stay with our old lands.”

-Elder Man 1, Konseguela
“Nowadays, food is an issue. The yield we were used to making in 0.25 ha farm in the past, we can’t even have the half nowadays. Also, to get yield in 0.25 ha, we must know how to produce. [...] The population number has grown compared to the existing lands, which became poor.”

-Elder Man 2, Molobala

Unpredictable precipitation patterns are contributing to a decrease in crop yields. To compensate for this, more farmland is devoted to cultivating crops. Crop rotation and allowing fields to lay fallow are no longer practicable, which further exacerbates soil degradation, an additional driver of crop insufficiency.

Elder men delegate increased farm labor to younger men in the household. Elder men view young men’s apparent resistance to labor, and larger social changes as being drivers of conflict in their households. Household conflict is also viewed as a threat to household needs and food security.

“My second son is responsible. He does not have the technical skills of the farm work. When I guide him, he does not follow my guidance. He does what he has in mind. [...] They have in mind that everyone should stand by himself. For us, if everyone must stand by himself, some people can’t support themselves. We think that is a way to ruin humanity. We, as elders, we do not appreciate that.”

-Elder Man, Kaniko

“Everyone has his own way to educate his children. Also, development has advantages and drawbacks.”

-Elder Man 1, Molobala
“But what I can tell you is if members of a given household do not do what the chief of the household wants, there will always be difficulties and problems within the household. Sometimes, members also may think that the chief of the household doesn’t take care of them. These are what set misunderstanding in the household.”

_Elder Man, Namposela_

Elder men view their vulnerability to climate change through an interconnected lens. Though the impacts of climate change destabilize household food stores, elder men in the study also emphasized the human dimensions of food insecurity, including household conflict. In the interviews, elder men did not attribute climate change to the lifestyles and practices of people in Western nations, but they viewed human behavior as a factor that exacerbates the impacts of climate change. According to elder men, the connection between climate change and food insecurity occurs within a complex socio-environmental context. Though climate change exacerbates the physical conditions of food production, the choices and behaviors of household members influence households’ abilities to successfully navigate environmental changes. Elder men’s concerns about the implications of climate change, social change, and food security are often centered on household children.

**Elder Men’s Perceptions of Children**

Children are often the most vulnerable to climate change impacts, yet the current body of research focuses on the nutritional needs of children as climate change exacerbates food insecurity (Lloyd et al. 2011; Hagos et al., 2014; Tirado et al. 2015). Though Turner (2016) did not focus specifically on children, household relationships may enhance children’s vulnerabilities to climate change damages. Children do not have the opportunity to express
agency, and must rely on adult members of the household. Decisions that impact the actions of adults have a cascading impact on children. For example, elder men often select their household’s daily food allotment, and direct women to prepare the food. Meals are shared among household members, but the food selection often depends upon the season. After harvest and during the dry season, cereals are in greater supply, and households eat millet, maize, and occasionally rice. During the rainy season, the household depletes the cereal stock, and switches to mangoes and vegetables. Shifts in the quantity and availability of food impacts children’s development and educational attainment. In light of their lack of decision-making power, children are not only vulnerable to food insecurity, but their vulnerabilities are compounded by the adaptation decisions of other household members.

Table 4.3 – Frequency of Actors Identified by Interview Group

<table>
<thead>
<tr>
<th></th>
<th>Children</th>
<th>Elder Men</th>
<th>Elder Women</th>
<th>Household</th>
<th>Young Men</th>
<th>Young Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elder Men</td>
<td>72</td>
<td>97</td>
<td>11</td>
<td>64</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>Elder Women</td>
<td>48</td>
<td>34</td>
<td>73</td>
<td>43</td>
<td>13</td>
<td>21</td>
</tr>
<tr>
<td>Young Men</td>
<td>33</td>
<td>65</td>
<td>11</td>
<td>84</td>
<td>109</td>
<td>9</td>
</tr>
<tr>
<td>Young Women</td>
<td>19</td>
<td>19</td>
<td>22</td>
<td>64</td>
<td>24</td>
<td>133</td>
</tr>
</tbody>
</table>

Elder men frequently discussed their concerns for the children in their household. (Table 4.3). Though the interview protocol did not center on the needs of children specifically, 10 of the 11 interviews with elder men mentioned children. In most cases, elder men view themselves as responsible for their children’s development into adults who could contribute to the farm and support household food security. In most cases, this includes tasks like weeding and sowing, but
the intensity of tasks increase with age (Figure 4.4). Additionally, elder men expressed some concerns regarding how cultural shifts were impacting the role of children on farms.

