Unequal Adaptation:

Socially differentiated responses to environmental change and food insecurity among smallholder farmers

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Abstract

Achieving food security in a changing climate is one of the greatest challenges of the 21st century. For subsistence-oriented farming families who experience firsthand pressures on their food system – population growth, environmental degradation and climate change, to name only a few – adaptation has become an urgent necessity. The ability to 'adapt and benefit' through a suite of climate change adaptation interventions that build adaptive capacity is touted by many humanitarian and development institutions as integral to food security today. However, adapting and benefiting is often a far reach for many smallholder farming families, who more commonly manage multiple interdependent stressors through a mix of adaptive actions and negative coping strategies. The relative benefit of this mix of adaptive and coping strategies is socially differentiated, varying by location and both between and within households. This combination of strategies, or the variety of options to enact livelihood outcomes, is framed as a response space.

This thesis explores the impact of social differentiation on the adaptive capacity of subsistence-oriented farming families experiencing food insecurity and environmental change. Using a case study of two villages in the Upper West region of Ghana, it investigates how adaptive capacity and response spaces differ based on points of social differentiation; the drivers that limit or exacerbate adaptive capacity and response spaces; and the implications of these responses for humanitarian, development, and government programmes that aim to support these populations. These questions are approached using mixed methods (embedded direct observation, the Women's Empowerment in Agriculture Index household and individual survey, participatory action research exercises, child growth and hospital admissions records, focus groups, and key informant interviews) and a unique conceptual framework which draws heavily from systems thinking, feminist research theory, Sen's capabilities approach and grounded theory.

I followed context-specific local drivers to deeply examine the familial and cultural political lives of households to better understand the interdependent nature of empowerment within the household, the distribution of scarce food, control over livelihoods and income, the management of poverty-induced stress, and the risk these drivers pose to public health. Out of this research, a multi-level vulnerability landscape surfaced, characterized by a food system on the margins and unequal adaptation within the case study population. The research led to the following insights: farmers experience multiple disadvantages being located in the Upper West of Ghana as compared to southern regions, and are underserved by multiple governmental and NGO institutions; farmers in turn experience heterogeneous vulnerability and access to response spaces at the community level, which are deeply entrenched in social norms that favour adult male bodies, male spaces, and male-typical productive roles; and, at the same time, there are individuals and families that stand outside these trends and are able to adapt and benefit, which highlights the need for an intersectional approach when examining the household and sub-household context.

The 2015 Sustainable Development Goals include a pledge to 'leave no one behind' in the pursuit to 'free the human race from the tyranny of poverty and want and to heal and secure our planet'. Understanding the differing vulnerability of subsistence-oriented smallholder farming populations, as well as the ways their response spaces and adaptive capacity have been differently shaped, will be important for the program design and targeting strategies of interventions to achieve this goal. This thesis aims to contribute to this enormous task.

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List of acronyms and abbreviations

ASF: Animal source foods

CCAFS: Climate Change Agriculture and Food Security Research Program

CDA: Critical discourse analysis

CGIAR: Consultative Group on International Agricultural Research

CST: Critical systems theory

CSA: Climate smart agriculture

FASD: Foetal alcohol spectrum disorders

FGD: Focus group discussion

GEC: Global environmental change

GHS: Ghanaian Health Service

IPCC: The Intergovernmental Panel on Climate Change

MoFA: Ghanaian Ministry of Food and Agriculture

MPI: Multidimensional Poverty Index

NGO: Non-governmental organisation

PAR: Participatory action research

SADA: Savannah Accelerator Development Authority

SDG: Sustainable Development Goals

SIA: Systemic Integration Adaptation

TZ: Tuo zaffi (pounded maize eaten with stew)

UN: United Nations

UNEP: United Nations Environmental Program

WEAI: Women's Empowerment in Agriculture Index

WHO: World Health Organization

1 Introduction

1.1 Motivation

Achieving food security in a changing climate is one of the greatest challenges of the 21st century. Food systems are facing unprecedented and ever increasing pressures including population growth, environmental degradation and climate change. Accordingly, the identification of socially appropriate and locally endorsed adaptation strategies that balance human development objectives with environmental management objectives in a changing context has become an urgent necessity. Through the 2015 Sustainable Development Goals (SDGs), 193 nations have 'resolved to free the human race from the tyranny of poverty and want and to heal and secure our planet' and have pledged to 'leave no one behind' (UN, 2015). This thesis aims to contribute to this enormous task by exploring the social and cultural dimensions of food security and adaptation to climate change in climate vulnerable and food insecure communities. In doing so, the thesis brings to light not only the unequal vulnerability to environmental change experienced by individuals based on specific points of social differentiation, but also the unequal response spaces – 'the set of options open to actors trying to enact multiple livelihood and development outcomes' (Osbahr et al., 2010, pp. 1-2). A case study of the Upper West region of Ghana is used to explore the impact of social differentiation on the adaptive capacity of subsistence-oriented farming families experiencing high levels of environmental change.

In this thesis, I will make clear the impact of social differentiation on response spaces and adaptive capacity to global environmental change (GEC), with specific focus on inequality and power. There are limitless ways that inequality and power can express themselves within a system. I have limited the analysis to themes directly related to the nexus of food

security and climate change. This thesis includes a review of relevant literature; the presentation of novel theoretical and methodological frameworks. The empirical chapters using data from the Ghanaian case study focus on (1) adaptation and coping strategies; (2) nutrition deficits and food scarcity experienced seasonally and at different life stages; and (3) a deep dive into the complex mutually reinforcing relationships between alcohol consumption, stress, poverty and developmental disabilities. Each empirical chapter includes the implications on adaptive capacity and programmatic interventions that seek to build resilience to GEC. The thesis concludes by outlining limitations to the research and where more research is needed towards the fulfillment of the SDG pledge to 'leave no one behind'.

1.2 Chapter outline

This chapter will outline the rationale of the doctoral research project, beginning with the motivation for the thesis and outlining the primary and sub research questions that the following chapters will answer. It will then provide a brief background on the Systemic Integration Adaptation (SIA) project, information on the section of the SIA multi-level case study, the role of the research funder – the Consultative Group on International Agricultural Research (CGIAR) program on Climate Change Agriculture and Food Security (CCAFS) – and the research team's partnership with the Ghanaian Ministry of Food and Agriculture (MoFA). It will then present an overview of the multi-level case study in Upper West Ghana, including rationale for selection and demographics. The chapter will end with a summary of each of the thesis chapters. The next chapter (Chapter 2: Literature and theory) will review the literature base, from which the research questions emerged and will present a novel theoretical framework.

1.3 Research questions

The literature on climate change adaptation and food security among small holder farmers is presented in greater detail in Chapter 2. Here, I outline the main ideas within the literature, from which the research questions emerged in order to introduce and frame the primary and sub research questions. Smallholder farmers have been the focus of numerous studies, both because the rural poor are a vulnerable population in developing countries, because of the volume of this population with an estimated 500 million smallholder farms worldwide (IFAD 2011) and because their productivity impacts national food security. Smallholder farmers are also a long-standing target group for humanitarian and development assistance. There is considerable literature specifically on the disproportionate burden of climate change experienced by smallholder or subsistence-oriented farmers, onto which this thesis builds.

There are ample publications in the grey literature by UN agencies, donor agencies, and international development organisations, highlighting the ways in which climate change is exacerbating the deprivations already experienced by women, children, persons with disabilities, and other vulnerable subgroups. This has been described as 'inequality beyond the front door'- that is, how the burden of poverty and environmental change is experienced differently among members of the same household. These studies have predominantly used broad categories of social strata and not specifically considered how vulnerability differs based on the intersection of multiple points of social differentiation. This thesis aims to fill this conceptual gap by collecting and analysing data using an intersectional approach to the consideration of social differentiation. The literature base on inequality within the household has also been limited because gaining access to the intimate dynamics of a family is challenging and the context-specific nature of the research area

limits generalizability. Few studies have used a sub-household unit of analysis. This thesis will contribute to building a stronger database of sub-household level research.

There is recognition within the literature as well as among climate change adaptation practitioners that even within smallholder farming communities and families, there is heterogeneity in the impacts experienced (Quaye et al., 2016; IFRC, 2015; Care, 2011; Chow et al., 2011; Hyder et al., 2005; Reid et al., n.d.), especially as it pertains to women headed households (Elliot & WFP, 2012, p. 26). Far less has been written about heterogeneity amongst the sets of response actions at the disposal of individuals to employ. Further, although understanding climate and poverty-induced vulnerabilities serves an important function, focusing exclusively on vulnerabilities has been the subject of criticism in the literature (Miller et al., 2010; Helfgott, 2008). Osbahr et al. (2010), among others, have argued that a vulnerability-exclusive focus undervalues the actions that affected individuals, households, and communities are taking in response to and in anticipation of environmental change. The conceptualization of a 'response space' (Osbahr et al., 2010), is helpful to this end. To support the most vulnerable, we need to both understand their differing vulnerability as well the ways in which their response spaces and adaptive capacity have been differently shaped. With these gaps in the literature in mind, the research questions were designed as follows.

The first question (*How do adaptive capacity and response spaces differ based on points of social differentiation?*) was the initial point of inquiry and is primary answered in Chapter 4. Following grounded theory, the subsequent research sub-questions emerged by asking: *what local drivers are limiting or exacerbating differences in adaptive capacity and response spaces?* Three themes emerged as both negative impacts and drivers of low and unequal

adaptation: (1) under-nutrition, (2) high prevalence of persons with disabilities and impairments and (3) alcohol consumption to manage stress. All three themes were identified as interlinked, and the interdependent relationships between the drivers became the focus of the remaining chapters (Chapters 5 and 6). The final research question (*What are the implications of socially differentiated adaptive capacity and response spaces for humanitarian, development and government programmes?)* brings the discussions of all the sub research questions together for a meta discussion on the practical impaction of all results. This question is answered throughout the thesis and is summarized in the concluding chapter.

Table 1: Research questions

Primary research questions	Sub research questions	Content which investigates the question
1. How do adaptive capacity and response spaces differ based on points of social differentiation?	1. A. What responses do small-holder farming families use to adapt or cope with environmental change and food insecurity?	chapter 4 (all)
	1. B. How do these response spaces vary between and within households?	chapter 4 (all)
2. What local drivers are limiting or exacerbating differences in adaptive capacity and response spaces?	2. A. How do nutritional deficits and food scarcity impact adaptive capacity?	Chapter 5 (all)
	2. B. How do nutritional deficits and food scarcity vary by gender and age?	Chapter 5 (all)
	2. C. How does reliance on alcohol to mediate poverty and climate-induced stress impact adaptive capacity?	Chapter 6 (all)
	2. D. How does a high prevalence of disability and physical and cognitive impairments impact adaptive capacity?	Chapter 6 (all)

3. What are the implications of socially differentiated adaptive capacity and response spaces for humanitarian, development and government programmes?		Chapter 4, Sections 4.3.4 and 4.4.2 Chapter 5, Section 5.8 Chapter 6, Section 6.10

1.4 Background and context

This doctoral research was conducted through the Systemic Integrated Adaptation (SIA) Program, of the CGIAR Climate Change Agriculture and Food Security Research Program (CCAFS). The SIA team consisted of a primary investigator and four doctoral students looking at the same challenges to smallholder farmers, but through four distinct 'lenses' – the social lens, the environmental lens, the political lens, and the economic lens. This thesis project presents the social lens, led by myself; and, unless otherwise noted, the design, collection, and analysis for the social lens were under my management and responsibility. Nonetheless, the thought in all stages benefitted from collaboration with the SIA team and other collaborators listed in the acknowledgements. The aims of the larger SIA program are outside the scope of this thesis. However, it is important to note that while the thesis presents results from Ghana, the approaches presented here were developed and pilot-tested in Nepal, and subsequently adapted and improved prior to final application in Ghana. Since the Ghana fieldwork, the methods have been replicated in the Gambia by the UNEP World Conservation Monitoring Center and in Togo by the Red Cross Climate Center.

1.5 Case study selection

The Ghanaian case study is multi-level, with data collected by the SIA team at national, regional (sub-national), district, village, household, and sub-household/individual levels. However, the greatest density of data for this thesis is at the most localized levels – village, household, and sub-household/individual level. The section will outline the rationale for the

case study that was selected. The following section will summarize the characteristics of the villages selected and the households within them.

1.5.1 Selection of Ghana as a focus country

Ghana was selected as the location of the SIA program's West African field site for multiple reasons. The country has been experiencing environmental change (Mcsweeney et al., 2010) as well as high economic growth. Growth has simultaneously put pressure on natural resources and increased the means of the national government to reduce poverty – increasing and decreasing vulnerability to global environmental change (GEC) in different ways. Ghana, like many middle-income countries (MICs) has seen a growth in inequality, which makes it an important place to study vulnerability to GEC and how this differs regionally, between households and within households. According to the Overseas Development Institute (ODI), if growth in Ghana had been 'pro-poor' over the last three decades, Ghanaians in poverty would be reduced by half the present number (Hoy & Samman, 2015). I, the social lens researcher of the SIA team, also have a long standing relationship with Ghana, having completed a year of my undergraduate degree at the University of Ghana, Legon campus in 2005-2006 where I studied social work, Ghanaian agriculture, and the traditional animist religions of the three northern regions, including the Upper West. My relationship with Ghana strengthened our decision to complete the research there.

1.5.2 Selection of the Upper West as the focus region

The Upper West region of Ghana was chosen because the population there are subsistence-oriented farmers primarily dependent on rain fed agriculture and vulnerable to small fluctuations in the timing and intensity of their annual rainy season, as compared to southern regions which experience biannual rains (Antwi-agyei, 2012). The region is

highlighted below in Figure 1: Map of Ghana with Upper West in red. Fewer agricultural studies have been conducted in the north as compared to the southern tropical regions, yet it is considered one of the poorest and most vulnerable regions (Shepherd et al., 2006). Therefore, conducting research in the Upper West offers an alternative view of the common perception of Ghana having moved up to middle-income country status due to cocoa, coffee, palm oil and more recently oil industries. This rhetoric on progress to middle-income country status does not highlight that benefits are not being felt uniformly (Cooke et al., 2016; Hoy & Samman, 2015; Jatoe et al., 2012). In the northern regions of Ghana, conditions still resemble that of a least developed country (LDC).

The northern region is consequently the least densely populated region in the country, home to the highest rural population of agropastoralists (34.4% in the Upper West District, 44.9% in the Upper East District and 18.8% in the Northern District) (Elliot & WFP, 2012, p. 114). Most people farm maize, sorghum, millet, groundnut, cowpea, cassava and dry season vegetables including okra, onion, tomato, chilli and green pepper (Naab & Koranteng, 2015; Naab et al,. 2011). Other livelihoods include livestock rearing, shea-butter making, weaving, and cashew or mango production.

The region has the highest levels of poverty in Ghana by all indicators, including low literacy, under-nutrition (Quaye, 2008; Tsikata & Seini, 2004) and as such is an important target region for poverty alleviation and climate adaptation programs. Further, in order to triangulate the results from action research (described in Chapter 3), which is itself an intervention, it was necessary to choose a location where baseline data existed. This research program was able to build off of the CCAFS baseline data and the CCAFS Farms of

the Future project (Nelson & Nathaniels, 2014) which was completed one year prior to the SIA field program.

Consideration of responsible community engagement motivated the research team to ensure that the research formed part of an ongoing program of research and development. As CCAFS has an ongoing relationship with the Ministry of Food and Agriculture (MoFA) in the region, the capacity existed in the case study region to carry forward the results of the research. As a result, the communities have a better chance of having sustainable change supported. In particular, CCAFS has a strong relationship with the MoFA office located in Lawra District of the Upper West region. For this reason, in addition to high rates of poverty and food insecurity among smallholders, Lawra District was selected as the focus area of research for the SIA program. Below, Lawra District is coloured in light green in Figure 2: Map of Upper West Districts. Within Lawra District, Lawra Town (the district capital) and two surrounding villages (Orbili and Tabier Village) were selected as the case study area. Lawra Town was an obvious place of inquiry as it is the location of the main market, food processing, all government services and most off-farm income generating activities. Further explanation on the selection of the focal villages is presented in Chapter 3: Methods in the scoping and diagnostics section.

1.5.3 Adaptation interventions in the case study region

As this thesis discusses the programmatic challenges to reducing climate and poverty related vulnerability, especially through the lens of climate adaptation programming, a brief look at the institutional landscape is necessary. Several important adaptation-themed interventions to strengthen poor rural communities and increase resilience to climate change have been instituted in the Upper West generally and in Lawra District specifically. These primarily aim to address barriers to food security by increasing income and farm

productivity through farm and livestock inputs, access to credit and improving knowledge on production, storage and market access. A subset of these programs also includes a component to *empower women* so that they are also able to take advantage of the same kinds of supports (farm and livestock inputs, credit, farmer training, etc.). Importantly, as will be discussed further in Chapter 2 (using theory) and Chapter 4 (using data), these empowerment programs have not specially included women's emancipation or a movement away from traditional gender roles, but rather women's empowerment programs for smallholders in the region have been the product of *gender mainstreaming*, whereby typical poverty reducing programs that were implicitly designed for male farmers, have been altered in design to reach more women beneficiaries.

Examples of the institutions that form the institutional landscape of climate adaptation and food security in the case study area include the Resilient and Sustainable Livelihoods Transformation (RESULT) program implemented by the Canadian Hunger Foundation (CHF); Volta Project on Integrated Management of Rainwater for Crop-Livestock Agroecosystems (CGIAR, 2015); Northern Rural Growth Project; and Enhancing Livelihoods through Climate Change Adaptation and Learning Project (Care, 2011). The use of weather indexed crop insurance is growing steadily in Ghana since 2011 through the National Insurance Commission and its local partners (GAIP, 2012), including schemes specifically focused on climate adaptation (Gille, 2013) but has yet to become widely available in the poorer regions, including the Upper West region. Multiple institutions (e.g. USAID; the Center for Indigenous Knowledge and Organizational Development; Konrad Adenauer Stiftung; Oxfam; the Ghana Red Cross Society) have also been involved in sensitization around the risks of

climate change in the Upper West, often with overlapping target groups or geographic areas and usually in the form of multi-day workshops.

1.6 Case study

This sub-section introduces and provides background to the case study. Subsequent chapters will enrich the knowledge of the case study through discussion of how methods were developed with participants (Chapter 3) and through the presentation of results (Chapters 4 - 6). The following two maps show the case study region of Ghana, which is situated in the north-western edge of Ghana. Much of the literature presented on the case study region is from the Upper West region generally, highlighted in red in the first map. The two villages (Orbili and Tabier) and one town (Lawra Town) are located in Lawra District, coloured in light green on the second map.

Figure 1: Map of Ghana with Upper West in red. Source: Wikimedia Commons.

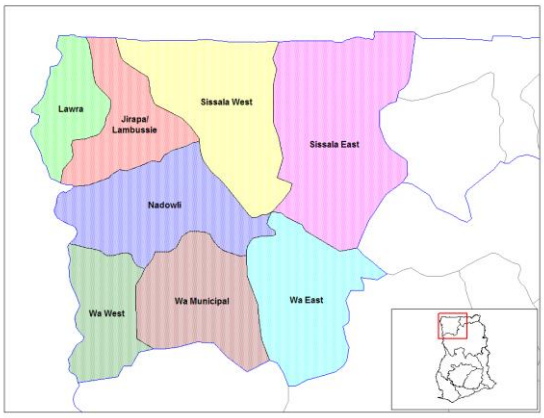

Figure 2: Map of Upper West Districts. Source: Rarelibra, with permission.

1.6.1 Introduction to the case study context

The following table outlines the levels of the case study.

Table 2: Levels of the case study

Nation	Ghana
Region	Upper West
District	Lawra
Villages	Orbili and Tabier
Households	90 households
Individuals	200 adults and 300+ children

The social lens data is primarily collected from two adjacent villages called Orbili and Tabier, which are both CCAFS baseline sites, and the neighbouring town – Lawra. The administrative hub for both villages is Lawra Town where I took up residence. Lawra Town is described as a 'dusty outpost with a frontier feel' and 'something of a backwater today' by the most popular travel guides (Briggs, 2010; Briggs 2014, p. 470) and consists of two major streets, is electrified, is home to several high skilled Ghanaians from different regions who take up job opportunities in the Upper West region in the absence of highly skilled individuals from within the Lawra area. The regional capital Wa City is two hours away from Lawra by public transit and is the administrative hub for the region. Wa City is home to a small university, with developed road infrastructure and a small manufacturing industry. The research was

completed in partnership with the Ministry of Food and Agriculture (MoFA), which is present in both Lawra and Wa and works extensively in Orbili and Tabier villages as well as all surrounding villages. The rest of this sub-section will focus on the villages of Orbili and Tabier.

The two villages of the case study differ in many dimensions of well-being. Orbili is adjacent to a river, which allows for riverside gardening in the dry season and is closer to the nearest town allowing greater access to daily labour jobs, cell phone charging, emergency medical treatment etc. The children of both communities attend the same school; their parents sell in the same markets and the same government officers and political representatives serve them. Tabier is known by NGOs, government officials and community member to be the poorest village in the district while Orbili is above average as compared other communities that are comparably remote in the district. These reputations were commensurate with the household data collected and direct observations. Orbili Village was selected as the SIA focal village for Participant Action Research and from which to examine implications of all of the lenses together. Neighbouring Tabier village was added to the case study of the social lens only (this thesis project).

The villages are located next to the Black Volta river that divides Ghana from Burkina Faso, which has provided the communities two significant income-generating activities. The first is cross-border trade of cattle and poultry of Sahel breeds that are high value in Ghana, so many men travel across the border weekly and return with livestock to sell in markets across the district. The second is dry season vegetable gardens along the riverside, which are irrigated, primarily by hand and sold for 3-4 months of the year in weekly markets by

women during the dry season. Few family farms are productive enough that they do not need to rely on coping strategies during the lean season when their grain stores run empty.

The two villages combined are comprised of exactly 90 households at the time of the final field visit with approximately 200 adults. All residents are smallholder farmers, with a minority having off farm work, apart from selling farm produce in the markets. Twenty-six individuals report having off-farm income to supplement farm income – eight of which engage in river fishing, seven in retail trade, two individuals gaining income from doing repairs, two individuals hunting wild game for sale, two individuals having formal community service roles (one community health volunteer and one person managing the local rain station and acting as the local MoFA contact person), and one person gaining occasional paid work as a cook at a nearby school.

The majority of Orbili and Tabier community members practice ancestral veneration, which is a traditional animist religion. They have not had a historical missionary presence although a few families have converted to Christianity in recent years and a small one-room church was being constructed in the area during the final visit. There is a strong Muslim and Christian presence in the neighbouring towns and most of the people from outside of the community that do government work or NGO service delivery within the village are Christians and consider conversion a significant part of their roles in the village.

They are ethnically and linguistically unified. All men in the villages were born and raised there. All residents, except for nine women who married into the community from elsewhere in Ghana and one woman from Burkina Faso, are from the Dagao ethnic group. All speak the language Dagaari within the household. A minority are fluent in the language

Twi, spoken in southern and central Ghana as a result of engaging in seasonal migratory labour.

Education levels are very low, as it outlined below in Figure 3: Head of household's highest level of education. In the household survey conducted for this thesis, 69% of male household heads and 74% of female household heads reported having attending no formal schooling. There is only one adult currently living in Orbili who is comprehensively literate and numerate. No individuals currently living in Tabier village are comprehensively literate and numerate, although there are 2-3 teenage boys in each village are nearing completion of secondary school and are on their way to becoming comprehensively literate and numerate. A major barrier to literacy is that the language of school instruction is English, with very little written work in the local language, and as such literacy rests on English language acquisition. The majority of adults have not completed primary school. At the time of the field work there was no school or medical facility in Orbili village. Tabier has no medical facilities but does have a primary school, where the children of both villages attend. The school in Tabier is underperforming. They did not have a single child pass the national standard in the previous six years at the time of the final field visit, which means that children are finishing school after six to ten years of daily schooling without knowing basic maths or how to read or write.

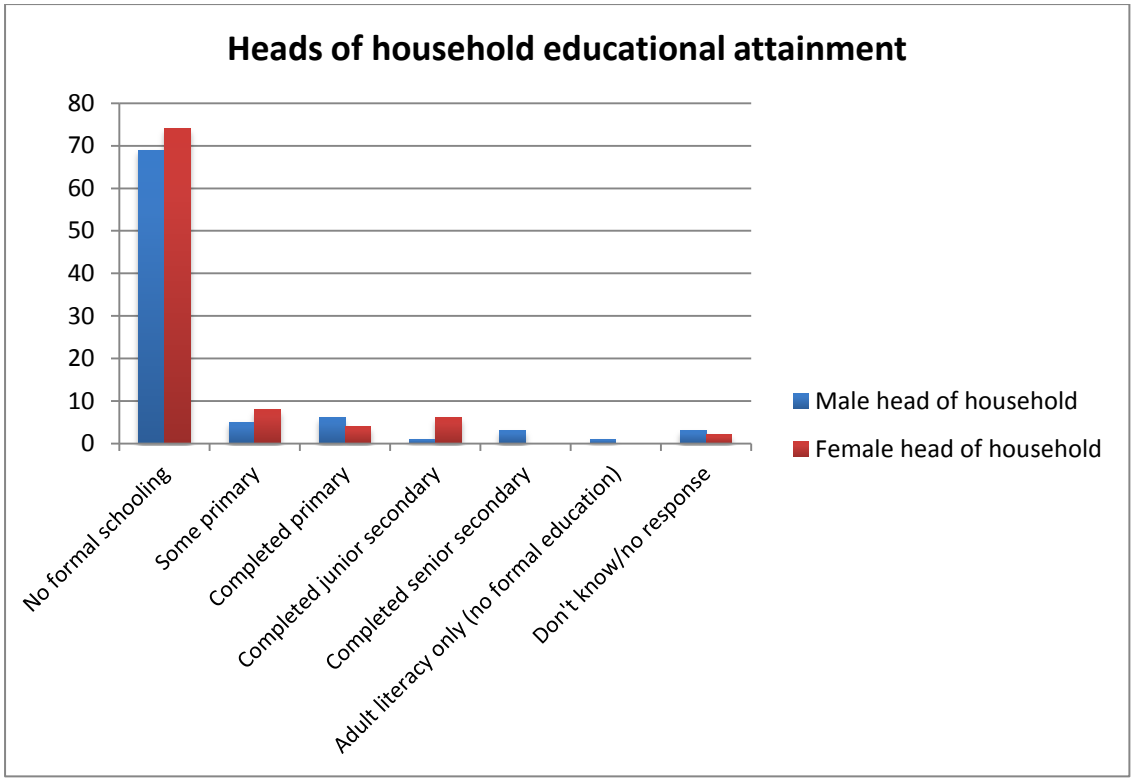

Figure 3: Head of household's highest level of education
Source: author's household survey data

According to my household survey, the average household size in Orbili and Tabier is 5.4 persons, which is above the national average of 4.1 person (Ghana Statistical Service (GSS), 2008). The size of households is shown below in Figure 4: Household size. The large households tend to include non-birth children – typically the children of the siblings of male household heads who do not live with their birth parents because of migration to the south for labour or as a result of parental death or illness. All five households with ten or more family members, shown in Figure 4 Household size include non-birth children. This is an important distinction as prevailing discourse on large families in the north implies excessive births. At least in these two villages, very large families are the product of

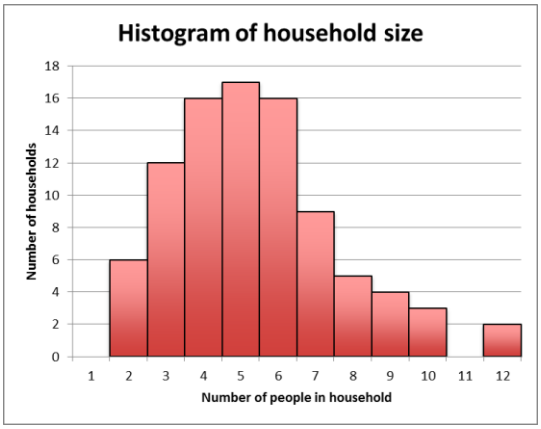

Figure 4: Household size
Source: author's household survey data

a traditional adaptive strategy to parent nieces and nephews as needed. Further, families with more than one wife tended not to be counted as large families as in all instances these individuals are elderly with all but one adult child living outside the household independently. This highlights another emerging norm in the case study, which is a movement away from multi-wife households among the younger generations. However, two younger households were considering expanding with a new wife, as expressed in interviews, although this was expressed as a coping strategy for labour shortage as the wives become more involved in economic activities as more adults within the extended family migrate seasonally for wage labour.

Fifteen individuals (18% of the population) self-reported having a disability of some kind in the household survey. Although this is likely an underestimation, as compared to observed rates of disability, it is still far higher than the national average of 3% estimated by the 2010 Ghana Population and Housing Census. 10% of households report having a child with a learning disability of some kind. This is also likely an underestimation as compared to observation and interviews with teachers and government officials within the education ministry. Additional data and literature on disability is presented in Chapter 6: Alcohol consumption, developmental disabilities, stress, and poverty.

In the two villages, there are 72 households headed by a man and woman jointly (80% of population), nine polygamous households with more than one wife, six man-headed households with no adult women residing in the home (all widowers or divorced), and three woman headed households. This is shown below in Figure 5: Household type. However, the later households are de facto woman-headed households because the women's husbands have migrated. These households would not self-identify as being exclusively headed by

women as the husbands have a decision-making role remotely. In instances of the death of a husband or a divorce, women typically return to their birth homes or become integrated into another household. As such, the literature on the vulnerabilities specific to women headed households does not easily fit the situation of these three woman-headed households. 35 of the households report a member of the household living permanently in the southern region of Ghana, which is commensurate with the literature on permanent and seasonal migration for the region (Hjelm & Dasori, 2012).

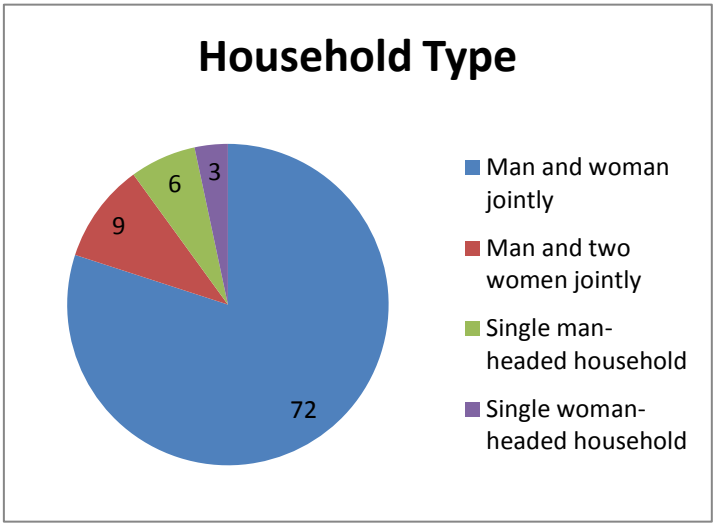

Figure 5: Household type
Source: author's household survey data

1.6.2 Environmental conditions, farming, and industries

A number of environmental conditions make the region particularly challenging to farm in, which are outlined in greater detail in Chapter 2 in the section on adaptation and environmental change. Unlike the bi/tri-modal rainfall zones in the south of the country (two or three rainfall seasons per annum), the rainfall pattern in the north is uni-modal. The length of the growing season is also the shortest in the country, with 180 days, compared to double that of 364 days in the south-western region of the country. Most people depend on rain fed agriculture for irrigation using handheld buckets, hand dug wells, small dams or boreholes. A lack of mechanised pumps and mechanized tilling equipment severely restricts the amount of land people are able to farm. This impacts their yield, income, and food security. Farms close to rivers engage in riverside gardening during dryer months (May-September) when they are unable to cultivate large areas. Idleness, especially among men

with fewer responsibilities for cooking, cleaning, and childcare, is common in the dry months, sometimes leading to social problems and excessive consumption of alcohol (discussed in Chapter 6). Seasonal migration further south is also a common strategy to avoid idleness and gain income during non-productive farming months (Hjelm & Dasori, 2012).

The north-south divide in the country is pervasive in development discourse within the country (Jatoe et al., 2012). It was the explicit policy of the colonial government to maintain northerners as an uneducated labour pool for the educated south and this legacy is still felt today (Shepherd et al., 2006). Combined with less favourable, more arid, agricultural conditions, history of religious expansion, and cultural diversity within tribes, the northern regions (Northern, Upper West and Upper East), are very different environmental and socio-economic places than the southern regions. Few infrastructural investments have been made in irrigation dams, roads, health services, employment opportunities, and education.

There is a major trend of seasonal and permanent migration south to work in urban centres and on southern farms – where people work in often taxing conditions without job security or any formal workers' protection provisions. These labour patterns are highly gendered with women taking lower pay migratory work that often leaves them vulnerable to exploitation. For example, informal retail selling from baskets that one carries on the head in southern cities by northern women has been described as one of Ghana's greatest policy failures. This practise, called 'kayaye', is known for long hours in the open sun, with high risk of being hit by cars, sleeping rough with high exposure to rape and assault, and returns on investment that barely allow sellers to subsist (van den Berg, 2007). Women also labour in food preparation and brewing for low pay. In contrast, men tend to work in farms or day

labour on construction sites for higher pay. More data and literature on migration as a coping and adaptive strategy is presented in Chapter 4: Adaptive and Coping Strategies.

1.7 Road map for this thesis

This section provides a road map for the reader of how this thesis is structured and what to expect in each chapter. Chapter 1 comprises this introduction. Chapter 2 provides a review of literature and theory. Chapter 3 explains the methodologies used. Chapters 4 through 6 are results chapters. Chapter 7 is a conclusion chapter. Each of the following chapters are summarised below.

1.7.1 Theoretical and methodological chapters (2-3)

1.7.1.1 Chapter 2: Literature and theory

This chapter presents the background literature on the systemic challenges facing smallholder farmers in a changing climate and the theoretical framework applied to the analysis. It includes the conceptual and operational definitions of all concepts, and how they fit together to guide the analysis. It details the framework that has been applied to answer the primary and sub research questions. It then provides a brief review of the literature on which this thesis builds on and refers to throughout the subsequent chapters. Since the literature on climate adaptation is vast, only a select subset of the most relevant literature is summarized that is specifically concerned with the nexus of food security, vulnerability, and global environmental change in the developing country smallholder farming context. The synthesis draws from literatures across multiple disciplines including geography, sociology, anthropology, social work, cognition science, climate science, agriculture science, public health, psychology, behavioral economics, religious studies, development studies, and gender studies.

1.7.1.2 Chapter 3: Methods

This chapter explains the rationale for choosing multiple methods and the literature supporting methodological pluralism. It includes substantive sections on methodological theory, including grounded theory as a research methodology and action research as a feminist approach to social inquiry. It then details each method used and how it was developed and applied. The chapter explains how all results have been triangulated and analyzed and why the results of a subset of the methods were dropped to maintain a high level of rigor. This chapter concludes with a section on the limitations of each method and key challenges experienced during the implementation of specific methods.

1.7.2 Empirical chapters (4-6)

This section highlights the link between each of the three empirical chapters. The following section outlines each of the chapters individually. The first of the empirical chapter examines the adaptation and coping strategies within the case study and how these differ between individuals and households based on points of social differentiation. This includes making clear the stressors and vulnerabilities underlying each adaptation and coping strategy and how the response spaces available to individuals have been shaped. The first empirical chapter (Chapter 4) is the broadest in scope and seeks to explain the differences in productivity, and adaptability of the farming families within the two case study villages. The remaining two empirical chapters are deeper in scope and each tackle a subset of the stressors and coping/adaptation strategies outlined in Chapter 4. These chapters are rooted in grounded theory and explore the local drivers that are limiting or exacerbating differences in adaptive capacity and responses spaces, which emerged through the research process.

Chapter 5 addresses undernutrition in depth, covering both the irreversible impacts of undernutrition which are gendered and disproportionately affect children with broad implications for community-level resilience, as well as the interdependent stressors that produce the levels of undernutrition and unequal food access that is experienced by families within the case study communities. Chapter 6 outlines alcohol consumption as a coping strategy to poverty and environmental change induced stress. In particular, the chapter presents novel data on one of the most challenging impacts of alcohol use to manage stress, which is the production of developmental disabilities – most notably fetal alcohol spectrum disorders (FASD).

Both Chapters 5 and 6 convey the complexity of community level vulnerability and the ways that deprivations are experienced unequally between families, within families, and in the case of child stunting and FASDs, between generations. The three empirical chapters make the case that environmental change has wildly differing impacts on adaptive capacity based on points of social differentiation. As such an intersectional, context-specific approach is required to achieve food security in these contexts that fulfills the SDG pledge to 'leave no one behind'.

1.7.2.1 Chapter 4: Adaptation and coping strategies

This chapter critically examines the impacts of environmental change by examining the adaptation and coping strategies employed within the case study region as it pertains to their social differentiation. It will argue that response spaces are limited by micro and macro social differentiation as well as co-stressors of a non-climatic nature. The chapter discusses the role of women's agency and self-determination and presents how mini-shocks in particular disproportionately have impeded women's ambitions. The chapter outlines how micro and macro social differentiations and the presence of co-stressors helps to partially

explain the differences in adaptive capacity between households despite similarities in land holdings, family size, access to credit, educational levels of parents etc. Further, it will explain how these micro-differentiations have played an important role in determining whether the actions taken are adaptive or coping/maladaptive.

The chapter presents the alternative/supplementary wealth ranking as a magnification of income difference, which was developed to produce household income data that was more reflective of the kinds of qualitative responses that were given by participants to explain inter household inequality. The results of the alternative ranking are presented. Although they are limited in breadth as they are difficult to measure empirically, they do provide insight into local perspectives on inequality and provide valuable insights into how adaptive capacity and food security might vary based on these indicators if they could be measured more substantively.

The chapter then presents a spectrum of coping strategies in response to poverty and low farm productivity which are exacerbated by environmental change that are used within the case study region. It provides an overview of how these are experienced differently by individuals and households based on social differentiation. The chapter presents the most common adaptations, which is the reliance on off-farm income during years of poor harvest and reliance on social networks. In both cases, the household treatment of money changes and inter and intra household relationships can become strained.

The more extreme coping strategies to avoid destitution and which incur higher risk are then outlined. This includes seasonal and permanent migration to southern regions, which is a gendered migration pattern with heightened risks for young women in particular and lower pay-off on average for women as compared to men. The chapter presents the earning

potential of young men and women who migrate seasonally in particular and how their varied income shapes their ability to invest in future livelihood options. Using an intersectional approach to analyzing adaptation and coping strategies, the programmatic challenges to improving food security and adaptive capacity for the most vulnerable are then made clear.

1.7.2.2 Chapter 5: Nutrition and food scarcity

In grounded theory manner, nutrition and food scarcity became a priority research area during the first wave of data collection because of the observable high rates of edema of the abdomen among children and frequent reference to the 'lean season' when adults and children become thin, weak or tired leading up to harvesting season. This chapter presents the evidence from the literature on the link between healthy physical and cognitive development and nutrition, particularly within the first 1000 days from the beginning of a woman's pregnancy to the child's second birthday. It demonstrates how childhood nutrition in particular plays a central role in community resilience because of its impact on a wide spectrum of life outcomes which affect adaptive capacity to environmental change. It highlights the evidence linking undernutrition to higher rates of chronic illness, reduced physical and cognitive abilities, lower educational attainment, higher rates of developmental disability, and lower income, as well as evidence that children with low birth weight are more likely to be younger parents who give birth to children with low birth weight. It also presents promising but so far limited evidence exploring the under researched area of parental stress and its impact on reduced infant cognitive stimulation and increased consumption of alcohol during pregnancy. The analysis is intersectional and considers intergeneration resilience and adaptive capacity.

The chapter then presents multiple sets of primary data on household food consumption and food security. The data presented was collected via the food consumption module from the WEAI, child growth and development records, hospitalization records from acute malnutrition and anemia, community focus groups, interviews with health professionals and extensive direct observation.

I argue that undernutrition in the case study ultimately stems from poverty, low levels of knowledge on the nutritional needs of children and the prioritization of 'productive bodies' when food is scarce. Unequal distribution of food within the home between adults is presented, which is a heavily gendered pattern. The discrepancies in food consumption within the household increase during periods of food scarcity, usually as a result of crop failure and/or high food prices.

Sex selective feeding, favoring male children, including sex selective breastfeeding is presenting using child growth records, direct observations of feedings and interview results. I also argue that son preference is also impacted by wealth, whereby wealthier families are able to use more resources to support sons leading to greater difference in growth between male and female children in wealthier settings and less of a gap in poorer settings. Multiple motivations for this pattern of son preference are presented and supported by interview responses with community members. The dilemma between selling and eating nutritious foods is also presented.

I conclude that regardless of the cause, gendered patterns of food distribution during pregnancy and at the early stages of life pose significant threats for future inequality between men and women and are part of a larger trend of incremental disadvantages to girls and women. The trends presented also call into question the theory of change that

guides most food security interventions in the region – the belief that greater access at household level leads to benefits for all household members. The evidence supports the claims that adaptive capacity begins at the antenatal stage of life and must be nurtured through each life phase. The chapter ends with a set of policy recommendations to address the underlying causes of under nutrition and food scarcity.

1.7.2.3 Chapter 6: Alcohol consumption, developmental disabilities, stress and poverty

This chapter is another deep dive into a complex problem. A major coping strategy for poverty related stress and hunger is the consumption of alcohol at high levels. In a grounded theory manner, additional focus groups were added to the research plan to better understand an observable trend of developmental disabilities, visibly pregnant women drinking alcohol and frequent reports of family and community disputes as a result of alcohol consumption.

The final empirical chapter presents qualitative data from individual interviews and focus groups, triangulated by observations, on alcohol consumption and the management of stress. The data is limited as no medical assessments were done and the sensitivity of the subject meant that a small number of interviews on the subject could be completed reliably. The chapter then presents multiple partial explanations for the prevalence of alcohol consumption during pregnancy and high levels of alcohol consumption among young adult men. It details the impact on adaptive capacity and poverty with specific treatment of the prevalence of fetal alcohol spectrum disorders (FASDs), chronic undiagnosed ill health and physical weakness that reduces the land area which can be manually farmed.

The chapter concludes that maladaptive strategies to manage stress and the prevalence of FASD related disabilities may be a much stronger impediment to building communities with

high adaptive capacity than previously considered. A greater focus on these stressors is needed in both programming and research. The chapter ends with policy recommendations to address the underlying stressors and consumption patterns that negatively impact health and farming capability.

1.7.3 Conclusion chapter (7)

The final chapter summarizes all results, and re-iterates how the research has contributed to the body of literature on climate change adaptation and food security. It discusses the limitations of the research and the generalizability of the case study findings. The chapter concludes by pointing out important areas for future research, which this thesis was unable to address. For example, it lays out the importance of measuring worldviews and other intangible points of social differentiation. This was attempted within the research project but the results were difficult to analyze and the rigor of the methodology developed was not high enough to be included in this thesis.

1.8 Conclusion

This chapter has outlined the rationale and structure of the thesis. It has explained how the thesis project fits in the context of the wider SIA project and provided basic background information on the case study, including how the case study was selected. The chapter has summarized each of the remaining chapters and highlighted how each builds off of the previous chapter to advance the central arguments of the thesis. The subsequent chapter will summarize background literature on the systemic challenges facing small holder farming families amidst existing chronic poverty and GEC. It will present the novel conceptual framework developed for the analysis and additional theory pertinent to the research approach employed, including systemic reflection and the positionality of the researcher.

2 Literature and theory

This chapter presents a review of the overarching literature, concepts and theory referred to throughout each chapter, from which the hypotheses of this thesis are based. Each empirical chapter (Chapters 4-6) also includes a review of literature that is specific to the content of that chapter. Since the literature on climate adaptation is vast, only a subset of the most relevant literature is summarized in this chapter. This literature is specifically concerned with the nexus of food security, vulnerability, and global environmental change in the developing country farming context. The synthesis draws from literatures across multiple disciplines including geography, sociology, anthropology, social work, cognition science, climate science, agriculture science, public health, psychology, behavioral economics, religious studies, development studies, and gender studies.

The chapter begins by outlining the challenge at hand for small holder farmers experiencing and making efforts to adapt to the environmental changes that are impeding food and livelihood security, amidst pre-existing poverty, all of which is mediated by social factors. Then, the conceptual framework is presented. The conceptual framework is grounded in and emerges from applying a systems thinking approach to identify concepts and theories, which come together to form the conceptual framework. The major ideas that have informed the conceptual framing of the analysis are presented in the following order: critical systems theory, adaptation and resilience theory, social differentiation, feminist research theory, and the capabilities approach.

The chapter will then provide a roadmap outlining the literature introduced within the empirical chapters (4-6), which are specific to the content of that chapter. It will end with a conclusion section.

2.1 The challenge for smallholder farming families

This section provides a brief summary of the challenge for smallholder farming families experiencing environmental change and food insecurity amidst poverty and social deprivations. This section has been divided into four subsections: (1) environmental change, (2) food insecurity, (3) social deprivation and poverty, and (4) adapting to change. The section will be followed by the conceptual framework, through which the challenges outlined in this section will be analyzed.

2.1.1 Environmental change

The environmental change experienced within the case study region is a combined result of (1) local level land-use change, (2) natural decadal and annual variation of rainfall due in part to the movement of the tropical rain-belt known as the Inter-Tropical Conversion Zone (ITCZ), and (3) anthropogenic climate change. Communications materials of development NGOs and civil advocacy groups tend to simplify the environmental changes experienced in areas like the case study region to attribute all changes to a rise in global emissions. There is a discernable shift from the dominant NGO narrative in the 1980s and 1990s in West Africa which sought to attribute negative changes to poor farm practice and tree felling, blaming women in particular (Fairhead & Leach, 1998).

It is difficult to pull apart the consequences of present-day environmental changes, such as a specific crop failure, and attribute these consequences to any one contributing phenomenon in real time. One can only analyze long trends and make judgments about how much of a particular trend is above what might be expected on annual and decadal time scales. When the term climate change is used in this thesis, it is in reference specifically to long-term climatic trends. The northern regions of Ghana including the case study region

have experienced more intense impacts of climate change than the southern regions: increases in the number of hot days and hot nights, decreases in the number of cold days and cold nights, and annual reductions in annual rainfall since the 1960s (Mcsweeney et al., 2010). Similarly, projections for warming estimate greater warming in the northern regions with substantially more hot days and hot nights. Projections for future precipitation are less clear with approximately half of the models projecting more rain and the other half projecting less (Mcsweeney et al., 2010).

This thesis does not attempt to attribute specific patterns or weather events in the case study to climate change. Rather a similar approach to Bryan et al. (2013) is taken. In their study of community-based analysis on adaptation decisions in Kenya, Bryan et al. consider climate change as 'perceived changes in average temperature, average rainfall or rainfall variability of the past 20 years' (Bryan et al., 2013, p. 30). However, this thesis will refer predominantly to environmental change, rather than to climate change, which more accurately conveys the extent to which the farming conditions one experiences are the culmination of multiple social and bio-physical drivers, including a rise in global mean temperature as a result of global emissions.

2.1.2 Food insecurity

There is a strong literature base attributing current and estimating future negative effects on farm yield in western Africa to these environmental changes, especially as it pertains to shortened growing seasons (Niang et al., 2014; Sarr, 2012). Low farm yield is one of many contributing drivers to food insecurity within the case study region. The food system of the case study region has been described as 'a great paradox' (Nyantakyi-Frimpong & Bezner-Kerr, 2015) with the majority of people engaged in agriculture (above 80%) yet with food insecurity and malnutrition widespread in the Upper West region (Rademacher-Schulz et al.,

2014; Ghana Statistical Service (GSS), 2011; Ghana Statistical Service (GSS), 2008). The World Food Programme (WFP) estimates that 16% of households in the Upper West are moderately or severely food insecure with more than one in five smallholder farming families being moderately or severely food insecure (Hjelm & Dasori, 2012). Half (49%) of smallholders (holding five acres or less) in the northern regions of Ghana are classified as poor. Food insecurity and poverty is in turn experienced unequally with the least food secure households tending to have smaller farms, be female-headed (of any education level) or male-headed with little or no formal education (Hjelm & Dasori, 2012).

2.1.3 Social deprivation and poverty

The negative impacts of environmental change and food insecurity are experienced unequally as a result of social deprivation and underlying poverty. In times of food scarcity, there is frequently a pecking order dictating which bodies benefit from sufficient quality foodstuffs (Hyder et al., 2005). Women are disproportionately affected by food insecurity in the case study region. Multiple ethnographic studies of northern Ghana have documented women's rations being controlled by male family members involuntarily (Nyantakyi-Frimpong & Bezner-Kerr, 2015) or women voluntary reducing their meal size or frequency in order to provide more food for children or male adults within the homestead (Quaye et al., 2016; Quaye, 2008). The effects of food insecurity on children are severe in the Upper West with an estimated 38.1% of rural children having stunted growth and 10.8% of children categorized as wasting (Amanor-Boadu, 2014; Maberry et al., 2014). These statistics highlight a major focus of this thesis – how impacts vary based on points of social differentiation and in particular how impacts vary between and within households of the case study region.

The challenge, as outlined in this section, has become absorbed within the remit of nearly all major poverty alleviation and development institutions (African Development Bank et al., 2002). The need to reduce existing poverty and food insecurity in addition to building resilience to environmental change – now and in the future – is an urgent necessity. Solutions to partially address the challenge facing smallholder farmers have been framed through multiple programmatic lenses including 'climate smart development', 'adaptive social protection', 'resilient livelihoods', and a suit of interventions classified as 'climate change adaptation (CCA)'.

2.1.4 Adapting to change

The environmental changes and other stressors (inflation, poor access to credit, limited infrastructure, etc.) to which one must adapt within the case study region are typical of West African semi-arid subsistence oriented farming areas where crops are rain-fed and where livestock and trade make up a small portion of residents' holdings and income. For these communities, adaptation frequently involves adjusting to changes in the following biophysical dimensions: rainy season timing, intensity of rain, the advent of gaps within the rainy season during vulnerable periods, elongation of the harmattan season, the arrival of new pests and diseases affecting crops and livestock, insufficient rain for crops to be taken to harvest, and crop damage from strong winds and violent storms.

Smallholder farmers engage in both autonomous (Thornton & Manasfi, 2010) and assisted adaptive and copy strategies (Care, 2011). However, there is increasing evidence that more external supports are required to engage in beneficial adaptive strategies because underlying poverty and restricted access to markets, quality inputs, credit and climate information remains a major barrier (Bryan et al., 2013). This thesis seeks to provide clarity on socially differentiated responses to environmental change as well as to examine the

implications of findings for humanitarian and development oriented interventions and supports. To do so, a specific theoretical framing is required. The next section will outline the theories and concepts used in the analysis that combine to make the conceptual framework.

2.2 Multiple theoretical lenses

This section will outline the theoretical lenses used to examine the above outlined challenges. Fundamental to this thesis is an appreciation of complex interdependent causes and effects, across scales and levels, disciplines and sectors, and across all dimensions of life, that interact to produce socially differentiated experiences and outcomes with respect to climate change, livelihoods, and food and nutritional security. Accordingly, this thesis applies Systems Thinking (Matthews, 2004; Midgley & Ochoa-Arias, 2004) and Critical Systems Theory (Cabrera, 2006; Midgley et al., 1998) in its theoretical and methodological approaches to examining these relationships.

In this thesis, taking a systems approach has meant using a diverse range of theoretical perspectives, applying similar boundary judgements to the theories applied as is done with the data itself. Different theories and methods suggest different system boundary judgements; therefore it is important to use a range of theories and methods in the process of understanding the context of the case study. Theoretical and methodological pluralism involves using a variety of different theories and methods in 'a coherent manner, becoming aware of their different strengths and weaknesses, to address a corresponding variety of issues' (Midgley et al., 1998, p. 61).

This thesis looks at the same challenge through multiple lenses to better understand the broader system, as is depicted in the drawing in Figure 6: Multiple lenses. The application of

theoretical pluralism used in this thesis will be explained in this chapter. The approach is consistent with Gregory's notion of discordant pluralism (Gregory, 1996), acknowledging that often different theoretical perspectives are discordant, and cannot be resolved into a single overarching theory without distortion and loss of nuanced information that is contained in each perspective. Each perspective should be appreciated for what it is and the differences between them are keys to deeper understanding.

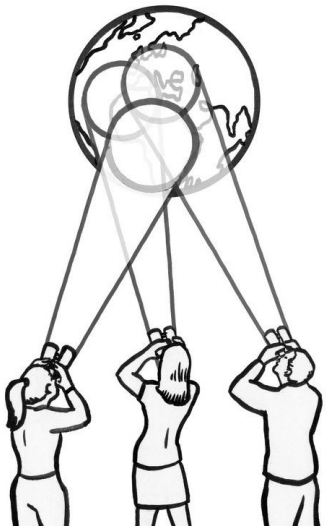

Figure 6: Multiple lenses. Source: Helfgott, 2014.

Accordingly, rather than fitting each of the bodies of literature used to provide the theoretical foundations for this thesis into a single totalizing framework, each is applied as a lens to the topic at hand, each providing a particular perspective and nuanced information. The theoretical lenses used in this thesis are (1) adaptation and resilience theory, including an application of systemic reflection, (2) food systems, (3) social differentiation and intersectionality, (4) feminist research theory including positionality and systemic intervention, and (5) Sen's capabilities approach including the concept of multi-dimensional poverty and theory on inequality. Each of these will be covered in turn in the following sections with an explanation of how each supports this research. First, critical systems theory is explained, which is the central approach that guides the selection of all other theories. This includes a brief summary of systemic boundary critique. Note: the application of methodological pluralism will be covered in Chapter 3: Methods.

2.2.1 Critical systems theory

This thesis draws heavily on systems thinking literature - which provides a set of habits or practices used to approach complex problems and considers the overall system rather than component parts (Midgley & Ochoa-Arias, 2004). Systems Thinking is a broad term that itself encompasses a large diversity of theories and methods, is used widely, and means different things to different people. The branch of Systems Thinking which is key to this thesis is Critical Systems Theory (CST) (Midgley, 2000; Ulrich, 1983). CST acknowledges that due to the interconnectedness of social, physical, economic, political, and ecological phenomena across scales, a comprehensive and objective definition of 'the whole system' is impossible and boundary judgments are inevitable, partial, and value-laden (Midgley et al., 2007; Midgley, 2000; Ulrich, 1993; Ulrich, 1987; Ulrich, 1983). In other words, since it is not possible to have a 'God's-eye view' of all that is interconnected (which would snowball to include the universe and all within it), one must decide on limits of what can be analysed for a particular question, while acknowledging interconnectedness that make affect the phenomena in question beyond the limits. Those limitations are the system boundary judgments.

Developed by Churchman (1970) and expanded on by Ulrich (1993; 1987; 1983), boundary judgments are a process to 'demarcate between what is in and what is out of a particular construct' (Cabrera, 2006, p. 1), acknowledging that system boundaries are not given objectively and non-problematically by the structure of reality (Matthews, 2004). A boundary critique makes these judgements explicit, including how the analysis would differ if more was 'swept in' or 'swept out' of the system under consideration. Systemic boundary critique involves examining and re-examining taken-for-granted assumptions about what is and isn't included within system boundaries, from the perspectives of diverse stakeholders

and experts; and taking into account the possible consequences of different system boundary judgements for intervention (Midgley et al., 1998). Given that different theories and methods guide the researcher's boundary judgements, CST suggests the use of theoretical and methodological pluralism. This involves using a variety of different theories and methods in 'a coherent manner, becoming aware of their different strengths and weaknesses, to address a corresponding variety of issues' (Midgley et al., 1998, p. 61).

Midgley's specific treatment of marginalization within systems theory explores the conflict arising when the viewpoint of one group (according to their boundary judgment) differs from that of another (Midgley & Pinzon, 2011). When the value judgments (or boundary judgments) of a dominant group become institutionalized, a particular worldview and narrative is created which may result in conflict. The same process of reflection works at an individual level in the consideration of differing boundary judgments not only between groups but also within groups, families, and so forth. This idea is central to the analysis of this thesis, which seeks to uncover how marginalization of particular individuals and households within the case study area based on points of social differentiation, has in turn impacted their ability to adapt and live well in a changing climate. In the pursuit to 'leave no one behind' (UN, 2015) which was outlined in Chapter 1, one must explicitly *sweep in* to the system under consideration that which is impeding or facilitating adaptation for the most marginalized. To do so, we must first cover the theory behind adaptation and resilience, which is the first of five theoretical lenses to be presented in this chapter.