“Because, the way our fathers educated us, we did not educate our children in the same way. The moment we tried to put pressure on our children in order to educate them like we have been educated, democracy makes our task difficult. In the past, if our father told us to do something, we did it automatically, but now if we tell our children to fulfill a given task, they are not cooperating. Our children have in mind that we force them to fulfill tasks; it is not the case. They do not want to work hard. What we tell them to do is for their better future.”

-Elder Man, Kaniko

“When I was young, [...] we experienced hard work. Hard work we used to do, children can’t do even the half. The pressure I have undergone by my parents. If I try to put the same pressure on my children, they will run away.”

-Elder Man, Ouloubougou

Mali is a relatively young democracy, and has experienced destabilizing conflict since 2012 (Tranchant et al., 2019). Though the elder men in the study barely mentioned the conflict, they feel that democracy and an emphasis on formal education has weakened family structures and promoted migration from farmlands.

These shifts may indeed impact the viability of farming, since children who spend time at school are unavailable to perform labor in the household fields. Though this means the household food consumption decreases, reduced labor capabilities threaten food security. Elder men, who spent their younger years on their fathers’ farms, may not have had opportunities to
learn to navigate changes in farm labor practices, given the relatively recent shift in educational priorities across Mali. In light of this, the concerns elder men have regarding cultural shifts are grounded in pragmatic concerns.

Subsistence farming is normative in Southern Mali, and disruptions to established practices can be difficult to navigate. Climate change is one of the factors that is increasing the difficulty of farming in Southern Mali. More burdensome farming tasks increase the amount of labor needed to produce sufficient crops to feed households. Given that equipment, such as tractors, are difficult to obtain, farmers have to rely on physical labor from household members or outside labor. Hiring outside labor is costly, and paying laborers requires selling livestock or drawing from the household food stores, both of which decrease food security within the household. When children depart for school, elder men manage their household farms with their adult sons, but encounter difficulty in filling the gap in labor. Fewer laborers reduces the capacity to tend to the farm and harvest crops; decreased yields leads to lower levels of household food security. This trend creates a feedback loop (Figure 4.8). As farming becomes more burdensome, and children learn of more promising vocational opportunities via formal education, the incentive to continue farming decreases.
Elder Men navigate a delicate tension. Traditionally, younger adults spent their childhood years learning from older adults, in preparation for a lifetime of farming. For many years, this cycle was able to meet household needs, and roles were well-defined. In recent decades, education has received a higher emphasis, and exposes children to alternatives to grueling farm labor. Increased departure from farming communities and households escalates the vulnerability of households to climate shocks and food insecurity. However, vocations that are less climate-sensitive can provide young people with options to send remittances to their households of origin. Both alternatives contain risks and opportunities, and guiding children’s choices is a difficult task. As climate change advances, and cultural norms shift, supporting household food security is an increasingly complex task.
**Relational Vulnerability**

To address vulnerability to food insecurity, households often adopt practices that on the surface, seem redundant (Figure 4.2). For example, elder men delegate farm management tasks to their adult sons, who implement the tasks or assign the tasks to other household laborers. The model depicts this as lines traveling from the “elder men” and the “young men” nodes to the “managing labor nodes.” Though the model may suggest redundancy, the above example shows how these decisions are nestled within a vertically hierarchical power structure. Elder men provide direction to elder women or young men, who also direct less powerful members of the household to perform tasks. Though elder women have limited opportunities to direct food provisioning, and young men have some responsibilities to manage farm labor, their decisions are situated in a power structure that centers elder men. These power structures exacerbate households’ vulnerability to climate-linked food insecurity (Turner, 2016).