2.2.2 Adaptation and resilience theory

This section will introduce adaptation and resilience theories, including the definitions used within this thesis and the rationale for their selection. I then introduce the concept of systemic reflection, outlining the 'iterative process used to analyze applied concepts,

including adaptation. Adaptation and resilience is central to my thesis, which aims to uncover how adaptive capacity and response spaces differ based on social differentiation, and how the outcomes based on those differentiated capacities and response spaces might be made more equitable.

Adaptation, the capacity to adapt (adaptive capacity), and resilience have been added to the development lexicon (Horn-Phathanothai & Tanner, 2014). I argue that the definitions of adaptation, adaptive capacity, coping, and resilience each influence how a system is analyzed and therefore impact the results and recommendations coming out of the analysis. Like other terms such as participation and empowerment, adaptation, adaptive capacity, and resilience have been assigned specific meanings within the development context. The following paragraphs discuss the meanings of these terms, but it is important to acknowledge first that they are value-laden and represent particular ideologies, despite the 'aura of infallibility' (Kenny & Clarke, 2010, p. 3). Kenny (2002, p. 284) describes such terms as 'Trojan horses for a new set of ideological predispositions' -- ushering in actions and programming without an examination of the terms in practice. With this in mind, adaptive capacity and other terms within development and climate change discourse will be used critically throughout this thesis, being as transparent as possible about the positionality of the author and of the persons and institutions referred to within.

Adaptive capacity is defined by the Intergovernmental Panel on Climate Change (IPCC) as 'the ability of a system [human or natural] to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with consequences' (IPCC, 2007). Adaptation is action based on the adaptive capacity. Resilience is 'the capacity of a system to absorb disturbance and

reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks' (Walker, Holling, Carpenter, & Kinzig, 2004, p. 2; Holling, 1973).

Communities or individuals who are resilient or have high adaptive capacity respond to or cope with change quickly and easily (Clark, 2012; Smit & Wandel, 2006; Deneven, 1983), for example by capitalizing on a bumper harvest through storage in order to ease the burden of poor harvest seasons and reduce variability of food supply between seasons and years. The most adaptive communities are able to adjust and benefit from change. Communities with low adaptive capacity frequently rely on short term coping mechanisms that leave them worse off in the long term – for example, cutting fruit-bearing trees for emergency fuel or selling off livestock after they have become lean from drought and have lost their value. A strong distinction is made within the humanitarian and development community of practice as to whether those adjustments are adaptive or maladaptive, because of its clear implications for development and livelihood outcomes.

Several scholars use the term adaptation to refer specifically to actions that render the actor better-off. Osbahr et al (2008), for example, define adaptation as 'the adjustment of a system to moderate the effects of climate change to take advantage of new opportunities' (Osbahr, Twyman, Neiladger, & Thomas, 2010, p. 30). By this definition, very few of the actions taken within the case study would be considered adaptation, as few individuals are able to adapt and demonstrably benefit, as is implicit with the wording of taking advantage of an opportunity. Other studies have similarly found a dearth of adapting and benefiting because so few can make the financial investment needed to engage in more expensive, beneficial strategies (Bryan et al., 2013). Other scholars factor in timescale heavily in the

categorizations of adapting and coping (Smit & Wandel, 2006; Folke et al., 2002), with adaptation referring to action in response to or in anticipation of long-term climate change, while coping refers to actions in response to short term climate-induced stresses with a focus on returning to pre-shock states. In this thesis, the more modest IPCC 2007 definition of adaptive capacity, as cited earlier, is used: this includes a broad range of adjustment activities as adaptations (i.e. coping, maintaining, and taking advantages) but distinguishes between actions which includes maintenance of well-being (return to a pre-shock stake) and coping actions that lessen the shock to make the negative consequences more bearable.

This thesis takes the perspective that the categories of adapting and coping are not mutually exclusive. For example, as Eriksen and Kelly (2007) have noted, '…improving coping mechanisms represents an important component of an adaptive strategy' (Eriksen & Kelly, 2007, p. 506). Further, as will be demonstrated in the data presented in Chapter 4, which responses are considered adapting or coping varies based on the boundary judgements placed around that action, such as the consideration of who benefits and at what timescale.

An individual's ability to adjust to changes by taking actions is mediated by the response space they inhabit. This thesis builds off of the conceptualization of the response space by Osbahr et al. (2010). A response space is 'the set of options open to actors trying to enact multiple livelihood and development outcomes' (Osbahr, Twyman, Adger, & S.G., 2010, pp. 1-2). Any action taken, whether adaptive or coping, exists within a response space, which has been shaped by multiple socio-economic and biophysical drivers. The authors argue that actions within a response space are limited by the scarcest of the sets of capital – natural, social, human, and financial – that adaptation actions draw upon (Osbahr et al., 2010; Adger et al., 2005; Lipton, Ellis, & Lipton, 1996). This thesis builds upon this conceptualization to

demonstrate the plurality of response spaces that exist between and within households of the case study and how this produces unequal adaptation.

Many studies have specifically framed the analysis of responses as coping or adaptive. Importantly, as Eriksen and Kelly note, '[f]ocusing on one type of factor rather than the other can determine the fundamental approach of any study and its conclusions' (Eriksen & Kelly, 2007, p. 506). They provide several examples to this end: an adaptive capacity focus leading to recommendations of technological, infrastructural, or institutional capacity nature. Likewise, a coping focus leading to recommendations about inequality or vulnerability of specific livelihood options. A CST approach, especially with the use of systemic reflection, which we will outline in the next section, helps to partially address the biases associated with these latent analytical trajectories. It does so by forcing the researcher to consider the framing of the subject of analysis and make intentional and justified decisions about what is swept in and out of the analysis, including the actions within the response space – both adaptive and coping. A robust consideration of these responses in a particular context requires the applications of systems thinking in the form of systemic reflection. This will be covered in the next section.

2.2.2.1 Systemic reflection

Operationalizing adaptation and other tools to build resilience involves systemic reflection. The diagram entitled Figure 7: Iterative framing outlines the iterative framing cycle for resilience and vulnerability designed by the SIA principle investigator (Helfgott, 2014). In order to implement adaptation meaningfully and ethically, it is necessary to talk about adaptation of what, to what, of what magnitude, over what timeframe, and from whose perspective. Thus any method used to characterize adaptation quantitatively or qualitatively relies on a definition of the scope and scale of the system under consideration, of the

measure of improvement or benefit within those boundaries and of the type and magnitudes of disturbance to be considered and the timescale to be considered.

Figure 7: Iterative framing. Source: Helfgott, 2014.

The section has outlined the first theoretical lens applied to the research – adaptation and resilience – as well as the approach taken to systematically reflect on the system under consideration. Systemic reflection will also be included under feminist research theory to systematically reflect on the concept of empowerment, on page 49. The next section will introduce the theoretical lens of food systems.

2.3 Food systems

This section will summarize the food systems approach, which frames the discussions on food security through a systems approach. For the world's poorest people, food security is fundamentally an issue of food access, affordability, and usage (Ericksen, 2008); food insecurity is driven by multi-level structural barriers that prevent individuals from consuming sufficient and nutritious food throughout each season of the year, at all stages of their lives. For subsistence-oriented farmers, adapting agricultural practices is often an important component of food access but is not the only point of interest within their food system. This is in spite of the tendency for climate change adaptation interventions targeted at farming families to be focused on intensification of farm production to the exclusion of all else. Achieving food security in these contexts requires consideration of the entire food system, which includes production, processing, packaging, transport, storage, markets and retail, and consumption (Ingram et al., 2010) as well as specific threats to this system such

as price variability/volatility (Ericksen et al,. 2009). All these food system activities impact on food and nutritional security, and are all subject to concerns regarding access, affordability, equity, marginalization, and vulnerability.

Even though it is possible to refer to 'food systems', defining the boundaries of food systems in concrete terms is both difficult and controversial; stakeholders have different values, interests, and ideas. Applying CST to food systems allows us to deal transparently, reflectively, and inclusively with these issues (Midgley & Ochoa-Arias, 1999). Further, understanding how environmental change and other drivers are affecting food security requires specific boundary judgments on what is considered adaptation, coping, resilience, and other terms that describe one's ability to engage in the strategies used to moderate food insecurity. This is particularly important for avoiding unintended consequences of community programs from a myopic view that does not consider broader cultural and community forces -- from access to markets, to alcohol as a coping mechanism, to status of gender. To fully consider how the food system is experienced differently, especially as it pertains to a society's most vulnerable, a framework for categorizing our social world is necessary. This will be covered in the next section.

2.3.1 Social differentiation

In this section I introduce the theory behind the sociological concept of social differentiation. Then I introduce the application of intersectionality to the social differentiation framing, highlighting the ways in which multiple points of social differentiation intersect. These concepts are important for my argument because barriers to food access, availability and usage are experienced differently based on points of social differentiation.

The consideration of gender and how perspectives on adaptive actions can vary based on gender is important. However, a gendered analysis does not reveal the full spectrum of difference, and the application of the concept of social differentiation is necessary. This thesis explores multiple points of social differentiation that impede one's ability to live well and attain food security in a changing climate. The concept of social differentiation has sociological roots, largely stemming from Weber, Durkheim, and Simmel (Weber, 1922; Simmel, 1907; Durkheim, 1893). Early work on social differentiation sought to categorize populations. For example, societies based on kinship relations with homogenous labour patterns were considered to have low levels of social differentiation while industrial societies with specialist and ordered labour (assumed to be at an advanced stage of social evolution) had high levels of social differentiation.

The contemporary use of social differentiation centres on extending Bourdieu's (Bourdieu, 1977) work on class differentiation to examine 'macro differentiations' such as race and gender as well as 'micro differentiations' such as sub cultures or differences in positionality, for example that of students as compared to teachers (Grenfell et al., 1998). Essential to the use of social differentiation is power and agency and how points of differentiation overlay with social marginalization. The consideration of macro and micro points of social differentiation alone, however, does not go far enough to sufficiently address identity and power because it lacks intersectionality. Intersectionality will be covered in the next sub-section.

2.3.1.1 Intersectionality

Intersectionality refers to the intersections of multiple points of social differentiation, and more specifically, how different markers overlay within one body (Chow et al., 2011). For example, an unmarried heterosexual woman of colour with a physical disability has a

particular lived experience. It is not possible to understand her positionality by considering only one of these identity markers, nor is it possible to pull them apart, even if that was desirable. Amartya Sen wrote extensively about multiple partial identities in *Identity and Violence* (Sen, 2007). Although Sen does not specifically discuss intersectionality, or the political movement behind the concept, his work is inherently intersectional and has influenced this thesis.

The UN agencies that specifically consider differentiation categorize it by gender, age and diversity+. The latter category is quite broad, and can refer to ethnicity, caste, marital status, religion, nationality, sexual orientation, gender identity, employment status, or level of education, among others. To date, this has primarily been used within protection programming with particular focus on displaced and resettled populations. To encapsulate the limitless nature of cultural and social differentiation, an inclusive and adaptive definition is required.

When considering the impact of social differentiation for the world's poor, with innumerable culturally specific points of differentiation, which are themselves often changing over time, the broadest use of the term is necessary. In this thesis, social differentiation is defined simply as the ways that people divide and categorize their social world. This means both the way people categorize themselves and the way they in turn are categorized by others. Using this definition, this thesis outlines the specific points of differentiation relevant for food access and climate adaptation for the case study at the present point in time. This is presented in Chapter 4: Adaptation and coping strategies.

The consideration of social differentiation and intersectionality lends itself naturally to Systems Thinking and CST. It is also associated with third wave feminism, which emerged as

a critique of second wave feminism's focus on the lived experience of white, upper and middle class women from developed nations. As such, the consideration of both social differentiation and intersectionality is a frequently used lens for feminist social theorists. The role of feminist research theory within this conceptual framework, and how Systems Thinking has been applied to feminist research theory is the focus of the next section.

2.3.2 Feminist research theory

In this section I introduce feminist research theory, making clear the ways in which feminist principles have guided the researcher's gaze. This includes critical feminist discourse analysis, feminist political ecology (FPE), and body politics, followed by an application of systemic reflection on the concept of women's empowerment. I then present the concept of positionality, which also helps to explain researcher gaze and address the bias as far as is possible. I then introduce the concepts of systemic intervention and action research. I include these under the feminist research theory section because of their 'change making properties'. Systemic intervention through action research acknowledges the impact the research has on research participants, allowing space for the researcher to both learn from that impact and be accountable for it.

Feminist research theory is embedded within a set of practises and processes – from data collection, to analysis to interpretation – that 'centralizes the relationship between the researcher and researched to balance differing levels of power and authority' (Nagy Nesse-Biber, 2014, p. 3). It necessitates a reflexive process, through which researchers examine their social backgrounds and grow to understand how this influences both the direction of research and the interpretation of results (Nagy Nesse-Biber, 2014; Keddy et al., 1996). Many feminist scholars have advocated that feminist research guides the researcher to undertake 'research from the margins' – that is research on marginalized people for the

purposes of social justice (Kirby & McKenna, 1989). Further, research practise with change-making properties, such as of grounded theory and action research have been advocated by feminist scholars (Keddy et al., 1996). (Keddy et al. 1996; Adelman 1993; Cain 2014; Reason & Bradbury 2007)

Feminist research theory provides additional guidance on the interpretation of results derived through feminist research praxis. This thesis has been influenced by multiple applications of feminist research theory. The most relevant will be discussed in the following order: critical feminist discourse analysis, feminist political ecology (FPE), and body politics. Each provides guidance on learning and un-learning about the social constructs that undermine and disadvantage the marginalized in the pursuit of transformative change. In this thesis I argue that feminist research is needed to understand the root causes of the disproportionate vulnerability women experience, in order to design policies and programs that could meaningfully reduce that vulnerability. Further, I argue that philanthropic organisations with a mandate to 'do no harm' (Collaborative for Development Actions, 2004), which includes the majority of development and humanitarian agencies, have a mandate to consider the unintended, gendered consequences of their operations.

2.3.2.1 Feminist critical discourse analysis

Feminist critical discourse analysis (CDA) aims to critique 'discourses which sustain a patriarchal social order' (Lazar, 2005). The disproportionate vulnerability of women to environmental change and disaster events has been the subject of a growing body of research (Quaye et al., 2016; Verhart & Pyburn, 2012; Agarwal, 2011). Gender and climate change has become a recognized area of study in its own right (Perez et al., 2015). However, an emerging critique of the work, through feminist CDA centres on the treatment of women as vulnerable passive agents amidst these changes, rather than active participants in

adaptation and development, emphasizing the need to integrate women into development and adaptation strategies and recognize the contributions they have made (Goodrich et al., 2015; Jost et al., 2015; Arora-Jonsson, 2011).

Literature on women as differently vulnerable to environmental hazards, for example because they traditionally collect water or are responsible for child feeding, without unpacking the multi-level gender relations which have contributed to that vulnerability, including government policy, implicit biases of extension agents and sub-household inequitable decision making, creates an obvious gap for feminist research to fill. Adaptation policies and programmes risk exacerbating existing inequalities and impeding transformations in traditional gender roles, as has been documented in the small but growing body of research using feminist CDA. One strong recent example is Gonda's ethnographic work documenting the subjugation of women through the promotion and incentivising of climate smart cook stoves and other 'adaptation technologies' (Gonda, 2016).

2.3.2.2 Feminist political ecology

A primary focus of political ecology is to understand 'the complex relations between nature and society through a careful analysis of… access and control over resources and their implications for environmental health and sustainable livelihoods' (Elmhirst, 2011; Watts, 2000, p. 257). Feminist political ecology explores 'the relationship between gender and the environment as a dynamic process in which culture and society play an integral role' (Gonda, 2016; Nightingale, 2006). Concerning adaptation, FPE leads the researched to specifically look at the local level to analyse the social relations that impact adaptation (Carr 2008b; Resurrecciion 2013). Indeed, FPE is the grounding for using a social lens within the larger SIA research project altogether.

Nyantakyi-Frimpong and Bezner-Kerr have used FPE to make an important critique of a pervasive framework used in the analysis of climate change vulnerability. They critique the 'double exposure' framework (Leichenko & O'Brien, 2008) which highlights how climate change and economic globalization pose simultaneous disturbance, without sufficient recognition of the social drivers at the local scale, and in particular ignoring important household dynamics and how impacts vary based on social class, age, ethnicity and culture in addition to gender (Nyantakyi-Frimpong & Bezner-Kerr, 2015). This intersectional critique of the double exposure framing is part of a very small but hopefully growing body of literature that uses this theory at the most local scale – a body this thesis aims to contribute to.

2.3.2.3 Body politics

Body politics, is a term originating from second wave feminist discourse that specifically considers the policies and practices through which dominant societal powers regulate the human body, and determine the level of social control one has over one's own body (Harcourt, 2012; Harcourt, 2009). Theoretical literature on body politics is relevant within this discussion, most notably because the categorization of some bodies as productive and other bodies as not, or less so, impacts the supports they have access to for adaptation. Importantly, the limited research that has been completed on the gendered impacts of increasingly popular adaptation interventions, such as the promotion of climate smart agriculture practises, have concluded that these practises may increase women's labour burden in particular (Jost et al., 2015; Peterson, 2014a).

Body politics is pertinent when considering the food system as food both nourishes (calories in through consumption) and depletes the body (calories out through farm labour and food preparation). Although I am unaware of a specific application of body politics in the

literature on climate adaptation and food security, the theory offers critical guidance on how to analyse the way that cultural norms affect women's, men's, girls' and boys' bodies differently (Harcourt, 2009).

2.3.2.4 Systemic reflection on empowerment

Empowerment is frequently defined as 'a process by which people, organizations and communities gain mastery over their affairs' (Rappaport, 1987, p. 122) and has long been used as a method for health promotion (World Health Organization, 1986). Most of the academic literature on empowerment as it pertains to attaining social goals comes from the field of public health. There is a long history of and literature base on the effectiveness of empowerment to improve social outcomes, particularly among marginalized populations (Brandstetter et al., 2015). Interventions to foster empowerment have been found to be a viable public health strategy but perform best when done in tandem with macro level changes that reduce inequality (Wallerstein, 2006). However, the challenges associated with measuring abstract notions of empowerment or using proxies for empowerment such as income, assets and education (Thomas, 1994) or mobility and absence of abuse (Bhagowalia et al., 2012) remain. The use of the Women's Empowerment in Agriculture Index (WEAI) to measure multiple dimensions of empowerment achievements, outlined in Chapter 3: Methods, is advancing this field (Alkire et al., 2013).

The term empowerment is well established in the development lexicon, but means different things to different people. In recognition that vulnerabilities and adaptive capacities are gendered among smallholder farming populations in many parts of the worlds, climate change adaptation (CCA) programming to date has frequently aimed to mainstream gender with the empowerment of women as an overarching goal (Alston 2014). In practice this has meant adding pro-woman components to climate change adaptation and climate smart

agriculture projects, such as requiring women to be included in farmer field schools or exclusively targeting women as project beneficiaries. However, the extent to which such policy and programmes have increased the ability of women to have mastery over their own affairs is limited. In fact, feminist scholars are increasingly demonstrating how climate adaptation and mitigation programs may be entrenching oppressive gender roles (Gonda, 2016) and exacerbating existing inequalities (Jost et al., 2015; Arora-Jonsson, 2011). This section however, will focus on the theory included within the broader conceptual framework.

Fundamental to the consideration of women's empowerment as a theoretical concept, is the application of systemic reflection, outlined previously on page 40. In this thesis I will argue that the framing of women's empowerment has typically not used a systems approach and in doing so has ignored fundamental sources of women's suppression, leading to flawed programmatic designs. I will also argue that using the iterative framing of systemic reflection, in addition to the application of CST, would improve the rigor with which women's empowerment is applied in policy and practice. This iterative framing will be particularly important to the analysis of Chapter 4: Adaptation and coping strategies, when exploring the external supports typically given to women to improve adaptive capacity, such as credit, and in Chapter 5: Nutrition and food scarcity, when looking at the relationship between empowerment and health outcomes.

The iterative framing cycle for systemic reflection on empowerment is illustrated below in Figure 8: Systemic reflection on empowerment. The researcher is guided to answer the following questions: *Empowerment of whom? To do what? Over what barriers? From whose perspective? According to who's values? To what end? And over what timeframe?*

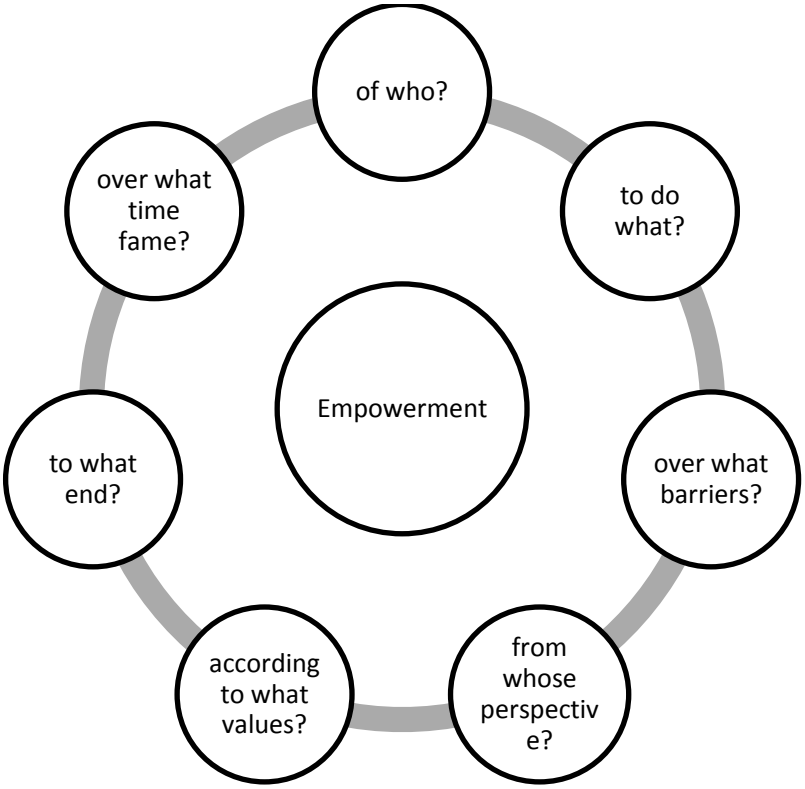

Figure 8: Systemic reflection on empowerment

The next two sections (positionality and systemic intervention) focus specifically on the application of feminist research theory with specific consideration of how researcher gaze affects the analysis and how the research itself has an effect on the populations studied. Additional theory on the application of feminist theory, including grounded theory as a feminist research methodology is covered in Chapter 3: Methods.

2.3.3 Capabilities approach

In the consideration of the impact of social differentiation on adaptive capacity to environmental change, one must make explicit the notions of progress and regression in use. In this section I introduce the capabilities approach to interpret and guide metrics on poverty, and development. I then explain the concept of multi-dimensional poverty and tools that have been developed to try and measure and account for reductions in poverty as defined by their growing capability for self-actualization. To consider poverty and development, one must first examine the concept of inequality. The social theories

surrounding equality which are relevant to this thesis center on moral equality and its interpretation as it pertains to social justice. It begins with the assumption that there is no natural hierarchy among persons and that there is universal human worth – an idea that characterized the Enlightenment and is often attributed to Kant (1797). This thesis was influenced by the work of Wilkinson and Pickett which specifically analyses how the material gain of some has historically led to the social failings of others (Wilkinson & Pickett, 2009). Wilkinson and Pickett argue, through multiple empirical studies, that the societies with greater equality have higher utility and in populations with the highest gaps between the wealthy and the poor, all are worse off. From this basis, the conceptual framing begins with the supposition that higher inequality is undesirable.

From this basis, we apply Sen's framing. This thesis uses Sen's Capabilities Approach to interpret and guide metrics on poverty, development and adaptation. Developed in the 1980s, the capabilities approach focuses on the moral significance of individuals' capability to live the kinds of lives they have reason to value. This is in contrast to exclusively economic metrics to measure poverty (e.g. persons living under 1.25 dollars a day) and development (e.g. GDP growth). The theory is articulated further in *Development as Freedom*, in which freedom is both the primary end and means of development. Poverty is the deprivation of the capabilities to live a good life and development is an expansion of capabilities. Sen defines agency as a person's ability to advance goals that one values and has reason to value and empowerment as an expansion of that agency (Sen, 2001). The consideration of equality using the Capability Approach forces the researcher to move away from considerations of 'sameness', as the kind of life each person has reason to value will be unique to each person. Rather, the focus is on inequality of the ability to advance goals. As

such, the consideration of unequal adaptation and unequal response spaces, which bestow differing ability to advance goals, is imperative.

Sen considers poverty and development as having multiple dimensions. In practice, this is not easily measurable, especially as compared to uni-dimensional fiscal measurements like GDP per capita. However, much scholarly work has been devoted to operationalizing the capabilities approach to measure poverty and development (Alkire et al., 2013; Bourguignon & Chakravarty, 2003), including a process of making explicit, normative, well-reasoned, cut-offs for indicators that an individual has the capacity to live the kind of life she/he values. Use of systems thinking and boundaries judgments are essential here as well. The consideration of multiple dimensions of poverty is the focus of the next section.

2.3.3.1 Multidimensional poverty

The concept of multidimensional poverty is a movement away from one-dimensional considerations of poverty, such as income, to better reflect the complex lived experience of impoverished people. This thesis specifically focuses on the food security and food systems of the multidimensional poor amidst global environmental change (GEC). The multidimensional poor typically experience multiple deprivations in health, education, income, social connectedness, empowerment, quality of work, physical safety and other social ills such as exposure to violence, unfair treatment and humiliation. Considering the world's poor in this way has been described as using a magnifying glass or binoculars to zoom in and make large and discernable the multiple deprivations that the poor experience. By zooming in to see how these deprivations stack on top of each other to produce differing levels of poverty, we can begin to see a spectrum of poverty that differs within and between households.

Framing poverty as multidimensional stems from the work of Sen's capabilities approach (Sen, 2001; Sen, 1976) and was operationalized by Bourguignon, Chakravarty, Alkire, Greer and Foster (Alkire et al., 2013; Bourguignon & Chakravarty, 2003). Multiple scholars have attempted to operationalize the capabilities approach quantitatively, measuring multiple deprivations including through the Multidimensional Poverty Index (MPI) and the Women's Empowerment in Agriculture Index (WEAI) – both developed by Alkire and Foster at the Oxford Human Development and Poverty Initiative (OPHI). An adapted version of the WEAI using components of the MPI has been used within this research project to collect household level information on multiple dimensions affecting poverty, adaptive capacity and inter and intra household level inequality. The adapted version of the WEAI used in this detail is explained further in Chapter 3: Methods.

The MPI has now been adopted in the measurement of the new post-2015 Sustainable Development Goals (SDGs). In these and other quantitative tools, deprivations and achievements are measured across multiple dimensions – most commonly (1) health (nutrition, child mortality), (2) education (years of school, school attendance by children), and (3) living standard (access to electricity, sanitation, water, flooring, cooking fuel, assets). The indicators within these dimensions are influenced heavily by data availability. The use of an adapted version of the WEAI which places a greater focus on social differentiation, for example with the inclusion of persons with disabilities, rather than a gender focus alone, is therefore a timely addition to the literature.

The distinction between persons with multiple deprivations and persons with singular or fewer deprivations is rarely made in climate change discussions. Rather, their poverty is homogenized – they are all considered poor in the poor/non-poor binary – as is their claim

for support. In the context of the challenge facing smallholder farmers, the consideration of equality within a changing climate has largely centered on responsibility between nations, fostering important policy debates on common but differentiated responsibility (polluter pays principle, carbon debts etc.) to reduce global emissions. Equality within non-historical emitting, low and middle income countries, such as those throughout sub-Saharan African has been a lower priority in international negotiations. Despite this national level focus, individuals experience changing climates at the most localized level, creating vast inequities within nation-states; but these factors are rarely part of the rhetoric or reparations plans. Studies on multi-dimensional poverty that are sufficiently sensitive to the local levels of poverty will uncover some form of inequality within the studied population. This thesis does not argue that the poorest of the poor should be targeted for support to the exclusion of all others, but rather argues that 'leaving no one behind' necessitates a specific treatment of the multidimensional poor and a magnification of their unique mixes of deprivations. This conceptual framework enables this form of analysis.

2.4 Conceptual framework

Each of the theoretical lenses outlined above are used to better understand the broader system – each providing a particular perspective and nuanced information, rather than trying to fit the theory into a single totalizing framework. The conceptual framework demonstrates how stressors of a wide variety impact social systems (including food systems). The stressors on social systems instigate a variety of actions to adapt or cope, which in turn produce particular outcomes, including outcomes related to food and nutrition security and well-being more broadly. Each of these steps (from the social system impacted by a stressor, to the actions available, to the outcomes of those actions) are

socially differentiated at both macro (e.g. gender) and micro (e.g. a leadership position in a community group) levels.

Central the conceptual framework is the response space, and the way in which response spaces are subject to limitations. This relationship is outlined in Figure 9: Limits to response spaces, drawing from the theoretical concepts outlined previously as well as the case-study specific information outlined in the background section on the introductory chapter. This diagram highlights the multiple tiers of limitations. First, there are limitations experienced by all in the case study area residents by the nature of their location. Second, there is a further reduction in the response space based on a multitude of individual and household level factors. The multiple colours of angled lines in the figure below are a representation of an infinite number of ways access to responses may be limited in time and place at sub-village and sub-household level. The visual highlights that although all residents are experiencing limitations, these are not experienced equally.

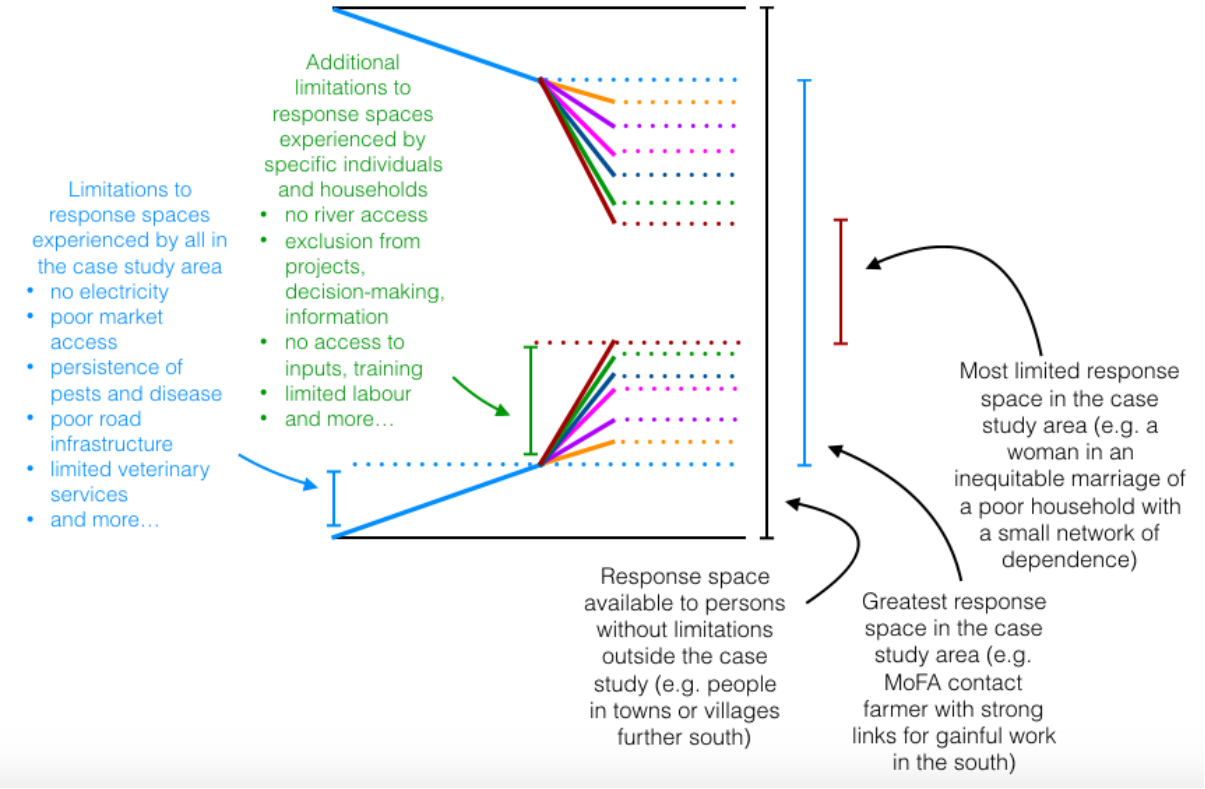

Figure 9: Limits to response spaces

The background and conceptual literature has highlighted that underlying poverty is not experienced equally in the studied population because the population is socially differentiated, and as such their vulnerability to stressors varies. In response to stressors, the population in turn has access to differing response actions – as was covered in the previous paragraph on limitations of response spaces. This conceptual framing posits that the response actions one can take affect how successful an individual or household will be at adapting to the stressor, which produces socially differentiated outcomes. Those differing outcomes in turn have a feedback loop, which either positively or negatively affect underlying vulnerability. These dynamics are reflected below in Figure 10: Stressors and socially differentiated outcomes. The figure shows an impact pathway: micro and macro stressors are experienced by a socially differentiation population that has access to differing

responses which produce differentiated outcomes and lead to positive and negative effects on vulnerability.

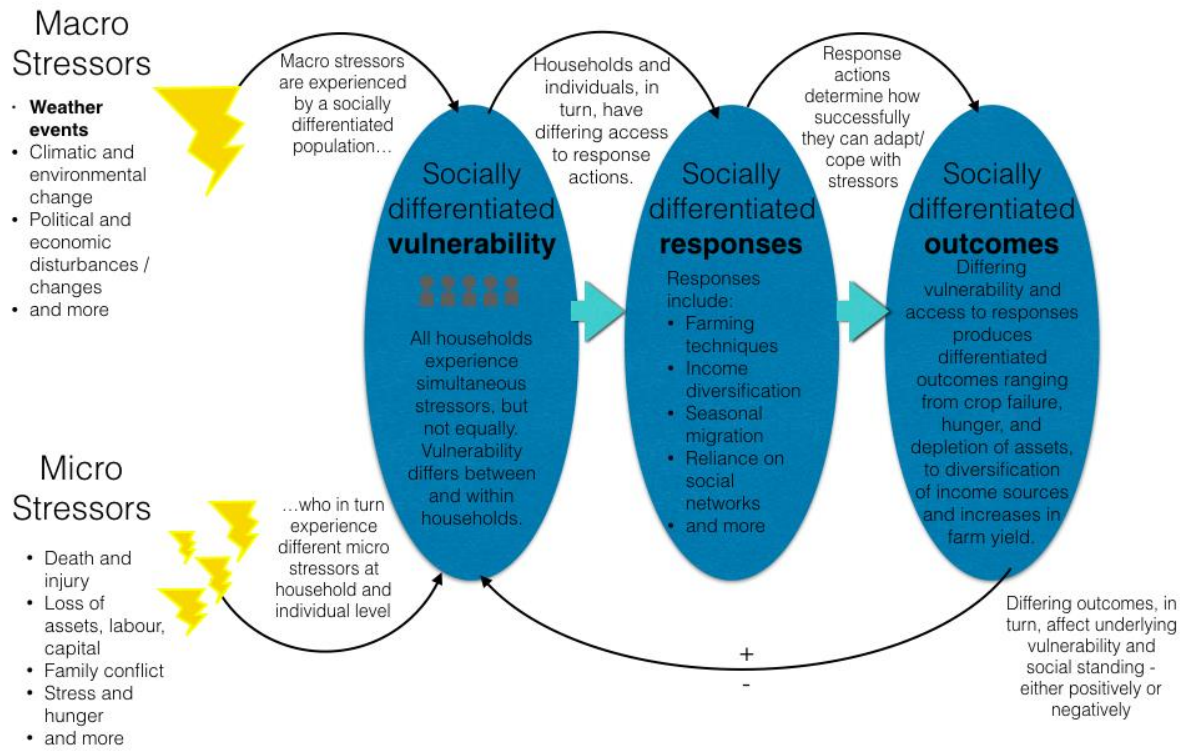

Figure 10: Stressors and socially differentiated outcomes

2.4.1 Conceptual summary

This thesis uses a conceptual framework that is based in systems thinking, and expands outward to include the application of systems thinking to adaptation and resilience theory using systemic reflection, social differentiation using the principle of intersectionality, feminist research theory including the treatment of researcher positionality and systemic intervention, and the capabilities approach which provides guidance on both the measurement of poverty through a multi-dimensional poverty index and conceptualization of inequality with which to interpret those measurements.

Systemic thinking lends itself naturally to each of these applications and provides the space for them to be considered in tandem. In particular, the consideration of social

differentiation, multidimensional poverty and intersectionality combined, is necessarily a systems approach, as the multiple partial points of identity and deprivations are clearly within and essential to the scope and scale of the system under consideration. Feminist research theory, especially when closely aligned with third wave feminist thinking on broader structural oppression which is experienced differently based on privileges or the dearth of privileges, is intuitively systems oriented. The above outlined framework has guided the analysis on unequal adaption in the case study region to uncover place-specific differentiated adaptation and coping needs, with recommendations that are both well-founded in the data presented and actionable from a policy perspective. The next sections will focus on the aspects of data collection which have been guided by the conceptual framework – systemic intervention, action research and the consideration of researcher positionality. The conceptual framework leads researchers to not only consider the effect of researcher gaze on the analysis but also the impact the research itself has on the studied population, either intentionally or not.

2.5 Positionality

Since it is not possible to be a strictly objective observer, the author's positionality as a researcher should be made explicit and included within the interpretation of results. As Ulrich (1983) states, 'It is not the reality 'out there' that determines the boundary between the system and the environment, but rather the inquirer's standpoint, the purpose of his mapping effort, his personal preconceptions of the reality to be mapped and the values he associates with it' (p. 226). Or, as I typically explain during trainings with researchers and evaluations in West Africa – we measure what we value and we value what we measure.

The exercise outlined in Figure 9 Positionality wheel was developed by CCAFS researchers to be used in advance of a data collection. Action researchers are meant to reflect using each

spoke of the wheel on their own positionality and how this differs to the positionality of the research participants, to the best of their knowledge.

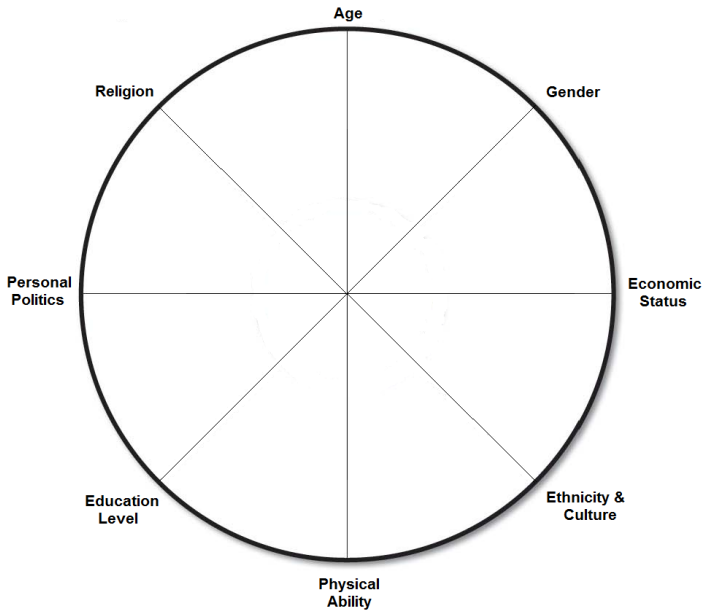

Figure 11: Positionality wheel

It is useful as a reflective exercise in all stages of research and has been used throughout the research process of this thesis. Of importance for understanding the positionality of the researcher is not only my status as a white, middle class, non-religious, highly educated, Canadian woman with a non-visible disability but also my identification as a feminist and advocate of universal individual-level human rights, my consideration of anti-colonial thought, body politics and intersectionality in academic and applied work, and my background in and affinity for rigorous evidence-based evaluation of interventions.

Of equal, or perhaps even greater importance, is the positionality of others involved in the research process include the host organization – the local office of the Ghanaian Ministry of Food and Agriculture (MoFA) – and their field staff who did occasional translation and co-facilitated the workshop, as well as my primary research assistants William 'Willie' Kpengnon and Shielo Bagre who conducted surveys and translated interviews and Delphina

Bonaa who accompanied my homestays and did nighttime translation. A brief summary of the most relevant points on the wheel of positionality is below. An exhaustive description of where these individuals are placed on the wheel of positionality will not be presented here, as each person's unique statuses are extensive.

MoFA staff:

MoFA staff appeared to be well liked and respected within the case study communities, but are also reputed to engage in favoritism surrounding beneficiary selection for programs and openly promote Christian baptism in the largely non-Christian case study region where the traditional animist religion dominates. By virtue of being formally employed full time, the staff persons are comparatively wealthy and sometimes hold local political offices. They typically come from the local area, although none of the staff persons originated from the villages of the case study, nor did they have direct kinship ties.

Importantly, several of the staff viewed their own history through a particular lens, which likely shaped their view of the studied population. They tended to view their own path as being self-made and the product of hard work, despite coming from poor uneducated backgrounds, similar to those of the case study. There was an underlying assumption that if members of the communities they worked with would only 'be more serious', work harder or follow their farming advice more thoroughly, that they too would be out of the poverty associated with subsistence-oriented farming. Further, there is always a risk of introducing bias into the analysis when the researcher is connected to an organization that has historically given supports to those being interviewed such as fabricating answers to solicit perceived benefits.

William 'Willie' Kpengnon (surveyor and interpreter):

Willie was born and raised in one of the case study villages, and at the time of the research was the person with the highest educational attainment (completed secondary school) currently residing in the community. He is in his mid-thirties with a wife and two young daughters. He is a well-respected thought leader in the community, but holds no political position nor is he above average in terms of wealth. He is actively involved in community groups and influences decisions of the chief. He is the 'contact farmer' for MoFA, which is the primary model used my MoFA staff – to provide supports to one individual as a demonstration for the others to follow. As such, it is viewed by others that he receives preferential treatment by MoFA. His employment as a research assistant for the SIA project was likely viewed in the same way.

Shielo Bagre (interpreter):

Shielo's mother is from the local area, which is why he speaks the language fluently, but he has otherwise been raised in larger cities and was privately educated. He was in his mid-twenties and unmarried with a pregnant partner at the time of the research. He holds a bachelor's degree in nutrition and worked for a local NGO that focuses on providing farmers credit in addition to supporting this research project. He is highly educated as compared to MoFA staff and community members and comparatively wealthy. He openly holds liberal worldviews that are typical of a young educated urban Ghanaian, including favorable views regarding women's empowerment and Christianity, and oppositional views on corporal punishment, government corruption etc., which would differ from many community members. He appeared well liked and respected by the persons interviewed.

Delphina Bonaa (nighttime translator):

Delphina is a divorced woman with a strong personality. Her education levels are low but her fluency in English is high because she spent much of her childhood and early adult years in Accra where her father worked as a chef for the University of Ghana. In this capacity she be-friended many non-Ghanaians, which meant she was much more in tune with me as a foreigner and where I was coming from, than would be expected of a woman living in Lawra. The fact that she is a divorced business woman who lives independently with a teenage daughter would be the characteristic most striking to residents of the case study. The dynamics between her and the families we did homestays in were complex and hard to pin down. Hosts sometimes appeared more unsettled in her presence, often apologizing for having an upswept homestead – behavior I hadn't seen before visits with Delphina.

Each of the attributes held by myself, MoFA and the research assistants will have impacted what is 'swept in' and 'swept out' of the analysis, at least at a sub-conscious level, despite the best efforts of the researcher and research support staff. Reflecting on how the data would be interpreted differently by others who differ on the various spokes of the wheel, and in some instances co-coding with other researchers has been an important component of the analysis phase of the research.

2.6 Additional literature covered within chapters

The literature for the overarching thesis has been presented in this chapter, which applies to all three empirical chapters (4-6). Literature that provides additional framing to chapter-specific content has been included in each empirical chapter, for the ease of the reader. The literature reviews included in each of the empirical chapters (4-6), which is not found within this chapter, has been outlined in Figure 12: Roadmap of additional literature.

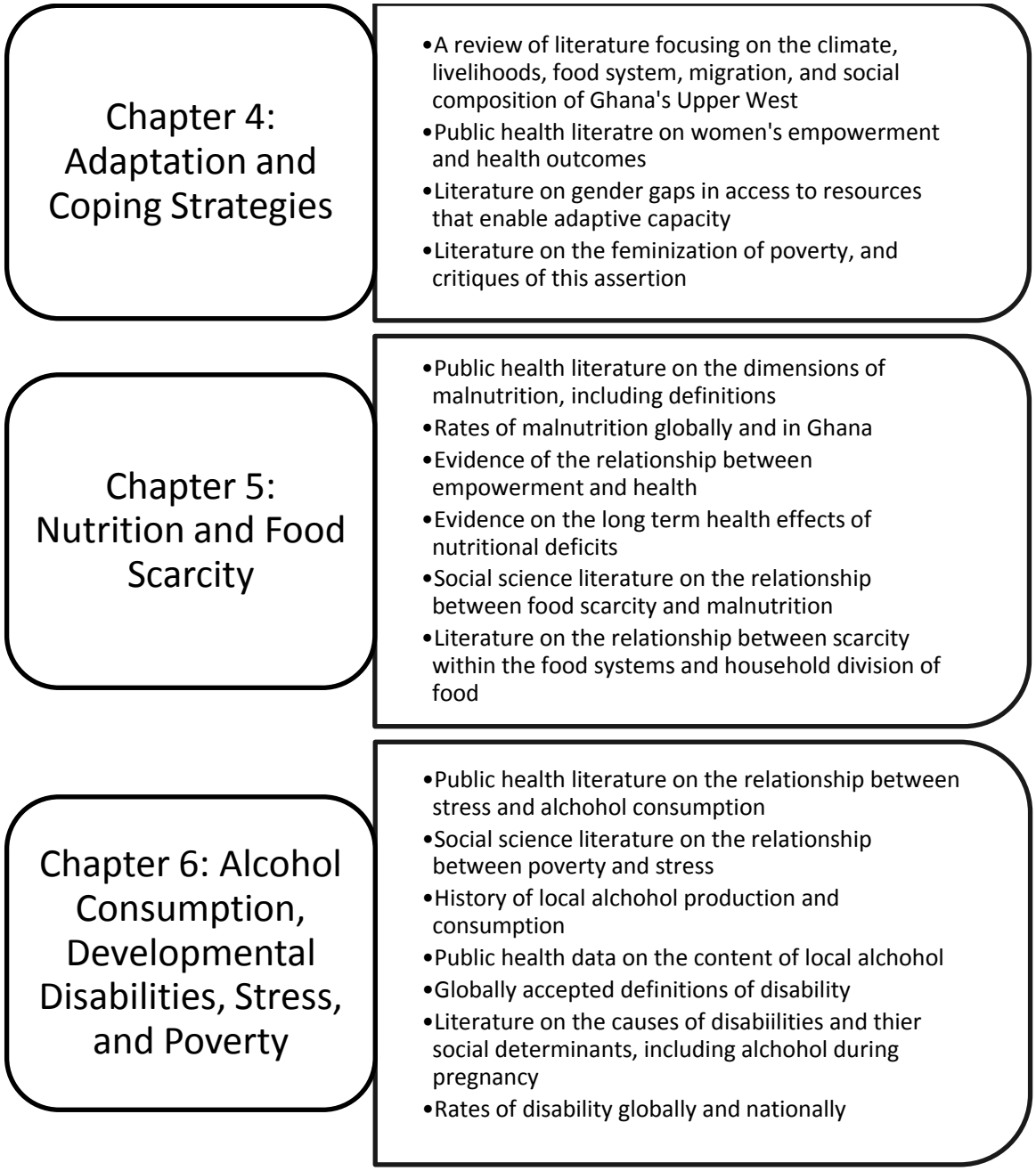

Figure 12: Roadmap of additional literature

2.7 Conclusion

This chapter has presented the background literature outlining the challenge at hand for small holder farmers experiencing and making efforts to adapt to the environmental changes that are impeding food and livelihood security, amidst pre-existing poverty, all of which is mediated by social factors. It then outlined multiple theoretical lenses to consider the challenges facing smallholder farmers, which were used to analyse all primary data

reported in Chapters 4-6. This was followed by the overarching conceptual framework. The framework guided the analysis on unequal adaptation in the case study region to produce place-specific, in-depth results, and where appropriate, recommendations for policy and practise. The next chapter will outline the methodological theory used within this thesis and each of the methods used to collect and analyse data for this thesis project.

3 Methods

3.1 Introduction

The data used within this thesis are derived through the use of multiple methods. I used a combination of a village wide participatory diagnostic and planning workshop, ethnographic field research, quantitative review of health records, qualitative interviews and focus groups, and an adapted version of the Women's Empowerment in Agriculture Index (WEAI) household survey collected in two villages (Orbili and Tabier) and one town (Lawra) in Ghana's Upper West Region. My research was conducted between January 2013 and April 2014. The data were collected during the Systemic Integrated Adaptation (SIA) research project. I spent four months (Jan-April 2013) in the field with the research team, in partnership with the Savannah Agriculture Research Institute (SARI) and the Ministry of Food and Agriculture (MoFA). Following the initial four month research period, I made two additional return visits, the first of which occurred six months after the initial field program for six weeks (Nov-Dec 2013) and the second six-week visit one year later (March-April 2014). Figure 13 on page 73 provides an overview of the data collection schedule, which is outlined in three distinct waves.

From the beginning, it was my intention and the intention of the broader SIA research program to develop and fine-tune replicable methods would be sufficiently rigorous for academic research and could be used by CCAFS (the funding organization), government, and third sector practitioners. Central to producing replicable methods are considerations of cost (can the methods be used cheaply?), scalability (can the methods be repeated over and over?), rigor (are these methods robust and defensible?), and researcher/practitioner skill (can these methods be used by in-country staff with training?). Each of these considerations

shaped the development of the methodological framework. The divide between theory and methodology, as outlined within these chapters, is an uneasy one, as grounded theory, action research and approaches to triangulation of mixed methods are both theories and applied methods. However, the divide has been made here to enable the methods to be presented as a stand-alone, replicable, and adaptable set of applied methods.

While the thesis presents results from Ghana, the approaches presented here were developed and pilot-tested during the doctorate in Nepal and were subsequently adapted and refined prior to final application in Ghana. Since the Ghana fieldwork, the methods have been replicated in the Gambia by the United Nations Environment Programme (UNEP) World Conservation Monitoring Center (WCMC) and in Togo by the Red Cross Climate Center. Several of the methods have been written up into a UNEP World Conservation and Monitoring Centre (WCMC) training manual and CCAFS working paper (Wicander et al, 2016). As such, much overlap exists between this chapter and those external publications, on which I am a named author. This demonstrates the salience, replicability and scalability of the methods.

The first section of this chapter provides a brief summary of the theoretical underpinnings of the data collection and analysis itself, including the decision to use mixed methods (Midgley & Ochoa-Arias, 2004), the influence of systems thinking and grounded theory on methodological design (Ulrich, 1987), and the use of a case study (Baxter & Jack, 2008). The second section of this chapter details each method selected, the rationale for the method's inclusion in the framework, and how it was developed and applied. The third section of this chapter details how the data were analyzed. The fourth section is a critical reflection on the limitations of each individual method, a summary of the data excluded from this thesis, the

rationale for excluding specific data sets, and recommendations on how the methods could be applied differently in future to improve data quality. The chapter ends with a discussion on which methods have high potential in an applied humanitarian or development context.

3.1.1 Methodological theory

3.1.1.1 Rationale for choosing multiple methods

This thesis ascribes to both of the two forms of methodological pluralism described by Midgely (2015). The first is the ability to draw on a wide range of methods in order to overcome the limitations of any individual method. Midgley (2015b) states, 'No methodology or method (whether it comes from the systems tradition or elsewhere) can do absolutely everything people might want. Therefore, being able to draw upon multiple methods from different paradigmatic sources can enhance the systems thinking resource we have available for intervention' (p. 288). Central to methodological pluralism is the ability to triangulate data from different sources rigorously, in order to not only co-validate data but to deepen the understanding of the context (Olsen, 2004). Olsen (2004) argues that triangulation allows us to generate a dialectic of learning, which she states 'thrives on the contrasts between what seems self-evident in interviews, what seems to underlie the lay discourses, what appears to be generally true in surveys, and what differences arise when comparing all these with official interpretations of the same' (p. 4). This pragmatist approach to analyzing diverse data sets was used for this thesis project.

The second form of methodological pluralism is the deliberate process of learning from other methodologies to inform one's own practice in an iterative, ongoing fashion, which in itself is a form of action learning. According to Midgley (2015a), with this approach, 'We no longer have to accept a situation where people build a methodology like a castle and then defend it against others who want to breach the castle walls. Rather, if people begin to see

methodology as dynamic and evolving, they can learn from others on an ongoing basis' (p. 160). This iterative process occurred at multiple stages within this research project timeframe.

Application of multiple methods was structured as follows: during the initial field program surveys, interviews and questionnaires were used to gain an initial understanding of the context, to design participatory methods and in-depth interview questions, and provide a baseline. Following interviews and participatory methods, ethnographic methods and direct observation was applied in order to assess subtle and socially differentiated impacts and triangulate data with the baseline information collected in the first process. Further, it became clear during interviews that there were micro differences between household income in particular that the household survey was not sufficiently sensitive enough to capture. In response to this realization, in an iterative fashion, I developed an alternative wealth index through participatory methods.

Many have argued that a mixed methods approach also allows for a more flexible design which gives the researcher more freedom, and in some cases, the research participants more power to direct the research process (Midgley & Ochoa-Arias, 2004; Midgley, 1996). This aspect was particularly important for the development of the SIA methodology, which was designed to be replicable to multiple country contexts and as such needed to be flexible to suit differing needs. Within this thesis, the research participants directly influenced the trajectory of the methods in three distinct ways: (1) through both negative and positive feedback of all methods, (2) through leading the process on developing an alternative wealth index, and (3) by selecting the community level goals that would form the basis of the action learning component of the research project.

In this thesis, methodological pluralism is closely linked with grounded theory as a research methodology. The methods used are diverse, but also iterative, with the preliminary results feeding into the design of subsequently used methods and interview and focus group questions. Several of the methods were open-ended, allowing the focus to be guided by the research process. Further, the methodological focus shifted during the data collection process, most notably away from prioritizing the survey results in the analysis and towards including more results from direct observation. This was a result of growing realization that many of the subtle differences between families that were relevant to the central research questions were not being sufficiently captured with the household survey. A grounded theory approach to the methodology itself allowed for a course correction during data collection.

This approach to data collection, whereby the problem at hand cannot be fully defined in advance, is also consistent with post-normal science in which policy analysis must be completed amidst uncertainty and competing values (Funtowicz & Ravetz, 2003), and wicked problems, in which the dynamic and complex nature of the problem combined with incomplete and contradictory requirements renders it impossible to resolve in its entirety (Rittel & Webber, 1984). In such a setting, multiple methods allow for investigation whilst continually adapting the researcher's understanding of the problem context as the research progresses. The following section will outline the use of grounded theory for the collection of data.

3.1.1.2 Grounded theory as a research methodology

Grounded theory, which is 'the discovery of theory from data' (Glaser & Strauss, 1967), is also a research methodology. Feminist scholars of the post-positivist critical realist persuasion have advocated for the use of grounded theory as a method in feminist research

(Keddy et al., 1996). No method is inherently a feminist method, as this is subject to the philosophy and application of the researcher. However grounded theory is well suited to feminist exploration because of its flexible design (in more recent interpretations of the method), its 'theory developing properties' which allow it to address complex evolving problems, and the ability it provides to integrate change-making or action research principles into research design (Keddy et al., 1996).

This thesis project has been especially influenced by feminist grounded theory's treatment of story lines and their social impact. Within grounded research, especially when it employs multiple methods, multiple story lines and themes often emerge. The selection of which path to follow (which area of exploration to prioritize given the limits of how much data can be collected) is not always obvious. Feminist scholars Keddy, Sims and Stern (1996) would advocate for a feminist researcher to consider the perspective of the participants when making the selection of which story line to follow. They suggest answering the question: 'What do the participants anguish over the most?' to make this decision (p. 451). It is through this decision pathway that the final chapters focusing on undernutrition, stress and the over consumption of alcohol were prioritized by adding additional focus groups and key informant interviews to discuss these topics.