Factors that may further enhance vulnerability to climate-driven food insecurity is the relatively invisible labor of young women. A cursory glance at Figure 4.7 may give the impression that young women do not perform household labor, but this assumption is in direct contrast to a substantial body of work (Rao et al., 2019). Elder men spoke of their interactions with elder women, but rarely discussed young women. Conversely, young women rarely discussed their interactions with the elder men in their households. The mental models reflect these data. Young women often receive direction from elder women or their husbands, and are the primary providers of household labor.

Our work introduces a compounded version of the relational vulnerability that Turner (2016) discussed. Elder women and young men are vulnerable to the decisions elder men make, and in turn, young women are vulnerable to the directives given by elder women and young men.
These added layers of relational vulnerability restricts young women’s decision-making capacity, and prevents them from performing tasks to enhance their own resilience to climate change impacts. Young women’s lack of decision making capabilities increases household’s vulnerabilities to climate change impacts (Rivers et al., 2018; Wood et al. 2019).

Overall, the structure of decision-making among members of Malian households presents a challenge. The vertical hierarchy of decision-making inhibits household members from fully exercising their agency, but instances of more equitable decision-making responsibilities help mitigate some of these vulnerabilities through ensuring that households continue to operate, and are able to transmit long-held knowledge.

Conclusion

Climate change contributes to a myriad of challenges, many of which are further exacerbated by unequal distributions of social power. Developing a deeper understanding of how social power and decision-making responsibilities are organized is critical to addressing the vulnerabilities that arise due to relationships. Elder men control household resources, and determine how other household members utilize household resources (Turner, 2016). Therefore, our work builds upon Turner’s (2016) findings, by showing how social relationships enhance vulnerability to climate-induced food insecurity.

Within Malian subsistence farming households, centralized decision-making power exacerbates climate-driven food insecurity, since the ability to make decisions is closely linked to proximity to the household chief. Elder men’s perceptions of vulnerability impact the decisions they make, which in turn, impacts how other members of the household respond to climate-induced stress. Although elder men hold much of this power, there are some indications
that these long-held norms are shifting. Future research may address how cultural changes, migration to cities, and educational access shifts decision-making roles within households. As environmental changes compel households to reconsider traditional farming practices, exploring avenues through which decision-making becomes more equitable can benefit subsistence farming households through modeling ways in which shared governance supports food security.
CHAPTER 5 – AVENUES FOR FUTURE RESEARCH

Overview

Climate change is a complex issue, and its impacts are widely disparate. My work shows how climate change exacerbates the social conditions that contribute to food insecurity in West African subsistence farming households. The ability to make food production and provisioning decisions are rooted in power structures that are often determined by sex and age. This power structure increases households’ vulnerabilities to climate change impacts. As a researcher who is outside of these communities, my role is to highlight and amplify subsistence farmers’ experiences. This work may inform just and appropriate interventions, but is not meant to be proscriptive. Looking forward, on a very broad level, more work is needed to understand how subsistence farming communities conceptualize interventions that meet their needs in a socially just and culturally appropriate manner.

On a more detailed scale, during the data analysis processes for Chapters 3 and 4, a number of interesting trends emerged through qualitative coding. Many of these themes were strongest in the Mali dataset, but have an indirect connection to the content in Chapter 2. Though compelling, there were not enough data to support an entire chapter, yet pointed to potential new directions in research. The following section outlines some brief thoughts on some of the more interesting, though infrequent, topics that came to light during analysis. Most of the ideas have a gender component. This is likely due to my focus on gender throughout this endeavor. Additionally, I include some of my thoughts on ethical research, and responding to concerns that some of the study participants brought up during interviews.
Studying children’s climate-linked vulnerability ethically

The body of literature concerning children and their vulnerability to food security driven by climate change impacts is underdeveloped. Most of the work concerning children, food security, and climate change focuses on nutrition (Lloyd, Kovats, and Chalabi 2011; Wheeler and von Braun, 2013). This work is critical, but often overlooks the social dynamics that impact children and their vulnerability to climate impacts. Conducting research on minors in the United States requires many safeguards to implement, many of which are not utilized in developing countries. In light of this, the dataset that was used to inform this study may point to a method through which children’s social vulnerabilities can be explored through the lens of adults’ concerns.

As discussed in Chapter 4, the wellbeing and development of children was never far from the minds of Malian elder men in the study. Though their discussion centered on children’s development as farmers, a few discussed concerns regarding changes in culture, and the associated impact on children.

“Besides, we are very concerned about children's current behavior. They must take part in farming training to build on lessons learned in order to cultivate their father’s farms better.”

-Elder Man, Kaniko

“For me, the farming challenge is due to the fact children refuse to produce. Otherwise, it is not complicated to produce. They have to go to the farm and work with a hoe and weed the farm. [...] Children constitute laborers. If they refuse to produce, that’s a challenge.”
They have to be included in the farming system. Not only do they refuse to produce, but also, they want to eat food. That is impossible.”

_Elder Man, M’Pessoba_

The research team used this as an opportunity to explore Malian young men’s perceptions on children. Young men’s responses varied. Some agreed with their elders, whereas others remarked on children’s willingness to perform farm labor. Overall, young men’s responses provided additional insight into the challenges and opportunities children are asked to navigate.

“The issue is that children can’t perform the job that people in the past did. In the past people took their time to carry out small farm work with good result. While today we do much farm work quickly with less result. I think is the reason they think children do not like farm work. Nowadays, all children are looking for money. In the past farm work ended at 5pm. But, now, the farm work ends at 4 pm. After 4 pm children leave the common farm to go to work on people farm as labourer. They make 250XOF per hour. With this situation, we do not spend the proper time we should spend on the common farm. Also, all children are attracted by money now.”

_Young Man, Molobala_

“Enumerator: Many adults state that children do not prefer farming, what do you think about that?

Surveyed: I heard people stating that, but I can’t accept it. I was bred by my father. He had a plough and two cows. We did sowing with string. If the father works on the farm, the child can’t refuse to work with him. We produced with our father. If he had to be
absent, he traced the line with the string and then we sowed through the line. Thanks to farming equipment left by my father, we do not have any challenge on farming today.”

-Young Man, M’Pessoba

Similar to the above groups, elder women in Mali were also concerned about their children’s skill development and futures, and largely reflected the concerns of elder men.

“You know children, do not like farming. In the future most of the children will move to big towns and will stay there. However, all rich people staying in the big towns have farm. When our children move to the big towns, they are engaged by these rich people as labourers in their farms.”

-Elder Woman, Kaniko

“In the past, although children attended the School, they performed the farm works. But, nowadays children have changed, especially those who attend School, do not prefer farming.”

-Elder Woman, Namposela

“They work hard, but the production, we make now is low compared to the production we made in the past. The farm that our fathers cultivated before we was born, is the same farm that is still cultivated.”

-Elder Woman, Ouloubougou

Additionally, elder women spoke at length about the types of food children consumed. Their concerns seemed to be a blend of elder men’s and young women’s concerns. In the comparatively rare cases in which they discussed children, young women described their roles in
feeding children. None of the young women in Mali discussed their outlooks on children’s futures. This is of particular interest, given that they are within the childbearing years, and many were married. This may be a reflection of how elder adults in multigenerational households provide instruction to children while young adults perform much of the household and farm labor.

Children were discussed frequently in the Ghana dataset, but concerns were largely focused upon food security and access to education. Ghanaian adults did not talk about family dynamics or intergenerational conflict. In consideration of these data, exploring children’s vulnerabilities to climate change impacts may be best understood through interviewing parental figures. This helps prevent some of the ethical concerns relating to research on minors. Additionally, this may lead to other opportunities to understand how adults view their futures in light of climate change.

**Household Conflict**

Conflict was discussed by a small number of participants, most of whom were Malian men. Discussions around conflict were often framed as conflict being a driver of household food insecurity. Elder men expressed dismay concerning changes in social norms that made certain actions, such as physical discipline, illegal. The elder men who felt this way thought that these changes resulted in less discipline among young people, and contributed to a growing disinterest in farming. Young men disagreed with this sentiment, as those on the farm desired to continue farming, but environmental conditions were making farming increasingly difficult. However, the dataset did not include interviews with people who had left farming entirely, which would be necessary to inform an exploration of how inter-household conflict exacerbates food insecurity.
Agricultural Associations