The aim to achieve great social change and learn by doing is a common thread through each of the theoretical considerations within the methodology. In this thesis, change-making opportunities are two-fold: (1) creating change through recommendations for policy and practice based on results, and (2) creating change through the data collection itself as the process is experienced by the studied population.

3.2 Methods roadmap

This section details each method selected, the rationale for the method's inclusion in the framework, and how it was developed, applied and how the individual method was analyzed. The subsequent section will cover the meta-analysis, and how data from multiple sources was triangulated and analyzed. Figure 13: Data collection phases demonstrates the order in which the methods were completed – with each phase building off the last and culminating in the triangulation and interpretation of results. In practice, the process was more iterative than the diagram suggests, with re-thinking and re-analyzing data points as new findings emerged. However, the general flow of this diagram is true to the process and helps clarify the initial set-up of data collection design. Each of the methods will be explained in detail in the following section.

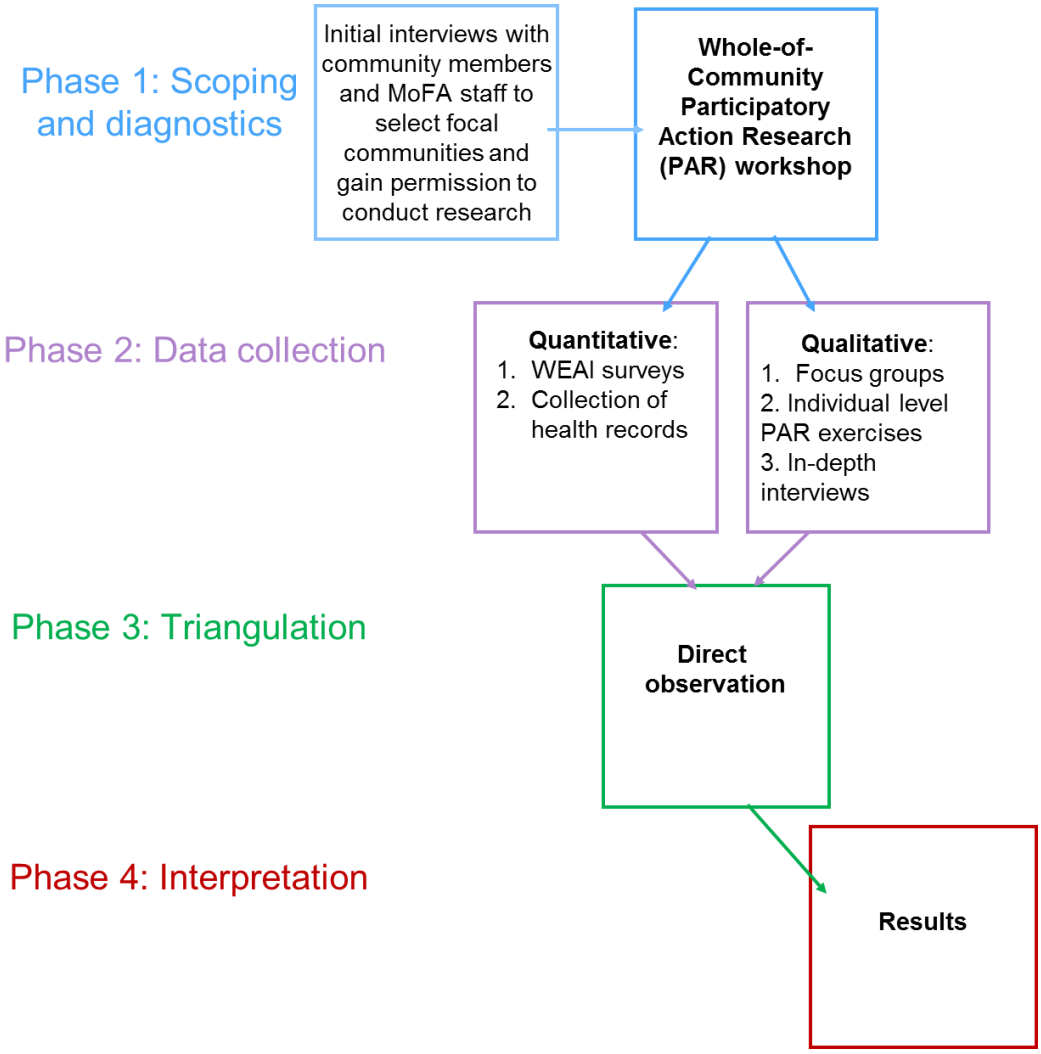

Figure 13: Data collection phases

3.2.1 Narrative description of the diagram

The first phase (scoping and diagnostics) had two main components. The first was initial interviews and observations to identify potential case study villages and assess their willingness and availability to participate in the research. This involved community visits, meetings with local authorities, the seeking of guidance from government officials and eventually gaining formal permission by village chiefs to be present within the communities. By the time the villages were selected and permissions granted, several weeks of initial interviews and observations had been made which became the foundation of my understanding of the context. This data was then used to design the second component, which was the whole-of-community participatory action research (PAR) workshop. The

skeleton of the workshop was already designed based on the pilot of the methods conducted in Nepal. However, the workshop structure allows for adaptations to be made to suit the local context. Those adaptations were made based on the initial interviews and conversations in the three weeks leading up to the workshop. The results of the workshop were then used to adapt the methods used in the second phase.

The second phase included collecting both qualitative and quantitative data. The women's empowerment in agriculture index (WEAI) was piloted in the previous field site and proved to be an important tool for collecting extensive household data that captured the differing perspectives of male and female household members, as several of the modules are done twice to collect data from husbands and wives separately. Additional modules and questions were added to the WEAI based on the data collected in phase one. For example, an additional module of production during the dry season was added to the standard WEAI survey. Further, health records were collected during this phase after health issues were highlighted during phase one. During phase one it was ascertained that the planned individual level PAR activities in phase two were appropriate and relevant, and the topics of the focus group discussions and interview questions were further refined before being implemented.

The third phase involved both an analysis of the qualitative and quantitative data that emerged of phase one and two, as well as additional data gathered through direct observation. Areas of interest where more clarity was needed that came out of phase one and two were shortlisted for phase three for direction observation. For example, in the first two phases it became clear that the dynamic of who sells what and how money changes hands between husbands and wives in the marketplace was important for understanding

control over resources, but was not sufficiently captured through the methods. As such, direct observation in the marketplace was added to phase three. Observations, including through homestays, were used to triangulate findings from the first two phases and increase the depth of my understanding of the context.

The fourth phase involved interpreting the data of the previous three phases to produce results that were sufficiently rigorous to be included within the thesis. Making careful and defensible boundary judgments on the data to be analysed and culling data that was beyond the scope of the questions to be answered in the thesis. In practice, phase four continued into the thesis writing process as new themes emerged and were interpreted. The next section will explain the methods used in each of the phases.

The following table illustrates how the methods map onto specific research questions:

Table 3: Mapping of methods to research questions

Research Questions with Corresponding Primary Methods	Embedded Direct Observation	Adapted WEAI	Collection of health data (hospital admissions and growth charts	Individual PAR exercises	Diagnostic Workshop PAR exercises	Focus Groups	Randomized Interviews	Key Informant Interviews
1. How do adaptive capacity and response spaces differ based on points of social differentiation?	X	X	X	X	X	X	X	X
1. A. What responses do small-holder farming families use to adapt or cope with environmental change and food insecurity?	X	X			X	X	X	
1. B. How do these response spaces vary between and	X	X		X		X		

within households?								
2. What local drivers are limiting or exacerbating differences in adaptive capacity and response spaces?	X			X	X	X		X
2. A. How do nutritional deficits and food scarcity impact adaptive capacity?	X		X					
2. B. How do nutritional deficits and food scarcity vary by gender and age?	X		X				X	
2. C. How does reliance on alcohol to mediate poverty and climate-induced stress impact adaptive capacity?	X					X		X
2. D. How does a high prevalence of disability and physical and cognitive impairments impact adaptive capacity?	X					X		X
3. What are the implications of socially differentiated adaptive capacity and response spaces for humanitarian, development and government programs?		X			X	X		X

3.3 Phase 1: Scoping and diagnostics

This section introduces the scoping activities and builds off the first chapter, which detailed the process of case study selection. In Chapter 1, the process of selection from national to regional to district level was explained. This section will provide more detail on the selection of focal villages (the level below district level) and how this fits with the broader multi-level case study of the SIA program. In the broader SIA project, through the identification of a focal district and a focal village, the analysis proceeds upwards and downwards across social and organizational levels, allowing the researchers to collect relevant data at multiple levels, from the individual all the way to national policy makers. This thesis, however, extends only to village and district levels, allowing the research to focus more in depth on the local context, while benefiting from the research done at higher levels by the other researchers of the SIA project.

The two villages of this study are both baseline sites of the funding institution – CCAFS. The CCAFS baseline sites are villages for which biophysical and social data was previously collected and form the basis of multiple research projects in addition to the SIA project. Using a CCAFS baseline site for the SIA program was necessary to allow us to build off the baseline data that was collected within selected CCAFS baseline sites and contribute to a wider dataset of CCAFS baseline sites around the world. Although research funding was contingent upon contributing to this ongoing data collection process, selecting villages for which there was CCAFS baseline data was helpful as it allowed the research to build off previous research and deepen the analysis as well as influence ongoing programming in these communities.

The Upper West Region of Ghana was identified as the regional area of interest as a result of high levels of food insecurity in the region over the past decade. Within the Upper West

Region, there were eight possible villages with CCAFS baseline data, from which to choose a focal community. The scoping exercises were used to identify one village that would be the most local level of analysis for the wider SIA project. I then added an additional village and town from which to collect data for my individual thesis project. Initial scoping exercises were completed with the partner organization, the Lawra District office of the Ministry of Food and Agriculture (MoFA), which was located in Lawra Town, in close proximity to the potential focal villages. The scoping exercises constituted visits to all eight CCAFS baseline villages to assess their suitability and willingness to participate in the research project. Each of the baseline sites are subsistence-oriented farming communities. These villages are reflective of the breadth of villages found in the region in terms of size, distance from urban areas and livelihoods. I visited each potential village within the first two weeks of the field study.

During these visits I conducted interviews, observations and completed fact finding to determine which villages met selection criteria. The scoping exercises aimed to answer the following questions:

1. Who is included in the analysis?
2. How should the methods be adapted for this context?

A list of criteria was developed to identify the focal community for the larger SIA project. This included considerations for the other three DPhil students within the SIA program. The criteria were as follows:

1. Community desire: the community desires to have researchers present and the local authority is willing to grant permission for researchers to regularly enter the village and conduct observations, surveys, focus groups, a workshop and take physical samples of soil, insects, plants and water. Implicit within the understanding of 'desire to host researchers' is an absence of research/NGO fatigue, meaning any community

which appeared to have had a strong research presence in recent years that was taxing to community members was not prioritized.

2. Transport/logistics: the community needs to be accessible to researchers who do not have access to a car or motorbike. As no public transit exists between villages, the village needed to be close enough to the nearest town that the researchers could live in and cycle daily into the village. It was estimated that the researchers could reasonably cycle 10km per day on the rough roads connecting the villages to towns, and so villages less than 5km from a town were prioritized.

3. Size: the village needs to be a manageable population for the production of representative samples. Specifically, it needs to be small enough that all households can be engaged in some aspect of the research, but large enough that a broad spectrum of livelihood options is present. Based on experiential knowledge of running similar research programs, the SIA team members identified a population of 60 households as the target size. This is also a typical village size for the region.

4. Typical livelihood and production patterns: the village needs to engage in livelihood and production patterns that are typical of the region. Typical livelihood and production patterns were ascertained by reviewing grey literature on the area before field work, and undertaking interviews with key informants. The shortlisted activities deemed necessary within the focal village were wet season farming; dry season gardening; trade of small animals; sale of meats, eggs and vegetables in town markets, and other trade (skilled and non-skilled). The focal village also needs the absence of any major industry that would render the village a-typical, such as an industrial brick factory, a slaughter house, or major construction project employing large portions of the adult population. In practice, the only required livelihood activity not present in each of the baseline sites was dry season gardening. Villages not in close proximity to a river do not engage in gardening. Villages not engaging in dry season gardening were not prioritized.

Using these criteria, Orbili Village was selected as the focal community for the larger SIA program and Tabier Village was selected as the second focal community for this thesis project. Permission was then granted by the local chiefs of both villages for the researchers to be present and collect data. These agreements were formalized during village meetings, where the agreement was communicated to all households.

3.3.1 Whole-of-community participatory diagnostic and planning workshop

Following the selection of Orbili Village as the focal community for the SIA program, a whole-of-community diagnostic and planning workshop was completed. This workshop is the first of the set of action research methods, as the activities themselves each have an

impact on the participants, and the final steps of the workshop include identifying community goals and producing plans to achieve those goals. As such, the method is a form of intervention as well as a forum for the researcher and participants to learn by doing. The workshop was completed over five days at the Lawra Town Teacher Resource Center with 60 participants. The resource center was selected instead of having the workshop in the village due to the availability of tables, fans and catering. Transport was provided to the participants each day in a rented mini-bus to ensure the workshop was accessible.

Figure 14: Community workshop participants and facilitators

Great care was taken to ensure that each household within Orbili Village was represented at the workshop with at least one representative of each household. This was achieved by numbering each of the 43 households and delivering invitation letters. Households with an odd number in the village household list were asked to send a male representative to the workshop. Households with an even number in the village household list were asked to send a female representative to the workshop. All representatives needed to be aged 16 years or

older. The remaining 17 places at the workshop were designated for community leaders. The Chief was asked to select members of the community who demonstrated ongoing leadership, such as being the heads of community groups, or holding a position such as community health worker or teacher.

The Whole-of-Community PAR Workshop was comprised of several sub-activities. This compilation of activities later formed the basis of a UNEP methodological training manual (Wicander et al, 2016). The following section briefly summarizes each of the exercises completed within the workshop for Orbili Village.

The first set of exercises focus on framing adaptation and answer the question: adaptation of what, to what, on whose terms? This set is made up of six different exercises as follows:

1.1 'What's important' exercise: participants reflect on what it important to them and draw a visual representation. Each contribution placed on the board by participants and then clustered on a large board with similar ideas of what is important and discussed. This exercise kicks off the workshop in a spirit of openness and inclusivity, as everyone's interests are included and nothing is too small or too personal to make it on to the board. It sets the tone of the workshop as being an event completely driven by community priorities, and the exercise also functions as an ice-breaker. It allows researchers and practitioners who do not have a long-term relationship and knowledge of a community to rapidly obtain a broad understanding of local values and priorities beyond adaptation alone.

1.2 Challenges brainstorming and clustering: participants reflect on the challenges they face on a daily, weekly, monthly, and yearly basis, and record these challenges on sticky notes. The challenges are clustered in groups and prioritized. This activity represents one key step in the practical framing of adaptation in terms of 'of what, to what, from whose perspective and over what time frame' (Helfgott, 2014). It provides the elements of 'adaptation to what' of adaptation planning, which is used for subsequent systems analyses such as the following step of causal mapping between these elements and mediating factors in the community, and prioritisation of key vulnerabilities and adaptation challenges.

1.3 Causal mapping: the challenges from the previous exercise are put onto cards and participants reflect on the ways in which these challenges are linked and influence each another. Discussion is facilitated on the relationships between the challenges, and arrows and causal pathways are drawn. The exercise provides an understanding and visual representation of how the system functions from the perspective of participants.

It highlights the interrelationships between challenges and suggests entry points for transformative change.

1.4 Challenges ranking exercise: participants are given dot stickers to vote for key challenges outlined in the previous two exercises. This activity provides an understanding of the relative priority of various vulnerabilities and adaptation challenges to the community, and sets priorities for further planning.

1.5 Responses clustering: using the causal map and the output of the challenges ranking as intermediary objects (an object used to stimulate discussion and focus thinking), participants are asked to brainstorm all past, present and potential future responses to these challenges. These responses are written down on sticky notes by the participants or facilitator and clustered by theme (not by challenge, as one response may address multiple challenges or only partially address a challenge). The purpose of the exercise is to elicit all community-endorsed past, present and potential future responses to the vulnerabilities and challenges identified in the previous stages of the activity. In this way, it is possible to map existing coping and response strategies and tools. This exercise will form the basis of the narrative event ecology/story circles that comprise the next activity.

1.6 Response stories: using the response clustering as an intermediary object, participants are asked to share stories about a time they tried any of the responses on the sheet, why and what happened. These stories are shared in a circle for some time. Following this, participants are asked if there are any responses on the sheet that they would have liked to have tried but did not. In this case, participants are asked to share stories about why they did not try certain things and what they did instead. Finally, participants are asked if there are any activities they would like to undertake in the future, and asked to tell stories about the opportunities or barriers to trying new things. During the activity, positive responses and coping strategies are spotlighted. The output is a collection of narratives, which create a rich picture of the status of adaptation and adaptive capacity within the community and identify and characterize barriers and opportunities to adaptation.

The second set of exercises focuses on what changes the group would collectively like to work on, and involves defining aspects of the current state and the desired future state. The first four exercises answer the question: where do we want to go? The remaining four exercises of this section answer the question: where are we now?

This set is made up of eight different exercises as follows:

2.1 Collages: participants use a large stack of magazines and newspapers to select clippings that represent an aspect of their desired future. The purpose of the exercise is

normative visioning. Participants add their cuttings to a central large sheet of paper and explain their choices and what each clipping represents. Aspects of the collage representing a desired future vision are included at a later stage during planning.

2.2 Future village map: participants are facilitated to draw a map detailing how they would like their village to look in the future. This captures the physical details of the village, including schools, healthcare, markets, industry, agriculture, housing, electricity, water storage and distribution, sanitation and so on. The elements on the map illustrate the goods, services, aesthetic and lifestyle considerations that the community would like to provide through its physical landscape. This is essentially an exercise in urban planning that also encompasses aspects of the participants' values and aspirations.

2.3 Visualization: with eyes closed, participants are then guided through a visualisation of their village, their homestead, their home and their daily calendar of activities in the future. Following the visualisation exercise, participants successively tell the story of what they imagined for themselves around the circle, sharing desired futures. The group then collectively summarises the visions and aspirations for development of the community. This exercise contributes to a 'rich picture' of the future in terms of local values and aspirations by capturing many aspects of daily life that cannot be represented graphically in a map or collage.

2.4 Adaptation planning and prioritization: participants synthesize a 'rich picture' of the shared vision from the previous three exercises. They do this by discussing each of the outputs from the previous exercises and voting on which aspects of the shared desired future they would like to take forward for the planning exercise. The top voted aspects are carried forward to the Backcasting exercise.

The previous four exercises completed the 'where do we want to go?' portion of the diagnostic and planning workshop. The next four exercises focus on 'where we are now?' to map the community's assets.

2.5 Resource mapping: participants collectively construct a map of biophysical resources available in the area on a flipchart paper. The exercise helps to identify the boundaries of the area to be assessed, the different resources in the site and their spatial distribution.

2.6 Daily and seasonal calendar: for each season, participants map out their daily activities from waking to sleeping for the three cases on the same diagram: of normal times, times of scarcity and times of abundance. The format facilitates comparison between activities during these times. Separate marks are drawn for the activities of men, women and children also on the same diagram. This exercise makes clear the daily labour and consumption patterns during times of scarcity and abundance as well as typical years

across the seasons and the corresponding production, harvesting and herding annual cycles.

2.7 Institutional mapping (formal and informal): together the participants list all groups and organisations present and draw a Venn diagram that represents the relationships between them. The purpose of this exercise is to completely map out all of the formal and informal organisations and institutions that the community relates to, and how these organisations relate to each other. This characterises the existing organisational and institutional capacity that the community has to build on, as well as which activities and resources can be coordinated through.

2.8 Individual strength mapping (community valentines): each participant writes an anonymous 'valentine' about one of the other participants. In the 'valentine,' they detail all of the 'good things' about the other person, including skills and characteristics. This activity captures the skills, knowledge, expertise and assets of individuals and is an opportunity for participants to receive praise and boost morale. The skills and characteristics included in the valentines are included in the plans to build on existing strengths.

The third set of exercises builds a step-by-step plan to achieve the goals defined in the previous exercises. This set is made up of one exercise, entitled Backcasting, which is repeated for each of the prioritized community goals. Backcasting is done by beginning with the desired future state and then working backwards step by step until the present state is reached. This is trialed first with a simple example of making fufu and then moves on to community level goals. See Appendix 1: Seed fund for an example of a community goal backcast that was developed.

At the close of the workshop four community-driven goals and plans to achieve them had been outlined. I then provided support and was the primary researcher contact for their process of seeing the goals through to completion over the following three months and again during follow-up visits six months and one year after the workshop. Observing individuals within the community working together to achieve progress towards these goals

was a major component of the action research portion of the methodology, which was recorded in field notes through ethnographic methods outlined on page 104.

3.4 Phase 2: Data collection

This sub-section first explores the quantitative data collection: the Women's Empowerment in Agriculture Index (WEAI), child growth records, and hospital admission data. Given the importance, comprehensiveness, and rigor of the WEAI, much of this subsection is devoted to this survey tool. After discussion of the quantitative approaches, I discuss qualitative approaches of focus groups, participatory action research, and in-depth interviews. The next sub-section will discuss observational research and triangulation. In reality, the various methods were often undertaken simultaneously and analysis of one was influenced by the results of the other approaches, such that the label of 'phases' provides a helpful framework (albeit not distinct linear phases).

3.4.1 Surveys: the Women's Empowerment in Agriculture Index

As the focus of my field work was on social differentiation, I decided to use the well-validated Women's Empowerment in Agriculture Index (WEAI) (Malapit et al., 2014; Malapit & Quisumbing, 2014; Alkire et al., 2013). The WEAI is a standardized tool which has been used all over the world to quantitatively measure parity of decision-making between spouses. Individuals are then allocated a multi-dimensional score, based on achievement cut-offs. The index is inspired by Amartya Sen's capability approach (Sen, 2001). It operationalizes the quantitative measurement of capabilities. The tool was recently adopted as one of the key tools to measure progress towards the achievement of the sustainable development goals. The WEAI collects household and individual level information on the extent of women's engagement in the agriculture sector and their empowerment relative to that of men in five domains: (1) decisions concerning agricultural production, (2) access to

and decision-making power over productive resources, (3) control over use of income, (4) leadership in the community, and (5) time use.

Overall the survey sought to answer the question: in which aspects of life common to subsistence-oriented farming families are adults within the household achieving parity? Data on the parity or disparity within specific aspects (domains) of life is then used to better understand specific challenges to food security and well-being. In this case of this paper, the disparities shed light on the stresses of poverty, how those stresses differ by gender, and how these disparities then provide a backdrop for alcohol dependence as a coping strategy.

An adapted version of the WEAI was administered to all 90 households in Tabier and Orbili Villages, collecting extensive household data and individual level data from spouses separately. The WEAI is a modular index, allowing for additional modules to be added as needed for the local context while still providing consistency across studies. The modules in highlighted text in Table 4 were added to the index for this study and are not part of the standard WEAI. A copy of the household and individual survey administered is included within the appendices of this submission.

3.4.1.1 WEAI sampling

The undertaken sampling was census style, meaning all households in the two adjacent villages were included in the sample. There were 47 household surveys and 98 individual surveys in Tabier and 43 household surveys and 68 individual surveys in Orbili. No households were excluded and none declined to participate. I spent three days training three enumerators, observed the enumerators administering several surveys and checked completed surveys. Due to the trust gained from the community, it became clear that there were issues with one enumerator falsifying some surveys. This was verified by asking the

household members from whom data had been collected, and these surveys were redone by a new enumerator. Fortunately, this issue was caught early in the research process.

3.4.1.2 How the survey used differs from the standard WEAI

The additional WEAI modules focus on climate change adaptation, including questions specific to adaptive behavior, sources of information (including climate information services) and climate sensitivity and consciousness. With these extra modules, the WEAI provides extensive information about the adaptation actions available to specific individuals, which can be analyzed according to gender, socio-economic class, ethnicity, disability and relation to the localized royal family (residents of the village palace and extended family members).

Additional questions were also added to the standard modules to collect information on whether any members of the household had a disability, whether any children in the household were struggling in school and whether any members of the household currently lack health insurance. These questions were added as a result of the high prevalence of disability within the case study region.

3.4.1.3 Survey modules

Module 9, 10, 15 and 16 are not part of the standard WEAI and were developed specifically for this research project.

Table 4: Modules on the WEAI

Household level modules	Individual level modules
1. Household Demographics – *who is in this household and what are their basic demographics (age, gender, marital status, education)?* 2. Dwelling Characteristics – *what are the amenities of this home and what materials is the physical structure made out of?* 3. Land and Agriculture (rainy season) – *what crops do you produce in the rainy season and what are the yields?* 4. Land and Agriculture (dry/gardening season) – *what crops to you produce in the dry season and what are the yields?* 5. Business and Entrepreneurship – *are any members of the household engaged in off-farm employment or business?* 6. Consumption and Consumption habits – *what foods have been consumed in the past 7 days, where do these foods come from and how frequently do you experience acute food scarcity?* 7. Characteristics of Differentiation – *building on the previously captured, points of differentiation, do any of your children experience difficulty learning and do any household members have physical or cognitive impairments?* 8. Extended Networks – *does your household receive monetary or in-kind remittances or other external supports?*	9. Climate Sensitivity and Consciousness – *to what extent is your livelihood and food security affected by changes to the environment and to what extent does changes in the environment bear heavily on your mind in day-to-day life producing worry or stress?* 10. Information Dissemination and Knowledge Sharing – *how do you receive information on multiple subjects and pass on knowledge?* 11. Role in Household Decision-Making Around Production and Income Generation – *do you make decisions around production and income generating activities? How does this compare to other household members?* 12. Access to Productive Capital – *do you have access to productive capital? If not, why not?* 13. Access to Credit - *do you have access to credit? If not, why not?* 14. Individual Leadership and Influence in the Community – *Do you have a leadership role in the community? To what extent do you feel your opinion is heard and valued?* 15. Adaptation Decision-Making – *do you make decisions about changing/adapting productive and home-life activities? How does this compare to other household members?* 16. Motivation for Adaptation Decision-Making – *to what extent do you make motivated and informed decisions on adapting behaviors freely and not limited by coercion or resource constraints?*

3.4.1.4 WEAI Analysis

The data was analysed by selecting deprivation cut offs for each domain and calculating empowerment scores for men and women. Data from the surveys was used extensively to triangulate the results of qualitative interviews, especially pertaining to food consumption and food rationing; family planning; and all demographic information including literacy, family size, child spacing, employment, etc. Specifically, trends identified within interviews and observations were checked for consistency with the survey data, wherever there was content overlap. For example, observations and quotes pertaining to the distribution of food in the home were compared to reported food consumption within the household questionnaire. Data from the different sources is reported side-by-side to demonstrate consistency, and where inconsistency exists between data sources, it is specifically addressed.

3.4.1.5 Limitations of the WEAI

The WEAI has several limitations for these research purposes. The WEAI is very long, which creates a time burden for interviewees and a cost burden for the researcher, as interviewers can only complete a small number of surveys per day. Although the index is widely praised within academic fields, there are critiques of the tool that center on the high level of abstraction in many questions, with concerns that participants may not be able to give meaningful answers to questions of an abstract nature. Further, the domains selected have been criticized as essentializing women's roles, and under-appreciating the macro-constraints that impede women's empowerment beyond household level power structures (Goodrich et al., 2015). Alternative question formats such as vignettes have been proposed to substitute a number of the standard WEAI questions (Masset, 2015). The subjectivity of deprivation cut-offs has also been the subject of criticism. Many of these limitations are

meant to be addressed in the second iteration of the WEAI, called *WEAI Project,* which is currently being developed.

Within this research project, in some domains the WEAI was not sensitive enough to detect micro differences between individuals and households. In the early stages of the data collection, initial regressions were run which showed less of a difference between households than one would expect based on direct observation. This was particularly true concerning food access and parity of decision making on productive and adaptive decisions comparing spouses of different households. During initial observations, it was clear that households varied considerably from one another from the perspective of community members, but these differences were frequently too subtle and place-specific to be detected by the WEAI. In response, I held focus groups to develop an alternative wealth index to be completed in addition to the WEAI. The domains of the alternative wealth index were difficult to measure robustly, and so the data collected is of questionable accuracy. As such, I do not present the results of the alternative index within this thesis, but rather present the new index which was produced in a participatory method, as a result itself. See page 94 for information on the alternative wealth index.