Chapter 3 devoted some space to discussing the role of agricultural associations, but the data did not support a thorough analysis of the topic. Of the 11 interviews contained in the Malian elder women dataset, 3 described their involvement in associations. One Malian elder man made a brief reference to his involvement in an agricultural association, but did not discuss any details regarding the organization or function of the association. Agricultural associations were not mentioned in the Ghanaian dataset or among young adults in Mali. The elder women who discussed associations did so at length, even seeming eager to discuss their organizations. As discussed in Chapter 3, elder women viewed these associations as opportunities to collectively make decisions and utilize resources, which are responsibilities usually managed by elder men. Though some studies highlight the promise of associations (Agarwal, 2010; Sidbe et al. 2018), few have explicitly focused on members’ perspectives on these associations.

Exploring agricultural associations provides opportunities to focus on pathways to resilience, rather than the ways in which women are vulnerable to climate change impacts. Western researchers’ continued focus on vulnerability is potentially problematic, and threatens to repurpose colonial narratives in which the voices and desires of the communities under study are lost. The capabilities approach (Sen, 1999; Nussbaum, 2001), provides a loose framework through which researchers can explore farmers’ needs on farmers’ terms. Though the capabilities approach has promise, other researchers (Robeyns, 2006; Zimmermann, 2006) have commented that the loosely defined boundaries and goals of the capabilities approach makes it very difficult to operationalize effectively. Exploring resilience pathways that avoid perpetuating past injustices, even in the name of justice, is not a straightforward path.
In light of this, examining women’s agricultural associations could provide insight into ways in which women-led organizations view both individual and collective vulnerabilities to not only climate change, but the social and financial pressure associated with being a woman in a patriarchal, agrarian society. Participants in associations have had time to identify and address the points at which individuals and communities experience vulnerability, and strategize ways to address this. An elder woman in Mali discussed a successful approach:

“We were facing water shortage to water our vegetable. We produced our vegetables in October, by December there no water. We were obliged to fetch a water in the surroundings of the garden to water our crops. Following to that situation, we reflected and decided to go to Koutiala to make a request for training from an organization on the vegetable produce. We thought that after receiving the training, maybe we can be supported to have water. The organization that was supposed to support us, require us to produce rice also. We say there is no problem, we are farmers and are living in farming zone. This is how we organized ourselves into women’s association. When the organization promised to support us, we reached the chief of the village and explained the situation to him. He provided us with land. We cleaned the land by cutting trees, then we plough the land by hand, since we did not have a tractor. After ploughing we sowed rice and applied manure.”

-Elder Woman, Konseguela

This was one example, but other members of the association were not interviewed, but exploring their perspectives would provide valuable insight into the hierarchies and functions present within the association.
Ghanaian women, men’s invisibility

Over half of the elder women interviewed in Ghana either mentioned being widows or did not discuss men at all. Several of these women discussed their children, implying that at some point, they were married. This was in stark contrast to Ghanaian elder men, who frequently discussed the roles of the women in their households. This represents an interesting tension, and could warrant further exploration. The women in each of the interviews were the sole decision-maker of their households, and as with the majority of the people in the study, faced periods of food insecurity. There is a research that explores widows’ vulnerabilities to environmentally-driven food and water security. In some cases, formerly married women find novel ways to adapt to environmental challenges (Gabrielsson and Ramasar, 2012). Whereas in other cases, widows face increased challenges and food insecurity (Van Aelst and Holvoet, 2016; Turner 2016).

Elder male invisibility may be a quirk of the Ghana dataset, as this pattern was not present in the Mali dataset. It is also important to consider that elder women in the Ghana dataset may have discussed the men in their lives if they were asked direct questions about their marital relationships. Within the realm of environmental social science research, the topic of male invisibility is largely unexplored. However, literature within gender studies may provide some insight.

Concerns regarding over-researched populations

One young man in Mali expressed frustration to the researchers, and discussed that researchers visit the communities, ask questions, leave, and do not follow up.
“Most the time, people come to interview us. We think that the purpose of the interview is to support us. Unfortunately, when they go back, we do not hear about them. We even think that they go to sell the records.”

-Young Man, Kaniko

Though the reasons for this are complicated by factors including schedule availability, in-country support, and funding, these concerns are worth considering. Communities in which research support networks exist helps eliminate barriers to researchers to work in these communities.

In addition, there is a small body of research that addresses over researched communities. Qualitative research fatigue can occur when groups under study continually engage with researchers, but see few changes (Clark, 2008). When vulnerable communities are over-extended by research, community members begin to distrust researchers and their agendas (Sukarieh and Tannock, 2013). There is little evidence that there has been significant engagement around the topic of over-researched communities in climate change vulnerability and adaptation research. This is especially noticeable in the body of research focusing on climate change in African countries. One thesis and one report from a non-profit mentioned over-researched communities in passing, but neither document fully engaged with the topic or its implications (Koelle and Oettle, 2009; Zehrer, 2012). This is a concern, given how the impacts of climate change and its impacts on the wellbeing of people in vulnerable communities. The relative invisibility of the issue of over-research presents challenging ethical questions (Koen, Wassenaar, & Mamotte, 2017). Additional engagement focusing on the emotional impact of asking people to discuss topics that are likely to induce stress, such as food insecurity and the loss of livelihoods is needed. Determining the appropriate level of research is a challenging task; arriving at an answer
does not come easily. Resolving this issue requires collaboration between Western researchers, in-country researchers, and the communities under study.

An additional consideration regards the presence of Western researchers in marginalized countries, and their impacts on the work being conducted by researchers who are in country. During my field visit to the Upper West Region of Ghana in 2017, I observed payment negotiations between the university-affiliated research team, and local translators. After the payment terms had been confirmed, members of the university-affiliated research team discussed that the payment rate had increased since the prior visit, in 2016. We did not thoroughly discuss why this was the case, but the Ghana-based member of our team commented on how it affected him. Though he was not responsible for paying translators during this visit, the in-country liaison told us that after the 2016 visit, the translators increased the cost of their services when he returned to conduct his own research. We recognize that is within their rights, but the increased cost of their services made it more difficult for the Ghanaian researcher to conduct his work. This raises a rarely discussed, yet important consideration. As Western researchers with access to a relatively large amount of financial capital, we have a responsibility to consider all of the ways in which our work impacts not only the communities under study, but also how our research impacts the work conducted by researchers within the countries we study. Navigating this challenge requires a tailored approach that requires more privileged researchers to educate themselves further, be aware that their presence may be disruptive, and seek avenues through which they can provide restitution for past and present harm. As Western researchers work with researchers who live in marginalized countries under study, it is critical to take note of the instances in which their work either supports or detracts from the work that is conducted by in-country researchers.
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Diplomarbeit, University of Vienna. Philologisch-Kulturwissenschaftliche Fakultät

APPENDICES
APPENDIX A – INTERVIEW PROTOCOL – ELDER MEN

What is your household’s day-to-day experience with food?

How does this experience change with the seasons?

What challenges does your household experience around food?

What challenges did the household you grew up in experience around food?

Tell us about your farm.

What is your role on the farm?

What decisions do you have to make on a daily basis about the farm?

How do you delegate responsibility on the farm?

What challenges do you face as a farmer today?

What challenges did you face as a farmer when you were a young man?

Is there anything you would like to add? For example, something about climate change?
APPENDIX B – INTERVIEW PROTOCOL – ELDER WOMEN

What is your day-to-day experience with food?
What is your role in buying food?
What is your role in preparing food?
How does this change during the season?
What is your role on the farm?
What challenges do you face on the farm?
What challenges did you face on the farm as a young person?
Is there anything you would like to add? For example, something about climate change?
APPENDIX C – INTERVIEW PROTOCOL – YOUNG MEN

What is your day-to-day experience with food?

How does this experience change with the seasons?

What is your role on the farm?

What challenges do you face on the farm?

Is there anything you would like to add? For example, something about climate change?
APPENDIX D – INTERVIEW PROTOCOL – YOUNG WOMEN

What is your day-to-day experience with food?

What is your role in buying food?

What is your role in preparing food?

How does this experience change during the seasons?

What is your role on the farm?

What challenges do you face on the farm?

What is your role in securing water for the household?

Is there anything you would like to add? For example, something about climate change?