3.4.2 Collection and analysis of child growth records

Using grounded theory as a frame for the research, nutrition emerged as a strong theme in the data and the child growth records served as a complement to the other measures to examine social differentiation. Early in the research, I discovered that strong weight for age growth records existed but had not been analysed, so I took photos of the records and later digitized them to analyse children's growth and development trajectories in relation to gender, village of residence, number of children in the household and season.

Weight for age growth records were collected for all children in Orbili and Tabier villages for whom growth charts were available, totalling 192 children from birth to five years of age. The data is longitudinal weight measurements, with the first data point typically being weight for height at birth. A practitioner from the Ghana Health Service (GHS) visits rural communities and weighs children monthly. These are recorded within an antenatal book, which is kept with families. The book is meant to be a health record, which is brought to each health appointment, and the data is not stored centrally or digitized by GHS. I visited each household one-by-one to gain permission to use the data contained within the health charts. The data set was digitized by taking photos of each of the 192 charts and copying the handwritten numbers of each weighing onto an excel sheet.

I analysed this data with the help of a statistician using generalized estimate equations (GEE) to account for non-independence of observations with an exchangeable correlation matrix. All numbers were sex-adjusted to account for the slight natural variation between male and female infants, and compared to the World Health Organization (WHO) trajectories of desirable growth.

For these records, I asked the following two questions: 1) Are child weights stagnating seasonally? and 2) Are there variations between male and female infants?. Then, I planned and used the other sources of data to look at the subsequent three questions: 1) whether any stagnation is sufficient to cause stunted cognitive or physical development; 2) what are the implications of the level of stunted cognitive and/or physical development for future adaptive capacity, if any; and, 3) what are the implications of any type of social differentiation between male and female infants and children. Health was also examined through observation, interviews, and the collection of hospital admissions data.

3.4.3 Collection and analysis of hospital admissions data

Hospital admission data was retrieved from Lawra Hospital to assess seasonal differences in ailments. For data protection and privacy reasons, the raw data was not released. Rather, the district hospital statistician produced the graphs below in 2013 following a request. We sat together at the computer to produce tables for anaemia and malnutrition, which are included in Chapter 5. This data aims to answer the central question: do hospital admissions vary by season? In particular, I was interested to know if there is a discernible spike in admissions or ill health during the lean season.

There are several limitations to this data set. Firstly, digitized records are only available beginning in 2010 and the first two years of digitization only included the primary presented health concern, according to the hospital statistician who was stationed in the hospital in 2012. If persons were hospitalized, they would be categorized in the digitized system as presenting only one health concern, such as malaria, while being treated for a number of conditions such as malaria, anaemia, and eye infection, for example. This issue was fixed for the 2012 records with the placement of a statistician within the district hospital full time. The difference between 2011 (only primary presented health concern) and 2012 is observable in the charts. The data presented in Chapter 5 was collected from the statistician directly in 2013 and was only available up to and including 2012, meaning there was only one year of hospital admissions data that included conditions other than the primary presented health concern. During the final field visit the following year, the author attempted to obtain 2013 records but found that the statistician had been re-posted to a new district hospital and not replaced. As such only a small number of years can be analysed.

Secondly, the numbers represent hospital admissions for both the data on anaemia and malnutrition, and as such the condition of patients would have had to be severe or acute. Non-acute conditions would have been treated as an outpatient case and therefore not captured within this data set. Thirdly, as I was not given permission to use the use raw data, I could not undertake any additional analysis other than visually inspect the tables created. Fortunately, there is a clearly visible seasonal differentiation, which answers the questions about seasonal peaks in admissions. However, other analyses could not be completed.

3.4.4 Focus groups

Eighteen focus group discussions (FGD) over the three field missions were completed in Tabier and Orbili Village on specific subjects as well as with Ministry of Food and Agriculture (MoFA) staff, totaling approximately 60 different individuals, as half of the individuals participated in two of the focus groups on different subjects. The focus groups were planned to comprise approximately five people each and be sex-segregated to better enable all persons to contribute. However, the numbers varied slightly, as outlined below, and three of the focus groups included both men and women. Each discussion lasted approximately one hour. The focus groups were initially used as a first step to gauge opinions and thoughts from the participants on the research, and were used again later in the final stages of field research to follow-up on emerging themes through a grounded theory approach – namely, child rearing, stress coping strategies and familial relationships, including family planning. They were also drawn on for the production of the supplementary wealth index. Sampling was generally convenience sampling with some stratification to provide a gender balance. Two additional focus groups were held with mothers of severely disabled children, following a USAID special needs program, and the students of an adult sewing class, following a class. The production of the alternative wealth index was

participatory but was set up similarly to focus group discussions and so I have included those discussions in this section as well. The following table outlines the focus groups.

Table 5: Focus groups

Subject	Participants
Observed environmental change, agriculture productivity and seasonal migration	Group 1A: 3 men Group 1B: 4 women Group 1C: 3 men, 2 women Total: 12 participants
Market sales, use of on-farm and off-farm income and price volatility of stable goods and good stuffs	Group 2A: 4 men Group 2B: 5 women Group 2C: 2 men, 2 women Total: 13 participants
Climate information services and planning for the future	Group 3A: 5 men Group 3B: 4 women Total: 9 participants
Nutrition and child rearing, family, community dynamics, relationships and alcohol consumption	Group 4A: 3 women Group 4B: 5 women Group 4C: 4 men Group 4D: 3 men Total: 15 participants
Discussion group with mothers of severely disabled children	Group 5: 5 mothers
Discussion group with students of the adult sewing class	Group 6: 15 women sewers
Production of the alternative wealth index	Group 7A: 3 men Group 7B: 2 men, 2 woman Group 7C: 5 women Group 7D: 5 men Total: 17 participants

3.4.4.1 Production of supplementary wealth ranking

After the first round of household surveys was completed during the initial field visit, it became clear that several of the questions of the household WEAI which aimed to collect data on income or value of assets were difficult for individuals to answer. As such, the quality of the data for those questions was of concern. Further, many of the households were being measured as equally poor in the household survey, although in conversations with communities members is was clear that some households were doing better and worse

than others. The WEAI, however, was not sensitive enough to the local context to pick on the micro-differences between households, even though the micro-differences appeared to be meaningful to the individuals being interviewed.

As a result, a participatory exercise was added to the methodology to develop a supplementary wealth ranking with focus groups. To do this, a modified wealth ranking exercise was conducted with four gender-segregated focus groups during the return trip to Ghana in late 2013. The aim was to create the antithesis of the WEAI – to create a set of indicators relevant only to the local context that could measure the difference in wealth between the households, as perceived by fellow community members.

In the focus groups, participants were asked how they recognized which families were more prosperous and which families were struggling to get by. *How do you know when someone is well-off? What does a well-off person have, do, and look like? How do you know when someone is not well-off? What does a poorer person have, do and look like?* This was followed by a lively discussion, at the end of which the participants were asked to finish the following sentences:

A wealthy Degao (local ethnic group) has _____.
A wealthy Degao does _____.
A wealthy Degao looks like _____.

A long list was generated and each participant voted on the options. The options were strikingly similar in each of the men and women's focus groups, showing good consistency of results.

A wealth ranking was created and administered to all households and individuals in the initial sample, to supplement the existing data. It was completed in all 90 households of Orbili and Tabier Village. However, several of the indicators were difficult to measure, such

as family unity. Further, there may have been some confusion on the part of the surveyor on how to record one of the indicators – the time needed to mobilize resources. As such, I decided there was too much inconsistency and inaccuracy to use the data collected at household level with the supplementary wealth ranking. Rather, the indicators themselves, which were developed using a participatory approach, will be presented as a result in Chapter 4.

3.4.5 Individual-level participatory action research (PAR) exercises

Individual-level PAR exercises were completed with a randomized sample of 30 adults from the two villages (15 women and 15 men) to explore adaptation and coping strategies as well as planning capacity. The exercises used were narrative collection on food scarcity and seasonal migration, urgent-import planning matrixes and repertory grids to elucidate aspects of worldviews (intangible points of social differentiation) that relate to climate adaptation and food security. These allowed for a more in-depth view of adaptation and food security than examined in the WEAI and triangulated with other qualitative methods, including observation. Each of the individual-level PAR exercises will be explained in the following section.

3.4.5.1 Collection of narratives

The collection of narratives was designed to uncover less obvious and contextually specific adaptation options. Narratives were captured through both media analysis (local newspapers and websites) as well as verbal capturing through event ecology with the 15 participants.

In this randomized sample, interviewees were asked the following questions:

1. Has anyone in your extended family experienced crop failure in the last 5 years?

    a. If so, under what conditions did this happen? What did you do? How do you feel about the actions you took looking back on them now? Did anyone have a dissenting view at the time, or now?
2. Has anyone in your extended family gone south to work during the dry season?
    a. If so, under what conditions did this happen? What did you do? How do you feel about the actions you took looking back on them now? Did anyone have a dissenting view at the time, or now?

In this way, collected narratives examined specific events of crop failure and migration to the south. This data was analysed like the other qualitative analysis, using themes and trends that emerged and then examining how the different methods complemented or contradicted one another to create a more complete picture.

3.4.5.2 Important-urgent planning matrix

This activity comes from a book called *The Seven Habits of Highly Effective People* (Covey, 2012). Participants are asked to map out actions they do which they personally feel are important or unimportant on the Y-axis, and urgent or not urgent on the X-axis. This is an exploratory exercise and also an example of an activity that is not purely extractive: the participant can be led in a reflection process about their personal priorities, how they match up with the time spent on them each day, and whether they are neglecting some of their priorities in a way that is unsatisfactory to themselves. The matrix provides invaluable information about individual preferences, priorities, time management related to day to day actions, including but not limited to adaptation actions.

3.4.5.3 Repertory grid technique

I used a repertory grid technique to explore worldviews and adaptation actions with 30 randomly-selected participants. These were the same 30 individuals (15 men and 15 women) who participated in the previous PAR exercises (narrative collection and urgent-important planning matrix). The repertory grid technique produced data that was less useful than originally anticipated, for reasons pertaining to methodological rigor that will be

outlined below. Further, it is highly time-consuming and participants often did not enjoy doing the grids because the purpose was not obvious to them, in addition to the burden of time. Consequently, the grid analysis itself is not used in this thesis, nor is it recommended for further use. However, the process data is used in this thesis, predominantly in Chapter 4, as quotes about specific adaptation options and in some cases observable trends in the placement of action cards on the grid are reported. The aim of the exercise was to enable individuals to discuss and analyze adaptation decisions by placing photo cards representing adaptive or coping actions onto a grid in a particular order. In doing so, they would elucidate underlying worldviews associated with those actions. The following paragraph explains the theory of the technique and the two versions of the technique that were piloted – first in Nepal and second in Ghana.

To begin to uncover the relevant cognitive processes, I attempted to outline prevailing and outlying perspectives using personal construct theory and the repertory grid technique (Vasileiadou et al, 2012). Personal Construct Theory (Kelly, 1955) incorporates a psychological theory of human cognition to better decipher the refined theories that individuals develop to help them understand the world around them and anticipate future events. Determining an individual's personal system of constructs helps understand their strong and unchangeable beliefs, durable identities, multi-accountabilities, aspirations, personal narratives, and preverbal or latent judgments/prejudices towards other individuals, practices, institutions or trends. It also helps us uncover an individual's salient memories associated with a given topic. At the community level, assessing the personal constructs of a group of individuals can help identify prevailing and outlying perspectives,

determine heterogeneity of perspective on a given topic, and also allow the researcher to operate with a richer understanding of the cultural models at play.

I first piloted the repertory grid technique during the SIA field study in Nepal in two distinct groups: (1) a randomized group of 27 who also answered a larger questionnaire (the Empowerment in Agriculture for Adaptive Capacity Index), and (2) the 15 participants of our climate analogue exchange program. The two different groups were selected for trials so that I could assess what kinds of additional information (the questionnaire data of group 1 or my experiential knowledge of group 2 members) were helpful when analyzing the grid results. The experiment was an adaptation of the method used in Vasileiadou et al. (2012), to assess social actors around disaster warnings. They used a triadic method of differentiation to analyze elements and constructs. The elements used in my study were a series of 21 adaptation actions that were identified during a whole village workshop. Participants randomly selected three cards at a time (each with an element written on in in Nepali script). They were then asked to distinguish the cards by pairing two together, separating the third and explaining their decision.

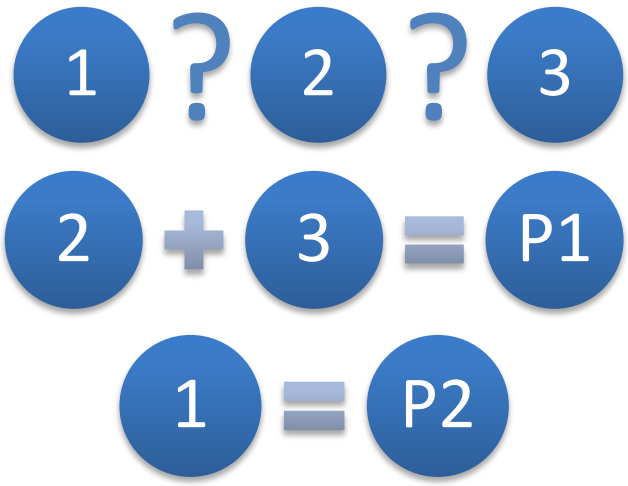

Figure 15: Explanation of repertory grid technique Source: author

The result is a discussion of the process and a set of bipolar constructs, within which an element (e.g. adaptation actions) can be placed. In theory, the set of bipolar constructs can be analyzed mathematically to help us understand the latent or preverbal filters through which all additional information is passed. This methodology was a pilot in this context and was added to the methods after I observed high levels of heterogeneity of opinion surrounding certain adaptation options discussed in workshops in the beginning of the field program. However, the repertory grid technique using undefined constructs made the data very difficult to analyze as nearly every participant provided different constructs. As such, the data gathered in this way in Nepal was not analyzed as a repertory grid, but rather the quotes that were made when explaining the choice of card selection were analyzed similarly to an interview question and themes coded. This did not produce results on the constructs that participants hold about the actions, but instead some interesting anecdotes about the actions. The application of the method was re-worked for the Ghana field site.

In the Ghana site, the constructs were pre-defined. Although this limits the worldviews that could be analyzed, I felt that holding the constructs constant would better enable mathematical analysis of the placement of the cards, which was not possible in the format used in Nepal. The constructs were based on Ulrich's critical systems heuristics: (1) sources of motivation, (2) sources of power, (3) sources of knowledge, and (4) legitimation. Each participant completed the grid exercise three times, based on each component of critical systems heuristics. First, the placement of the action cards on the grids indicated whose decision it was to engage in the activity (your decision alone, someone else's decision alone, shared decision, no one's decision (e.g. only God); second, the placement of the cards indicated if you have sufficient information to decide whether to complete the action and

how to do it; third, the placement of the cards indicated if the action was important to the participant personally, important to someone else, important to everyone or to no one.

The actions on each card were developed in a participatory process outlined further in Chapter 4. The actions of the cards are represented in the following table.

Table 6: List of actions on cards for PAR

Actions
Dig a water duct
Grow vegetables at the riverside
'Go south' for seasonal work
Plant in ridges or raised beds
Use chemical pesticides or fertilizers
Intercropping and crop rotation
Plant 'improved seeds' (most commonly, seeds for early maturing maize)
Intercrop with trees/agro-forestry
Produce shea butter
Ask family and neighbours for loans, or 'susu' (micro-credit savings groups)
Day labour in Lawra town or surrounding areas (NGO projects, city businesses)
Raise livestock
Petty trade (most commonly in local markets)
Micro-enterprises (brewing, sewing, selling of prepared food)
Ask family and neighbours for food or cash or 'susu' (micro-credit savings groups)
Ration food (reduce meal frequency and size)
'Go south' for seasonal work
Sell livestock
Fell trees to produce timber and charcoal for sale
Hunt wild animals (often involving bush burning)
Eat wild fruits and vegetables

The original plan was to analyze the placement of the cards using software specifically designed for the repertory grid technique called Sci Vesco, with which I experimented. However, I felt that the constructs did not hold enough validity for this type of analysis. In

undertaking the repertory grid technique, I felt that the cards were interpreted too inconsistently for mathematical analysis to hold construct validity (such that relationships would be based on chance rather than patterns), but that the action of undertaking the exercise resulted in meaningful discussions. The qualitative data from the discussions is thus incorporated into this thesis, and the utility of this method in this context is an area for future work.

3.4.5.4 Photo project

I distributed cameras to Orbili community members and women with severely disabled children throughout Lawra. This provided an inside look into their daily lives, and provided more space for co-creation of data and reciprocal relationships, as they were provided with knowledge on how to use cameras and the photos for them to keep. This participation action research method was well received. It served as an attempt to understand power and structure: since poverty is intersectional and multidimensional, I looked for those expressed as most marginalized to better understand their lives. Equitable strength-based adaptation hinges on ways in which individuals and classes relate to each other, experience stresses and adapt. The pictures were reviewed with each participant, so the explanation for each photo that was used in conjunction with the photo. The explanations provided during the photo reviewing sessions were added to the set of qualitative interview field notes. The lessons coming out of these discussions also initiated additional discussions, especially on the division of caring labour within the home that was explored more during homestays. The photos themselves have not been published, as this was not the agreement made with the participants, except for a small number of photos that included children with visible symptoms of malnutrition that have been used in Chapter 5 with permission sought afterwards.

3.4.6 In-depth interviews

In-depth interviews were completed with key informants as well as the same 30 participants in order to expand on the findings of the repertory grid, important-urgent matrix, and collection of narratives. Additionally, in-depth key informant interviews were completed with fifteen public servants from the ministries of Health, Education and Food and Agriculture; staff of local NGOs and international staff placed from British, American and Canadian agencies; community, religious, and traditional leaders; and, women working in women-dominated enterprises in Lawra Town. Questions and discussion bullet points for these semi-structured interviews were developed based on emerging themes and findings, and thus developed throughout the process of the research.

3.5 Phase 3: Triangulation

The third phase involved preliminary analysis of the qualitative and quantitative data coming out of phase one and two, followed by additional data through direct observation. Where possible, direct observation to triangulate the preliminary results and provide a deeper understanding of the theme through direct observation was completed. Areas of interest where more clarity was needed, arising out of phase one and two, were identified and additional information was sought. For example, more clarity was needed to understand the gendered differences in child growth that emerged from the growth data. Data from surveys on food consumption and feeding-related data from PAR exercises were analyzed side-by-side in order to draw preliminary conclusions. The direct observation of feed practices was undertaken to try and gain a better understanding of the complex system affecting child growth and its variance by gender. Observations through homestays in particular were used during this stage to triangulate findings from the first two phases and increase the depth of my understanding of the context.

3.5.1 Embedded direct observation

I used direct observation techniques following the direct observation methods designed by Dewalt and Dewalt (Dewalt et al., 1998). I was the only member of the research team embedded in the villages. I participated in community life through home-stays and daily visits, often with local assistants/translators. I made institutional-level direct observations through taking up an office at the Lawra MoFA District office, and through attending functions, trainings and community meetings of MoFA and other NGOs working in the region. I recorded more than 450 hours of direct observation.

Data was collected through handwritten field notes, audio recordings of conversations, and photos of specific visuals difficult to describe, such as farming methods or unknown food crop varieties, to help with subsequent investigations. Observations in the first and second wave of fieldwork were used to define focus group and interview questions in the third wave of fieldwork in addition to constituting data used in the final analysis. Field notes were read and re-read multiple times until key trends within the notes were identified. Each of these trends was then considered separately and compared to the literature and household survey data for consistency.

Observational data included:

- Direct observation of farming, riverside gardening, income-generating activities, community meetings, festivals, funerals, marriages, and daily life through 24-hour participant household observations during home-stays with three families in Orbili village and one family in Lawra Town
- Direct observation of sewing programs for women with special needs in Lawra Town and Tabier Village, three monthly sessions of the Special Needs Awareness Program

in Lawra, and the four Ministry of Education 'Prevention of Disability' school programs

- Direct observation of government and NGO programs and community meetings and proceedings including the Canadian DFATD (Department for Foreign Affairs Trade and Development, formerly CIDA) RESULT (Resilient and Sustainable Livelihoods Transformation) program; the Special Needs Awareness program (SNAP); a livestock health training; a livestock distribution program; parent teacher association (PTA) meetings in one urban and one rural school; a solar energy program; multiple women's loans and savings groups; multiple farmer field schools; multiple women's enterprise programs, including a soap making training, hair dressing training, tailoring school and business skills development training

This methodology was particularly helpful in discussions around disability (Chapter 6), as well as with sensitive topics and understanding the quotidian in general. Furthermore, by participating in direct observation, I seemed to gain individuals' and the communities' trust, such that I believe it strengthened participation and responses in the other methodologies, such as interviews, focus groups, and item response rate for the WEAI. However, it is of course impossible to know the exact consequences of my presence.

The relationships that developed during the research, particularly during the embedded observation and action research, continued to provide data outside of the waves of data collection. This included ongoing telephone contact (once every two months) with community leaders and key informants.

3.6 Schedule of data collection

Data was collected iteratively in three waves, totaling eight months in the field, as illustrated in Figure 16 below.

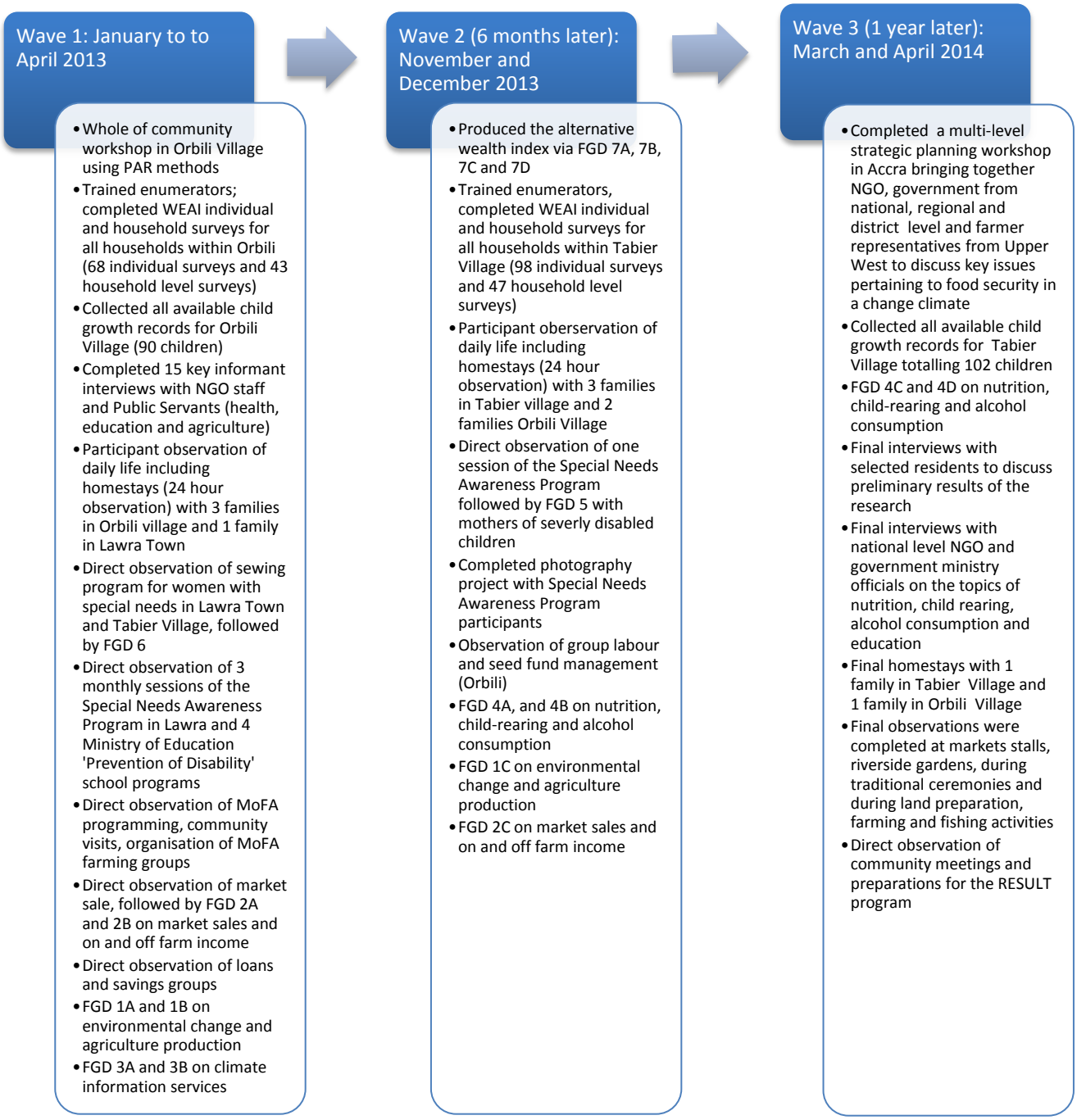

Figure 16: Waves of field-based data collection

3.7 Phase 4: Interpretation

The fourth phase involved interpreting the data of the previous three phases to produce the results that were sufficiently rigorous to be included within the thesis. This subsection details how the data was analyzed and interpreted. The analysis was iterative and thematic, following the tenants of Glaserian grounded theory, in order to allow themes to emerge (Oktay, 2012). Srivaastava and Hopwood (2009) have called iterative analysis 'the process of meaning-making and progressive focusing inherent to analysis processes' (Srivastava & Hopwood, 2009, p. 77). Using the tenants of grounded theory, the analysis built off my previous experiences, including the pilot work in Nepal, and the knowledge of the literature. With this process, I engaged with Srivaastava and Hopwood's (2009) practical iterative framework by asking: (1) what are the data telling me?; (2) what is it I want to know?; and, (3) what is the dialectical relationship between what the data are telling me and what I want to know? This is another perspective of engaging with the analysis steps: the examination and re-examination of the data and themes and relationships to create a meaningful contribution to the literature.

Although the qualitative data analysis process was not linear, the phases of thematic analysis can roughly be grouped into the following steps:

1) Enter into the analysis with the overarching topic of climate change adaptation and inter- and intra-household dynamics, theoretical and methodological perspectives, knowledge of the literature, and positionality
2) Read and re-read qualitative data and reflections
3) Generate themes based on patterns

4) Combine themes into major themes (e.g. focus group discussions of male children eating more, observations of distended bellies, and interview discussions on food scarcity for children becoming the major theme of child malnutrition)
5) In the process of combining themes, compare and triangulate data methods (e.g. qualitative themes with survey data and growth charts)
6) Define each major theme from both the qualitative and quantitative data, which aspects of data are being captured, and what is interesting about the themes
7) Examine how the themes support the data and the overarching theoretical perspective
8) Decide which themes make a meaningful contribution to the understanding of what is occurring in the data (the field site) and develop these major themes fully for the thesis

As reflected throughout this methods section, methods, and thus analysis, were adapted and changed as themes emerged and as methods appeared more or less helpful. Coding was done by hand predominantly using self-produced tables in Microsoft Word, as outlined by Yates in example SAQ 8.2 and Flowerdew and Martin (Yates 2004; Flowerdew & Martin 2005), not using specific coding software. It was particularly to uses codes across data sets (e.g. observation field notes, survey data response categories within excel, interview notes hand written and transcribed) to find disagreement or agreement between the categories of codes to either strengthen or call into question emerging theories in grounded theory manner.

The aim with analysis was to reach a point of 'saturation' where no new themes or information critical to these themes were being found. The quantitative data of the surveys

and child growth charts were census samples and thus inherently saturated. For community-level interviews, I planned prospectively for 30 interviews, with the idea that at that point I would reach saturation. I felt confident that most themes reached saturation at this point (30 participants), as evidenced by answers being repeated and no additional critical information coming out of the interviews at the later stage except on a few key themes. The key themes that did not reach saturation but were critical to answering the research questions were feeding practices for infants and young children and the consumption of alcohol. These themes were later explored in focus group discussions and through additional interviews focusing specifically on those subjects. These themes, like others, emerged through grounded theory, but had not been a previous focus of the literature review before entering into the field. As such, an additional literature review was taken at the final stages of phase 4. The process of data analysis thus reflects the 'rich yet ambiguous and messy world of doing qualitative research' (Crang, 2005, p. 235). The 'messiness' of the research is also a product of challenges in data collection. Challenges and the reflexive process used to analyze the impact of and account for the challenges is covered in the next section.

3.8 Reflexivity and challenges during data collection

Chapter 2 introduced my positionality and the importance of reflexivity. This section reflects on my role as a researcher – my position within and outside of the community – and some of the challenges I faced in implementing the methodology. All research is interpretive, and qualitative research more explicitly so; thus, my position on the 'wheel of reflexivity' referenced in Chapter 2 influenced how others interacted with the development and implementation of methods. As England (1994) noted: 'research is a process not just a product. Part of this process involves reflecting on, and learning from past research

experiences, being able to re-evaluate our research critically, and, perhaps deciding, for various reasons, to abandon a research project' (p. 82). Throughout this chapter, I reflected this process, and this subsection examines challenging experiences in Ghana to create 'a geography in which intersubjectivity and reflexivity play a central role' (England, 1994, p. 82).

3.8.1 Personnel challenges

I experienced several challenges with personnel that emerged in part from being an outsider, not knowing the language and not having a relationship of trust or understanding expectations and relationships. First and foremost, I did not speak the local dialect of the Degari language, and it was difficult to find individuals who are fluent in English as well Degari. As noted in the introduction, this was a poor area with low levels of education, which thus created some distance between the communities and myself as well as the communities and their services. Most staff of local government agencies and NGOs come from different parts of Ghana and, as such, are not Degari speakers and are outsiders to the communities. Those who could speak English tended to have limited English vocabulary and be young men.

It was difficult to find female translators or male translators who would be able to translate content related to gender issues in a way that was acceptable to me. For example, at one point a male translator refused to translate the word 'decision' for women, using the word 'suggestion' instead. In his words, 'women can only make suggestions, not decisions.' In the end, the only female translator that could be hired was a woman called Delphina Bonaa, who was not sufficiently literate to administer surveys but would spend the nights with myself as a translator during homestays. She also acted as passive security while sleeping in other people's homes.

Two of the translators/enumerators who were hired to complete the WEAI survey collected falsified data. For at least two weeks, one was collecting data full-time but was only collecting household biodata and then filling out the rest of the forms on his own. Although an agreement had been made for me to be present for all the surveys, the translators said that they had gone to the village early or in the evening to do surveys on their own and had not wanted to disturb me. In truth, they were not going out to the village at all during those times. One of these translators also mistranslated intentionally when setting up times for enumeration, saying no one was available to do the surveys on weekends or most mornings, to amend the work schedule to when he wanted to work. Although all data was redone with new retrained translators, this shortened the timeframe for other methods. Being reflexive on the experience, it was disheartening. I felt my position as a 'researcher' and 'outsider', and also acknowledged that the research was transactional in nature for many in order to achieve salary or perceived benefits for themselves or the community. This transactional nature was reflected in their willingness to interact and through the answers they provided. However, I also do not want to over-emphasise my position or the transactional nature of the research, as findings were triangulated amongst sources, trust was gained over multiple rounds and months of research, and there is little reason to believe responses included in this thesis were fabricated or exaggerated.

The process also supported a finding of a structural engagement that can affect services and adaptation programming. There is an ethos among some people that one should do the least amount possible without getting in trouble or losing their employment. Although I did not explore the origins of the ethos, it may stem from power structures and a response to historical exploitation such as those under colonialism. Where this ethos is present, it can

have severe consequences for the vital services – such as the numerous reports and observations of teachers and government extension officers not showing up for their job. This experience with the initial two enumerators, followed by vastly different experiences with the final enumerator and NGO staff, showed variation in the local area. The experiences with enumerators also caused me to move forward with greater scepticism, working to check and validate surveys as well as triangulate findings.

3.8.2 Stepping outside a research role

Throughout the fieldwork periods I developed friendships and gained the trust of many vulnerable people, without fully anticipating the extent to which these relationships would complicate my role as a researcher. I was frequently exposed to situations of injustice where I felt I could not in good conscience do nothing, but at the same time worried about how my actions could affect my role as a researcher, my access to villages and government offices and how I might be perceived differently by the farming families I stayed with and interviewed.

Initially I developed friendships with women in the area and became known as someone who enjoyed visitors, lent her bike, watched babies, and would answer questions. It was common, for example, for the housemaid of my neighbour to drop her new-born infant off at my cottage if she knew I was working from home, for her elderly mother to set up her sewing machine at my kitchen table on days that it was raining, and for adults to show up at any time of day to ask me to read the backs of pill bottles or cell phone instructions. Slowly over time, without meaning to, I developed several relationships of dependency, whereby several different women relied on me for emotional support and for me to advocate for them. I became aware of serious problems affecting specific individuals, including rape, incest and child trafficking. At certain points my day-to-day activities included a lot of social

work-type activities, rather than research alone, especially during follow-up field visits. Although I learned an enormous amount about individual vulnerabilities, especially those affecting disabled women and teenagers, my role there became blurred.

By the end of the first wave of fieldwork, I often found children sleeping on my doorstep in the morning, who would beg me for food when they woke up. I provided shelter to a molested child, accompanied women upon request who wanted to report rapes to the police, and attended medical appointments with disabled adults who did not have anyone to explain their treatments in a way they could understand. I travelled to Accra to find a disabled boy from the area who had run away from the group home for disabled children and was lost in the city with no ability to speak. I spent three nights on the streets of Accra before I found him. I discovered a child trafficking ring and worked with authorities to try and retrieve a local child, unsuccessfully, and continue to be involved remotely on this case. Although none of these cases directly involved community members of the two focal villages of my study, the community members became aware of specific cases.

I continually reflected on the ethics of my interventionist actions as well as the ethics of not getting involved. I asked myself the following: Am I compromising my research? What authority do I have to be engaging in social work activities? Is it irresponsible to allow individuals to become dependent on me, knowing I will leave the area at the end of the fieldwork period? Should I be using my position of power in this way? Can I live with myself if I don't use my position of power for these purposes? In the end, I chose to be an involved person, and do what I could to support people in need whilst keeping the lowest profile possible. I encouraged individuals to seek support from others in their network in addition to myself, and continued to provide low-level emotional support via telephone and

Facebook following the fieldwork period. It was not a perfect solution, but one that I felt I could stand by and live with.

3.9 Reflexivity on methods and future applications

This section is a discussion of the methods used that have high potential in an applied humanitarian or development context. Several of the methods trialed in Nepal and Ghana for the doctoral project were similar to the types of methods popularly used in applied humanitarian and development contexts. However, with each method, small adjustments were made from typical implementation to make the data of sufficient quality for academic publication. A major lesson learned through the course of developing these methods is that often by making small improvements in the sampling (using a sampling frame and increasing the sample size); data recording process; or coding process; popular low cost, low-tech methods could be made more rigorous. The use of randomization to select the 30 individuals for PAR exercises and in-depth interviews proved to be a beneficial means to increase the diversity of respondents and avoid implicit biases in convenience sampling.

The whole-of-community workshop has been applied several times in a development/humanitarian context, most notably via the UNEP manual, and is an appropriate tool in situations where in-depth knowledge is desired about a specific community. The results of the workshop are specific to the participants and as such the findings are not broadly generalizable. For programmes seeking to gather data about a large population, these methods need to be completed several times in several locations. Other methods would be more cost-effective in these instances. The workshop methodology is accessible, adaptable and replicable, but facilitator skill needs to be high. Where facilitator skill is not high, other methods would be recommended. The sampling methodology used in the workshop is appropriate for most community-level workshops. Workshops of this kind

in the humanitarian and development fields typically use convenience sampling; this introduces considerable bias into the process – most notably having an over-representation of individuals with high involvement and power in community affairs. The sample strategy outlined in this thesis is one method of improving data collection design to humanitarian and development-applied work that adds no additional costs.

The original version of the WEAI used within this thesis will soon be replaced by the next iteration, entitled 'WEAI II', 'WEAI Project', or 'Pro-WEAI'. The exact tool has not yet been finalized and published. Reportedly, it will have a greater focus on assets and will be adaptable to measure specific project indicators. The original WEAI has limited application due to the high cost of application and because it is not specifically designed to be adapted to measure specific projects. In fact, it was designed to capture comparable, ideally identical, data between countries. The next iteration is a significant shift away from strict comparability and towards lower-level users, including NGOs. It appears likely that the new iteration will render the tool more appropriate for applied use.

The limitations of the repertory grid technique will be discussed further in the conclusion chapter. More work is needed to adapt this tool. As is, it is not an appropriate method for applied use, as the fixed constructs are difficult for participants to use, the method requires a significant investment of time and the approach to analyze the data accurately remains unclear.

3.10 Conclusion

This chapter has summarized relevant methodological theory, building off the theory set out in Chapter 2. It has detailed each of the methods used to collect and analyse data for this thesis project, including the limitations of specific methods and which methods produced

data that was not sufficiently rigorous to be included within the thesis. The methods in this chapter have drawn together systems thinking, grounded theory and feminist research theory to assess socially differentiated impacts of climate change and the response spaces available to individuals and households within the case study. The methodology was sufficiently adaptable to allow the research to take new directions based on the initial phases of the research. In doing so, the research took unexpected directions and enabled data to be collected on under-researched areas, such as the use of alcohol as a coping strategy for environmental-change induced stress in Chapter 6. This deep dive into a complex problem would not otherwise have been a possible research subject.

This chapter has also outlined the rationale for trialling multiple methods that are replicable and adaptable between case studies and could later inform a methodological handbook. The methods outlined for the diagnostic and planning workshop have already been made into a methodological guide for identifying community level priorities and developing plans to see the goals through to completion. The set of workshop methods trialled as part of the thesis research project have been made into a UNEP training manual (Wicander et al., 2016) and a CCAFS working paper (Helfgott et al., 2016). Feedback on implementing the WEAI has also been provided to the developers of the tool at the Oxford Human and Poverty and Human Development Initiative (OPHI) during the process of developing the second WEAI tool designed for projects.

The next chapter is the first of three chapters presenting primary data derived from these methods. It will answer the question*: How do adaptive capacity and response spaces differ based on points of social differentiation?.* It will look specifically at the adaptation and

coping mechanisms of the case study, presenting data on specific themes collected using each of the methods outlined in this chapter.

4 Adaptation and coping strategies

4.1 Introduction

Food and livelihood security for smallholder subsistence-oriented farmers is heavily impacted by the adaptation and coping strategies in use. This chapter examines the adaptation and coping strategies within the case study – Tabier Village, and Orbili Village in Lawra District, Upper West Ghana – and how these differ between individuals and households based on points of social differentiation. This includes identifying the stressors and vulnerabilities underlying each adaptation and coping strategy and examining how the response spaces available to individuals have been shaped. The chapter critically examines the impacts of environmental change amidst underlying poverty with stressors and shocks that are both climate-related and not. The aim of the chapter is threefold – (1) to explain the differences in the productivity, and adaptability, of the farming families within the two case study villages, (2) to outline the programmatic challenges to improving food security and adaptive capacity for the most vulnerable in the case study, and (3) to outline a novel framework for understanding social differentiation and adaptation.

The chapter will begin with an overview of literature specific to the content of this chapter that was not previously covered in Chapter 2. I will then present results in the following four categories: (1) stressors and shocks, (2) social differentiation of the case study, (3) adaptation and coping responses, and (4) programmatic challenges. This will be followed by a discussion, a section on limitations of the study, and conclusion, including a discussion on policy relevance.

This thesis is presenting particular ideas about social differentiation – for example recognizing the diversity of capacities and vulnerabilities among women. As such, it will not

review all possible forms of social differentiation, which are innumerable. Rather, in grounded theory, the points of social differentiation that appeared most relevant for adaptation were the focus.

4.2 Background

This section builds on the introductory literature review in Chapter 2. It provides a background on (1) the relationship between low farm productivity and climate change, (2) adaptation and coping strategies for small holder farmers in low resource settings, (3) on-farm strategies to improve yields, (4) livelihood diversification beyond the farm, (5) migration strategies, and (6) gendered patterns within each of the strategies outlined. Previous chapters have outlined the environmental changes expected for the region based on the scientific literature (see page 7 and page 29) and will not be repeated here. However, the perceived environmental changes will be covered in the results section of this chapter.

4.2.1 Low farm productivity and climate change

The relationship between reduced agricultural yields and climate change has been the subject of extensive research, with the expected magnitude of the impacts varying between studies, but the majority predicting reduced yields (Below et al., 2010; Challinor et al., 2007). Schlenker and Lobell project that crops, including the staples of the case study region – maize, sorghum, millet, groundnut and cassava – could have a reduced yield of between 8 and 22 percent in Africa, under a range of climate scenarios by 2050 (Schlenker & Lobell, 2010). The sensitivity of agricultural systems in sub-Saharan Africa to climate is in large part attributed to a dearth of irrigation and water management, with 89% of cereal crops being exclusively rain-fed (Rosegrant et al., 2002). However, social and institutional factors play a role as well. Challinor et al. (2007) describe the vulnerability of food crops systems as being the product of (1) crop sensitivity to variation in the climate, (2) capacity of farmers to

adapt, and (3) the supports provided by institutions to facilitate adaptation. In the results section primary data will be presented on the latter two categories - adaptive capacity of farmers and institutional actions.

In a study of the northern regions of Ghana, Rademacher-Schulz et al. (2014) examined responses to rain variability and food insecurity. In their household survey 92% of households reported that crop yield declines negatively affect household incomes, and 75% reported not having enough food to meet household needs in the months of May to August, thereby constituting a 'food gap'. They also reported a decline in animal production, which '…reduc[ed] the safety valve in times of crisis when people sell livestock in order to buy food from the market' (Rademacher-Schulz, Schraven, & Mahama, 2014, p. 48). In a multi country study that included a case study in Ghana's Upper West, Warner and Afifi (2014, p. 6) documented high rates of economic losses attributed to unfavorable weather conditions. They found that in the Upper West, '…most respondents (87%) indicated that dry spells were more frequent and lasted longer during the rainy season, that there was more floodings (87%), and that there were more extreme events (65%) than in the past'. Further, 'rainfall variability changes affect food production 'a lot' in 91.1% of [households] surveyed, and negatively impact 89.2% of surveyed [household] economies. In total, 92.4% of [households] reported lower crop yields affecting [household] income when unexpected rain patterns occur, 37.3% reported increasing food prices' (Warner & Afifi, 2014, p. 7).

Both of these studies make clear that there are climatic stressors impeding livelihoods of small holder farmers in Ghana's Upper West, where the case study of this thesis is located. However, an ethnographic study by Nyantakyi-Frimpong and Bezner-Kerr (2015) on the relative importance of climate change in the Upper West also makes clear that weather-

related stressors are only one category of stressors affecting smallholders. In their study farmers did not rank climatic stressors as the top priority, despite being aware of environmental changes and these changes also being reflected in the historical meteorological data. This relative priority is consistent with the findings of this thesis, and offers an important framing for exploring climate and weather related impacts on farming families. It also further iterates the importance of a systems thinking approach to understand the realities of life for the case study population.

4.2.2 Adaptive and coping strategies

Like Carr, I use the word 'strategy' to mean 'an outsider's shorthand for a set of tacit understandings of and practices related to environment, economy and society' (Carr, 2008a, p. 693). Carr refers to adaptation as '…not a change in a single behavior, but a suite of beliefs and practices related to risk and its management that takes shape under locally specific conditions of uncertainty' (Carr, 2008a, p. 693). There are several classification systems and typologies that have been created to classify actions and strategies in response to climate change (Thornton & Manasfi, 2010; Agrawal, 2008; Smit & Skinner, 2002). It is not the aim of this thesis to try and perfectly fit the adaptive actions used within the case study into any of these typologies. Rather, the aim is to provide a breadth of the responses, which surfaced through multiple data sources, to analyze how the responses which are accessible and desirable to farming families produce the respective response spaces. However, these typologies do provide a useful basis for understanding the breadth of actions as well as which categories have been more frequently studied.

This chapter will refer to the classification system by Below et al. (2010) who conducted a systematic review of adaptive actions. Below et al. (2010) classify adaptation practice in the following five categories:

1. Farm management and technology
2. Farm financial management
3. Diversification on and beyond the farm
4. Government interventions in rural infrastructure, the rural health care services, and risk reduction for the rural population
5. Knowledge management, networks and governance

In their review, Below et al. (2010) found that more than half of all studies focused on the first category: farm management and technology. This finding is commensurate with the review of literature conducted for this thesis, which confirmed a dearth of literature on the remaining four categories. As such, primary data will be presented on the remaining four categories, although the bulk of conclusive data centers on diversification on and beyond the farm and government interventions. Relevant literature on the first category is the subject of the next section.

4.2.3 On-farm strategies

On farm strategies for small-holder farmers have been referred to as micro practices and represent an important component of adaptation for smallholder farmers (Below et al., 2010). Micro practices are local level, typically small-scale practices. These on-farm strategies can be the product of indigenous knowledge and autonomous innovation (Thornton & Manasfi, 2010), as well as external interventions that specifically seek to change on-farm behavior (Nelson & Nathaniels, 2014; Wright et al., 2014; Waha et al., 2013; Duflo et al., 2009). Within the literature, common on-farm adaptation strategies for small-holder farmers include the introduction of new crop varieties, improved breads of livestock species to suit new conditions, greater reliance on livestock as compared to crops, irrigation technology, water conservation and anti-erosion techniques (terracing, bunds, raised beds), crop diversification, mixed crop and livestock farming systems and changing planting dates – to name only a few of the suite of actions smallholders have been documented taking in

order to improve yields amidst climatic variability (Bryan et al., 2013; Waha et al., 2013; Deressa et al., 2009; Cooper et al., 2008)

However, autonomous adaptation is often insufficient to allow farmers to live well in a changing climate. Bryan et al. conclude in their study of smallholder producers in multiple sites across Kenya that autonomous adaptation is insufficient and external supports from NGOs and government is needed to allow producers to be able to use longer term adaptation strategies rather than relying exclusively on short term coping (Bryan et al., 2013). As such, research is needed on the external supports which are efficacious in addition to being acceptable and desired by the beneficiary population.

The suite of on-farm strategies that are most commonly promoted to smallholder farmers by external actors in the region are coined Climate Smart Agriculture (CSA). CSA's conceptual framework centers on balancing the trade-offs between adaptation, mitigation and food security (Peterson, 2014a). CSA is defined as agriculture that 'sustainably increases productivity and resilience (adaptation), reduces or removes GHGs (mitigation), and enhances achievement of national food security and development goals' (FAO, 2010). Another CCAFS study, which was conducted in the same region and at the same time as the SIA research program, specifically looked at the use of CSA practices (Peterson, 2014a). The CSA practices determined to be appropriate for the case study region's climate and farming system were identified from the CCAFS CSA database. The CSA practices in the study conducted by Peterson determined appropriate are listed as follows, with the percentage of the 60 respondents who reported using the practice:

1. crop rotation (92%)
2. manure management (88%)
3. planting on contours and ridges (88%)

4. composting (88%)
5. residue management (85%)
6. intercropping (67%)
7. chemical fertilizers (63%)
8. erosion control (57%)
9. organic pest management (57%)
10. agroforestry/tree planting (55%)
11. mulching (45%)
12. minimal tillage (32%)
13. dry season gardening (18%)
14. irrigation (17%)
15. improved crop varieties (15%)
16. sunken beds (15%)
17. water storage/harvesting (13%)
18. stone bunds (8%)
19. improved forages (2%)
20. improved livestock breeding (0%)

Peterson found a wide range of CSA practices in use. Further, although awareness and willingness to adopt CSA practices was generally consistent among men and women (with women having lower awareness of erosion control, livestock breeding, mulching, stone bunds and water harvesting than men), women were more hesitant than men to adopt on-farm practices that require greater labour. This may be because many of the CSA practices target crops which are the traditional domain of women in the region, and because woman already contribute greater shares of labour to the household (Naab & Koranteng, 2015; Naab et al., 2011). As such, the labour burden of adaptation may be disproportionately experienced by women farmers (Peterson, 2014b).

Further, on-farm strategies alone are typically insufficient for smallholders in low resource settings, with households typically relying on livelihood diversification including migration for work, direct government supports and social support networks including remittances (Dumenu & Obeng, 2016; Rademacher-Schulz et al., 2014; Abdul-Korah, 2011; Nielsen &

Reenberg, 2010). Due to the importance of non-farm related strategies, literature on off-farm strategies will be covered in the next section.

4.2.4 Livelihood diversification strategies

Several studies have looked at livelihood diversification as an adaptation to low farm yield connected to environmental change in sub-Saharan Africa. The studies are conclusive that off-farm work is an important pillar of the adaptive strategies employed by smallholder farmers and that the reliance on off-farm work to eke out a living is increasing over time (Nielsen & Reenberg, 2010; Carswell, 2002; Barrett et al., 2001). Barrett et al. (2001, p. 315), write 'Diversification is the norm. Very few people collect all their income from any one source, hold all their wealth in the form of any single asset, or use their assets in just one activity. Multiple motives prompt households and individuals to diversify assets, incomes, and activities'. Further, non-farm income may make up as much as 45% of income (Little et al., 2001). Multiple motives in this instance constitute push and pull factors that are both climatic and non-climatic. They find that off-farm livelihood pursuits are positively correlated with income and assets (Barrett et al., 2001).

In an ethnographic study of smallholders in neighbouring Burkina Faso, which is similar to this thesis' case study region in terms of climate and farming systems, Nielson and Reenberg (2010, p. 143) identified the four most important pillars of livelihood diversification for that context: (1) migration to the capital city to do labour, (2) working for NGO-backed development projects, (3) gardening (off-season), and (4) women entering the labour force through small enterprises. Each of these livelihood activities was done with the goal to cope with drought and rainfall variability and be less dependent for food and income on rain-fed crops. There are many parallels with this Burkinabe case study to that of the case study of this thesis, with will be explored further in the discussion section.

4.2.5 Migration strategies

Migration in response to or in anticipation of climatic variability or change is the subject of another substantial body of research. In a multi-country study of how vulnerable households use migration to manage rainfall variability and food insecurity, Warner and Afifi (2014, p. 1) highlight two different kinds of migration based on the vulnerability of the household. They argue that more resilient households engage in 'content' migration, for whom migration is an adaptation, and that more vulnerable households engage in 'erosive' migration, for whom migration is a symptom of reaching the limits of one's adaptive or coping capacity. This is a conceptual classification and not necessarily categories into which individual households can easily fit. There is overlap between the categories and the dynamic nature of households, which means that the variety of migration they are engaging in changes over time and will vary based on whose perspective is being considered.

Warner and Afifi's (2014) eight-country study using household surveys with representative sampling frames included a case study in Upper West Ghana (Nadowli District), in which 77% of households reported household level experience of migration to manage the risk of rainfall variability and food insecurity. This was the highest of any of the countries studied. By comparison, only 59% of households in the Tanzanian case study (the only other African site) had experience with migration. Of those that migrated in the Upper West Ghana site, 69% were male and 31% were female, 40% were single and 53% were married. The average age of the migrants from Upper West is 22.7 years, with an average of 4 years of primary schooling. 83% reported migrating to earn a livelihood while only 9% reported migrating for education or to improve skills. 58% percent of the migrants were seasonal, while 37% migrated permanently (Warner & Afifi, 2014, p. 10).

These rates are commensurate with the results of ethnographic studies in the region that have documented that, although migration in northern Ghana has historically been only male household members who tended to be married and left wives back in the village to raise children, increasingly women are migrating seasonally and permanently with husbands or on their own as single women. This means that the profile of migrants is becoming much more diverse and stands in contrast to much of the prevailing discourse about migration in Ghana (Abdul-Korah, 2011; van den Berg, 2007). Abdul-Korah (2011, p. 397) argues that women's increasing involvement in migration for livelihoods is changing gender relations, provoking one respondent to say, 'Now if you only have sons you are dead'. This statement, which was used in the title of the paper, refers to daughters now providing more remittances than sons, as well as a higher bride price as a result of women's greater contributions to household income through migration.

Another study in Nadowli District, Upper West Ghana, explored dry-season migration to mining sites or day labour on farms in southern districts with biannual rains. They found that individuals migrate predominantly to meet immediate food needs of household members, and found a correlation between the number of food insecure months and rates of migration. In their study, smallholder farmers attributed recent food insecurity to the unpredictable nature of rainfall and erratic weather, which negatively impacted both crops and livestock and contributed to food price volatility (Rademacher-Schulz et al., 2014).

The practice of women from northern Ghana migrating to southern cities to work as head porters has been the subject of ample popular media coverage in Ghana and a small body of scholastic work. This mode of labouring, called 'kayayei', involves carrying goods on one's head and selling the goods to passing foot and vehicle traffic. It is predominantly done by

women who have migrated as a result of poverty, including food shortages, or abuse, including forced marriage. Head porters generally sleep rough and are exposed to physical abuse and exploitation, including sexual exploitation. No studies have empirically studied the relationship between climatic variability and becoming a head porter. Most of the literature has centered on understanding their current situation, physical and reproductive health risks and more recently their social capital (Awumbila & Ardayfio-Schandorf, 2008; van den Berg, 2007).

Each of these diversification strategies are connected to climatic variability and low farm yield in some capacity. However, one must continually bear in mind that climatic stress is one of multiple interdependent stressors that smallholder farmers experience. Nyantakya-Frimpong and Bezner-Kerr (2015) studied the relative importance of climate change in Upper West Ghana in two case study villages in Nadowli and Lawra District. Using ethnographic data, they found that 'climate change is not of acute concern among some social groups of farmers, even in situations where local perceptions and meteorological data show clear patterns of climate variability. Compared to climate change, we find that intra-household property rights, liberalized markets, and insecure land access are more critical challenges for farmers' (p. 41). They argue that socio-economic challenges feature predominantly in farmer's top concerns and, as such, research and programmatic interventions must reflect this reality (Nyantakyi-Frimpong & Bezner-Kerr, 2015).

Much has been written about the disproportionate impact that climate change has on women (Alston, 2014; Denton, 2014; Resurrecciion, 2013; Shah et al., 2013; Agarwal, 2011). Understanding the strategies women use to adapt in a changing climate, and how these differ to that of men in a particular context, is necessary. A central feminist political ecology

critique of adaptations, like the livelihood diversification and on-farm strategies presented above, is that adaptive strategies (autonomous or through external supports) can perpetuate gender roles that suppress women (Quaye et al., 2016; Carr, 2008a; Carr, 2008b; Harcourt, 2009). As such, a specific review of what has already been written on this subject is necessary. This will be the focus of the next section.

4.2.6 Gendered strategies

This thesis uses an intersectional social differentiation approach and seeks to not only look at gendered impacts and response spaces, but to broaden the scope to consider other forms of identity which are linked to marginalization and to understand how particular groups of women or men are disadvantaged. In doing so it attempts to further the work of scholars such as Arora-Jonsson (2011) and Harcourt (2009) who have criticized the homogenization of the poor and the characterization of women and men as being in static, non-complex hierarchies. Background on social differentiation and intersectionality was presented in Chapter 2. However, this chapter includes data disaggregated by gender where it is not possible to disaggregate at a finer resolution (for example, women with and without children, women connected and unconnected to the village chief, and so forth). Further, background literature that this thesis aims to build off has been disaggregated by gender to demonstrate important gendered patterns. The presentation of gendered results and existing gendered inequalities in the case study region will build on the body of feminist research on the subject. As such a brief review of the literature is required.

This section will briefly cover gendered divisions of labour and gender roles found within the literature on the case study region, women's emancipation and a review of the concept of women's empowerment. This will include background on the programmatic interventions

that have been used in the past to foster women's empowerment, including women's enterprises.

Women's suppression in the case study region is rooted in both indigenous patriarchy and colonial patriarchy and is dynamic – changing over time and with each generation (Abdul-Korah, 2011; Allman et al., 2002). In a baseline study of Lawra and Jirapa Districts of the Upper West, data on farm labour show a clear trend that women bear the majority of work load both on farm and off farm. In on-farm work, women completed 44.29% of work, while men completed 33.5% of work, with the remaining being completed children or joint/shared labour. For off farm work, women completed 42.86% of work, while men completed 10.71% of off-farm work, with the remaining being completed by children or joint/shared labour (Naab & Koranteng, 2015; Naab et al., 2011). In other regions of Ghana, studies have demonstrated how particular adaptation strategies have reinforced gender roles (Carr, 2008a). This also builds on a broader area of literature discussed in Chapter 2 which advocates that adaption through technological fixes has previously impeded transformation away from traditional gendered roles and placed the burden of mitigation and adapting disproportionately on women (Gonda, 2016).

In studies of livelihoods and adaptation in the central region of Ghana, Carr (2008a) argues that men have been able to link adaptation actions to existing gender roles and familial patriarchal power structures and in doing so have legitimized both the adaptive action and the inequitable gender roles it rests on. The results of the CSA studies discussed previously (Jost et al., 2015; Naab & Koranteng, 2015; Peterson, 2014b), which highlighted women's reservation to begin CSA practices because of concerns about the burden of labour, are relevant to this discussion as well. If external interventions do not detect and take steps to

address increases in women's workload as compared to that of men, programmes risk exacerbating existing inequalities (Arora-Jonsson, 2011). Other external supports may also be discriminating against women. For example, anti-woman biases have been documented within agricultural extension provision (Perez et al., 2015).

Carr (2008a) aimed to explore '…why particular adaptations are accepted or implemented within a group, even if the outcomes of those solutions result in uneven benefits for those in that group'. In doing so, he found that '…the most persistent adaptations are those that draw upon existing, naturalized understandings of society, environment and economy to ground particular decisions and lend them legitimacy' (Carr, 2008a, pp. 689-690). Families in Carr's central Ghana case study may be foregoing overall household income and the shock-absorbing capacity of the household in order to maintain a patriarchal social order whereby women control only a minority of the income generating and production capacity. For example, Carr (2008a) demonstrated that women are given enough access to land to meet household needs of direct crop consumption yet the land access is then capped to minimize additional income that women might use for their personal needs. This thesis adds to this literature on gendered unequal adaptations through its focus on gendered risks and benefits to seasonal migration and gendered opportunities for livelihood diversification.

4.2.7 Use of social networks

Relationships of reciprocity are a traditional social safety net, through which individuals and households receive support from other individuals and households informally during times of increased vulnerability. Reliance on social networks, including money lenders, is a common coping strategy among the world's poor (Karlan et al., 2014; Marr, 1999). Drawing on Putnam's theory of social capital (1993), Osbahr et al (2010), explore the conceptualization of relationships of reciprocity as either 'bonded ties' or 'bridged ties' – the

former referring to reciprocity between friends, family or kinship network to exchange goods and services, including labour among those of the same social and economic standing, and the latter being reciprocal relationships with individuals and households of a different social and economic standing, either within the local community or elsewhere. Both of these types of reciprocal relationships require investment. One must nurture these relationships during times of lower vulnerability in order to rely on support during times of scarcity and hardship. Osbahr et al (2010) call these 'external investments'.

Individuals and households may have to make choices of resource allocation between investing internally (within the household, such as buying food, paying school fees for their own children or making home improvements) and externally (responding to the requests of others, giving gifts, communal labour, labouring for other households, etc.). These investments can form a central part of a household's livelihood strategy, if sufficiently nurtured, and can act as a buffer to climatic vulnerability. In the data presented within this thesis, we see farmer families continually grappling with the choices surrounding these kinds of investments and trade-offs between them. 'Smart investors' will invest in bonded and bridged ties in a broad portfolio, if they are able to. In this way, these investments are similar to any other portfolio of fiscal investments. For example, investing in a relationship with individuals who are not subject to the same seasonal vulnerabilities, such as those farming areas far enough away as to be experiencing different weather patterns, specialising in different crops, in non-agriculture related informal employment or in formal employment who are paid regularly.

4.3 Results

The results section will present primary data on stressors and shocks experienced within the case study region with a focus on the stressors connected to environmental change and food insecurity. It will then provide an overview of points of social differentiation in the case study to provide sufficient background with which to understand how response spaces differ between and within households. The chapter will then present primary data on multiple actions and strategies used in the case study region in response to environmental change and weather-related shocks and stressors with a focus on the impacts that contribute to low farm productivity. This will be followed with data on programmatic challenges specific to the case study region, and in some cases, Ghana more broadly, to improving food security in a changing climate.

4.3.1 Stressors

'You cannot prevent a bird from flying above you but you can prevent it from making a nest on your head'. – Male farmer in Tabier Village [FM3023]

Following a critical systems theory (CST) approach to the challenge at hand, in this section I will present data on stressors of a wide variety that affect the case study area. The data partially answers the '*adaptation to what?*' question in the resilience and vulnerability framing cycle outlined in Chapter 2. This chapter will not present primary data on specific climate stressors, such as quantifying yield losses or triangulating recollections of 'failed rains' with hydro-meteorological records, as this has already been done in the literature (Dumenu & Obeng, 2016; Nyantakyi-Frimpong & Bezner-Kerr, 2015; Rademacher-Schulz et al., 2014; Warner & Afifi, 2014; Below et al., 2010; Schlenker & Lobell, 2010; Cooper et al., 2008; Quaye, 2008; Challinor et al., 2007; Brew et al., 2004; Rosegrant et al., 2002) and has been summarized in the background sections of this chapter and in Chapter 2. Rather, this section will provide sufficient data on the stressors that are impeding productivity and

adaptability in order to sufficiently understand the responses to those stressors, and how those responses differ between and within households.

In this chapter I am making the distinction between macro and micro stressors. In this thesis, macro stressors are defined as aggravations that are experienced by the population under consideration broadly, such as a storm, food price spikes, poor road access or generalized violence. Micro stresses are aggravations that are experienced by an individual or a household, such as theft of an asset, a pest destroying stored food or a death in the family. In the field of social protection and development practice, the terms covariate shocks and idiosyncratic shocks are often used to refer to these concepts. I am not using those terms because they over-emphasis the temporal nature of shocks or stresses, creating the sense that these aggravations are shock-like, fast onset and in isolation. Rather, in the case study community the aggravations are often slow-onset, consecutive and chronic. While macro stressors are experienced differently by individuals and households, their reach and scale differs from micro stressors. Both of these stressor types are important for the analysis. Of particular interest is the experience generated when they happen simultaneously; both can limit the response space to climate change and ensure food security. The distinction is normative as the boundary between when micro ends and macro begins is unclear and will vary according to whose perspective is being considered.

The distinction is nevertheless important for this analysis, as it helps to highlight that micro stressors are important to understand the vulnerability context, despite being under researched and under documented, as compared to macro stressors. There are enumerable stressors that are experienced in any given area, especially in low resource settings where there is less physical and social security. This analysis will be limited to stressors that are

directly weather or climate related, and stressors that are not related to climate or weather but happen simultaneous to and interact with weather and climate related stressors.

First I present data from the household survey to set the scene that climate and weather related stressors must be considered in the context of broader socio-economic interdependent stressors. Then I present data from interviews, observations and narrative collection on both micro and macro stressors and how they interact and cumulate to created varied vulnerabilities and impacts.

4.3.1.1 Data from household surveys

This data is commensurate with and builds off of other ethnographic studies which have argued that climate change is often not the primary concern of smallholders, but is within the mix of several relatively important stressors (Nyantakyi-Frimpong & Bezner-Kerr, 2015). In the adapted WEAI survey, male and female adult household heads were asked separately about their top concerns. Figure 17: Survey responses listing top concern, below, presents the responses given for each of the 164 respondent's single top concern. The question used to solicit these responses is as follows: 'The following is about your top concerns/ worries about the future. Take a moment to think about the concerns that you personally are most worried will negatively impact you and/or your family in the future. Please tell us the top 5 that you are most worried about. There are no right or wrong answers.'

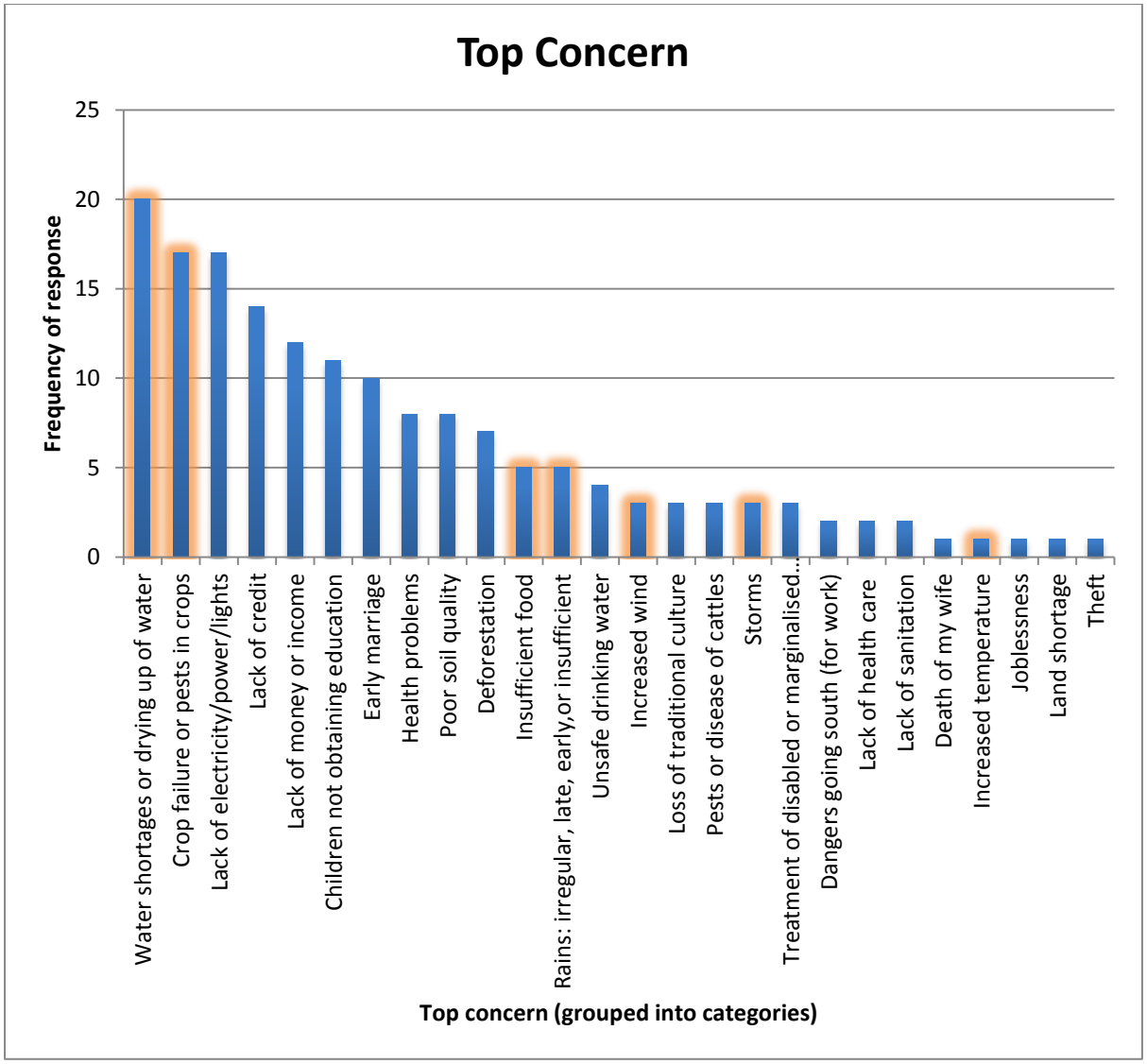

Figure 17: Survey responses listing top concern. Source: author's survey data

Responses were coded and categories collapsed where there was significant overlap. The categories highlighted are the responses that are directly related to weather and climate. Although these distinctions are not clear and the categories are messy and not mutually exclusive, highlighting the categories that are the most directly related to climate and weather provides important information. The weather-related challenges of water shortages and crop failure come out strongly as concerns the respondents worry about the most, but these concerns are closely followed by concerns reflective of broader poverty and infrastructure – lack of electricity, credit, money/income and education. Concerns rooted in

traditional practice, such as early marriage, also come out strongly, although qualitative data suggests that early marriage is in turn affected by poverty, which is in turn affected by income among smallholder farmers. As these categories are messy, this chart will not be used for broader analysis. It does, however, demonstrate that climate and weather related stressors are situated in a broader context of stressors that are not-directly related to climate or weather. Thus, micro and macro stressors of a wide variety are impacting the case study area.

4.3.1.2 Data from interviews

During interviews about farming and changes in climate, the theme of 'crop failure' emerged strongly, with all 30 randomized individuals who participated in the in-depth interviews discussing crop failure in relation to day-to-day stresses in farming life. Further probing through narrative collection revealed a range of co-stresses to produce crop failure, which will be outlined later under data from narrative collection. Crop failure was largely attributed to 'bad rains'/'failed rains', with 21 (out of 30) respondents in the in-depth interviews referring to either bad rains or failed rains connected to crop failure. Seven respondents attributed crop failure to poor soil quality as a result of land degradation. The terms – crop failure, bad rains or failed rains – are emotive and used to describe a range of conditions. This section will first explain what is meant by these terms using primary data and then present data on the occurrence and conditions of crop failure.

The terms 'bad rains' and 'failed rains' were often used interchangeably in interviews to describe rainfall that was not amenable to growing crops because (1) the rain fell over too short a period for crops to mature, or (2) the rainfall in total was insufficient, or (3) there were gaps in the rains whereby the rain started and stopped during the rainy season one or more times so that crops dried out. These three weather patterns described are consistent

with the literature on the area (Dumenu & Obeng, 2016; CGIAR, 2015; Nyantakyi-Frimpong & Bezner-Kerr, 2015; Rademacher-Schulz et al., 2014). One interviewee described failed rains as '*rains that disappointed us*' [FM1101], which largely captures the sentiments expressed in the interviews.

The term drought was also occasionally used in interviews. When probed to describe what was meant by the term drought, the responses were not consistent with standard definitions of meteorological or hydrological drought. Rather, they were describing conditions that were less severe than a meteorological drought. The term drought was also not used to describe low rains over multiple years or decadal variation, as would be expected with the El Nino Southern Oscillation. The conditions described as drought were similar to failed rains; as such, these terms, as used by the respondents, will be considered the same. From the interviews we gain the following shared common understanding of failed rains: in this climate and agricultural system, bad and failed rains refer to a dearth of consistent rainy days over a sufficiently long period of time to allow crops to mature.

Box 2: Farmer quotes on crop failure

'My biggest worry is crop failure. Three years ago I lost everything. There was a gap in the rains.' When asked if he would do anything in the future to prevent this from happening again he replied*: 'For now, I have given everything to God'.* [FM1301]

'The land was more fertile before. Because of too much tree felling the land fertility is less.'[FF2301]

'It used to rain more than now. Crop yield used to be good but now you must use fertilizer so the crops will grow quickly before the rain stops.' [FM3001]

'Rains last year disappointed us. The season threatened to begin [traditional weather indicator] *and it had only begun when it decided to stop. What can we do? '* [FM203]

'As a small boy, my father didn't have these rain problems. For them they had no roads, no mobiles, but when the rain threatened, it came.' [FM2201]

Multiple farmers described gaps in the rainy season during vulnerable times for crops, generally around the time the crops are tussling (early in the season) or during the time the crops need to be weeded (later in the season). The most frequently cited problem is a rain gap during weeding time as it is then too late in the season to re-plant. One farmer in Orbili Village described his adaptation to the gap in the rainy season: '*Now I wait for the gap. When the gap comes then I will plant fast maturing maize. I won't waste my seeds planting before the gap. At times people will be looking at me, thinking I am lazy. They will be giving you headaches. But I wait and then they see*' [FM302]. Additional quotes from interviews in Box 1 represent the range of sentiments and contexts connected to crop failure.

Changes in the rainy seasons, not specifically connected to crop failure, also emerged during interviews. Shifts in the rainy season were discussed as a problem for planning livelihoods, especially for farmers who engage in off-farm income-generating activities outside the rainy season. The following quote from the local shopkeeper, who also farms, highlights the inconvenience and potential losses associated with changes in and the unpredictability of a changing rainy season. He said, '*Now the wind doesn't have a specific pattern. It is confusing. It used to tell us when to get ready to plant. Now you will prepare to sleep outside for the heat and then you will be surprised that rain is falling on you asleep. You will have to rush down. Maybe your mat will get spoiled from the rain.*' [FM205]

An older farmer offered another perspective on the shift. He said, '*One good thing about the change in rains is the rainy seasons are becoming more similar* [to the rainy seasons in the south] *so people don't go down to work in south* [FF1501].' The increasing unpredictability of the rains has meant that young people cannot travel south to work

seasonally with the same assuredness that they won't be needed on their own farms during that time. Perspectives on this subject were highly divided, typically by age. When asked, elderly respondents tended to considers going south to be bad, because of the risks to women migrants and the risk of young men becoming too independent from their family responsibilities. In contrast, young adults tended to consider seasonal migration to be a security from hunger, and as such any changes that limit the time and predictability with which they can migrate was highly undesirable. This is thus a response space limited by macro-stressors, gender, and age. These perspectives on seasonal migration are consistent with the limited literature that has explored the changing social context of who migrates and under what conditions discussed in the literature review (Abdul-Korah, 2011), although the relationship of seasonal migration to the convergence of north and south rainy seasons in Ghana has not yet been considered in the literature.

4.3.1.3 Data from narrative collection

The theme of co-stressors emerged strongly during collections of narratives around crop failure. 30 narratives around crop failure were collected and all but two narratives included soil quality conditions as a prominent co-stressor in addition to weather. The response space available to respond to the climate stressors was limited by the co-stressors as well as the position of that individual and family in the community. Each narrative talks about limited options in decision-making (e.g. the inability to purchase fertilizer, change planting timing, or purchase food). The following narrative shared by a member of Orbili Village demonstrates the stressful situation that led to poor cropping decisions and was compounded by a challenging rainy season:

> '*The last year we had crop failure was the year my father died. The main decision that was wrong was planting timing. I planted late. The planting was drawn back when my father died. We were in misery. It was my first time to be controlling that much land* [previously bulk of land was under father's control]. *Planting was late, and some other problems. Then a gap in the rains came when the crops were tussling. Only our farm was affected. Other farms were more mature and could stand the rain gap. When it* [this instance of crop failure] *happened we depended on others for everything. They gave us food. They gave enough food to last the three of us* [remaining household members] *enough to eat for three months. That year we learned to ration, yes! Yes, we knew hunger the year my father died*.' [FM402]

Another farmer's narrative shows how struggles in one season can make one more vulnerable in the next season, and how underlying challenges like a lack of education and literacy can continue to disadvantage people into adulthood:

> '*My last crop failure happened three years ago because I didn't have fertilizer and the rains were not good. The river didn't overflow its banks to make my riverside garden* [done in the dry season] *fertile so I couldn't buy fertilizer for the farming season that followed. It was my maize that really failed but the beans and millet performed average and so I could sell them to buy maize. The maize I produced was not even a full bag*.' [MF302]

When asked about how much fertilizer he had wanted to buy, but could not, he shared that he wasn't sure how much he needed to buy. Instead of prior calculation, he buys as much fertilizer as he has the money to afford at the time of planting. This is a common struggle according to MoFA staff persons interviewed, who reported that farmers tend to buy more than they need in some years, causing run-off into the water system, and less than they need or not at all in other seasons. The male farmer interviewed felt that it was his illiteracy that made it difficult to work out how much to buy. During the collection of his narrative, he said, '*My father didn't put me in school so I would take care of the cattle. In those days we had many cattle. My father made me a cowboy*' [MF901]. He also felt this was one of the reasons that he doesn't have strong farming knowledge. He is unable to use his livestock

knowledge because his family has had to sell off all the livestock during years of poor harvest. The term 'cowboy' is used frequently to describe men who don't have or don't want to use their education and prefer to focus on cattle, often because taking care of cattle is less labour intensive or because there is greater freedom associated with it.

The following table outlines the co-stressors that were reported during narrative collection on crop failure. This table includes a sample of 15 of the 30 narratives to show the breadth of circumstances reported. This table highlights the trend of co-stressors, which is highly variable (no two combinations were exactly alike) but all serve to add further strain during seasons with challenging rainfall. In each of the narratives a macro stressor of a climatic nature was mentioned. In all cases, apart from two, at least one micro stressor was mentioned.

Table 7: Narratives of climatic stressor(s) and co-stressor(s)

Climatic stressor(s)	Co-stressor(s)
Gap in rainy season	Injury following a motorbike accident meant lack of labour to prepare field [MF3006]
Gap in the rainy season	Death in the family led to a new person making cropping decisions as well as late planting and low resources following funerary expenses [FM402]
Gap in the rainy season	The bag of fertilizer that was purchased got a puncture and spilled on the roadside while being transported home. Only a small portion could be used and saved. [FM303]
Gap in rainy season	Household could not store sufficient seeds from a previous poor harvest and so a smaller portion than the land area typically planted was cultivated [FF3010]
Gap in rainy season	Household had to repay a debt by selling off seed and spending the money saved for the coming season after a household member invested in a bulk order of broth cubes to sell retail as an income generating activity. The broth cubes arrived water damaged. She had no legal recourse and lost her investment. [FF3026]
Gap in rainy season	Household took out a loan to buy piglets following an NGO demonstration project for pig farming. Piglets contracted a disease 'from the soil' and all died.

	Household had to sell saved seed to make a loan repayment. When the gap in the rains came, many farmers replanted afterwards, but household was unable to re-plant as they had sold their remaining seed to make a loan repayment. [FM302]
Multiple gaps in the rainy season	Injury following an accident while cleaning a hunting rifle led to a lack of labour to plant and weed as well as too low of income to hire additional labour as the injured person could not complete his typical non-farm cash income. [FM301]
Rainy season began later than expected and ended early	No resources to purchase farm inputs after having to liquidate assets to pay for a medical procedure while health insurance was expired. [FF3027]
Rainy season began later than expected and ended early	A break-down in communication as a result of no phone charge meant the wrong farming inputs were purchased, and the farmer received no fast maturing seeds as planned. [FF3017]
Rainy season ended earlier than expected	Death of a child from falling through a hole in a bridge meant family was in grief and planted late. [FM2301]
Rainy season ended earlier than expected	Inputs were not purchased at the right time as the household was expecting a seed distribution from an NGO which never arrived, leading to late purchase and late planting. [FM3005]
Rainy season ended earlier than expected	Insufficient labour as adult children did not return in time from labouring in the south. [FM2302]
Rainy season ended earlier than expected	Household head was stung by a scorpion and unable to farm. Oldest son accompanied him to regional hospital and so both primary farm decision-makers of the family were absent during first two weeks of the planting season. The combination of a late planting and an early end to the rainy season meant the crops did not reach maturity before the end of the rainy season. [FM1601]
Lighter than average rainy season	Lack of labour after wife suddenly left the family to live elsewhere. [FM3008]
Lighter than average rainy season	Farming decisions made under duress after wide-scale death of livestock due to disease, followed by an episode of depression of the household head. [FM3009]

While this list of narratives show how co-stressors affect the response space, it does not directly reflect the intersection with social differentiation that was revealed in some of the stories, such as education level, gender, ability to draw on material wealth, and ability to

draw on a social network. Types of macro- and micro-social differentiation also thus also affect response spaces as discussed in the next sub-section.

4.3.2 Social differentiation

'The gender gap is always wide because we are in a rural area. In rural areas we have losses, and the woman is the one to take the loss.' – Woman farmer in Orbili Village [FF1501]

Building on the sociological literature covered in Chapter 2: Theory and literature, this section will present primary data to describe the ways the social world in the case study area is divided. I will present examples of both macro and micro social differentiation. The possible combinations of multiple partial identities that make up the micro and macro points of social differentiation are innumerable. The examples in this subsection are illustrative to gain an idea of social differentiation. The data presented is not exhaustive of all the different forms of social differentiation in the case study area. A sub-set most relevant to understanding how social differentiation affects response spaces has been prioritized for this chapter. Other aspects of social differentiation are presented in subsequent chapters – most notably age and gender as it pertains to selective feeding in Chapter 5 and disability in Chapter 6.

Social differentiation by gender runs through this whole sub-section, and indeed chapter and thesis, because the research revealed a prominent role of gender in affecting lived experiences and response spaces. In this section I will present the most relevant subset as it pertains to understanding adaptation of smallholder farming families as expressed by informants. First I will present data on relative wealth, showing how the small differences in income are meaningful to the affected individuals despite having similar levels of wealth by most indicators of poverty. Second I will present data on the intersection of gender, and equality within marriages showing a wide range of circumstances associated with these

multiple partial identities. Third I will highlight a context specific point of differentiation – proximity to the village chief and/or contact farmer.

4.3.2.1 Wealth

At first glance, using standardized measures of wealth gathered through the household survey, there is similarity of income by household in each of the villages, with households in Orbili Village having only marginally higher incomes and asset ownership than households in Tabier Village. Using standardized micro-level indicators such as durable assets, employment, household food consumption, or housing materials, all households fall similarly short of national averages. The one exception is survey data on household food consumption, which does show notable differences between households, although it gives little indication of how food is divided among household members. Household food consumption will not be presented in this chapter as content on unequal access to food between and within households will be discussed in Chapter 5: Nutrition and food scarcity.

The proxies for household income for subsistence oriented farming communities are typically the presence of durable goods, value of land, quality of housing, quality of drinking water, access to sanitation and education, employment and the absence of deprivations or risk factors like crime or toxic exposures. In the case study area, several of these proxies including access to education, sanitation and absence of exposure to crime are at a macro-level, marked by a dearth of public services, and therefore not useful for distinguishing between households. With both micro and macro-level indicators, the households are similar to one another. In the case study area no households own a large asset like a tractor, mechanized farming or irrigation equipment, or car; few households include an individual with formal employment or an off-farm business, as was presented in the background to the

case study in Chapter 1: Introduction; no households include an improved latrine of any variety; and no households have all rooms roofed by metal sheets, as is the local preference.

These survey results are what one might expect given that the Upper West is one of the poorest regions in the country. However, other sources of data provide greater insight into the subtle wealth differences between the households that are both meaningful to the local population (as they do not consider themselves equally wealthy or poor) and important for the analysis on the extent to which adaptation response spaces differ between and within households. Data from the supplementary wealth ranking will be presented to demonstrate this finding.

4.3.2.1.1 Data from supplementary wealth ranking

As was elaborated in Chapter 3: Methods, participants were asked how they recognized which families were more prosperous and which families were struggling to get by. This was in response to the income measurements in the household survey being insufficiently sensitive to the differences observed between the households. The participants were asked: *How do you know when someone is well-off? What does a well-off person have, do, and look like? How do you know when someone is not well-off? And, what does a poorer person have, do and look like?* This was followed by a lively discussion – at the end of which the participants were asked to finish the following sentences:

> A wealthy Degao (local ethnic group) has _____.
> A wealthy Degao does _____.
> A wealthy Degao looks like _____.

A long list was generated and each participant voted on the options. The following responses were the top voted, which formed the points of the new supplementary index, and the questions to determine where a participant would rank with the spectrum 1-5.

1. A wealthy Dagao is united with his/her family – does many activities together which reduces economic losses and increases economic gains.
2. A wealthy Dagao owns more than 30 heads of livestock.
3. A wealthy Dagao generates non-farm, non-seasonal income through a formal or informal job for most of the year.
4. A wealthy Dagao has a non-farm skill, such as natural handwork.
5. A wealthy Dagao can get help quickly (1-2 days) in an emergency through contacts.
6. A wealthy Dagao has plans for future expenses and does not only plan for day-to-day expenses (e.g. future school fees for children who are not yet attending secondary school).
7. A wealthy Dagao has a well-kept homestead that is expanding slowly-by-slowly over time.

The following questions were co-developed with the focus group participants to obtain information that would allow us to assess to what extent individual participants current attributes aligned with the above statements:

1. How do you work with your spouse, neighbours and extended family? Give examples of work you do together
2. How many livestock do you own?
3. Do you do non-farm, non-seasonal work for most of the year? What does this job pay?
4. Do you do any natural handwork or have a special skill?
5. How much time does it take you to get emergency assistance?
6. What is your plan for future expenses? Give examples
7. Have you made any additions to your homestead in the last five years? What were the additions and when were they completed?

These questions were answered for all adults who completed the household survey, but several of the questions proved to be difficult to answer and so this data is not being used in the analysis. The seven dimensions which indicate if a person is wealthy by local perspective that were derived in a participatory manner, however, do provide interesting insights on local perceptions of wealth and productivity and guidance on the dimensions of life that might be important to target in climate adaptation programming. The seven dimensions are: unity, dwelling, future planning, social network for emergency response, non-farm production skills, non-farm earning, and livestock ownership. These differ in several

important ways to the dimensions of the WEAI and other indices that include measurements of wealth, which will be covered in the discussion section. The following web diagram (Figure 18: Example of wealth ranking results) is an example of results from seven participants, shared here for illustrative purposes only.

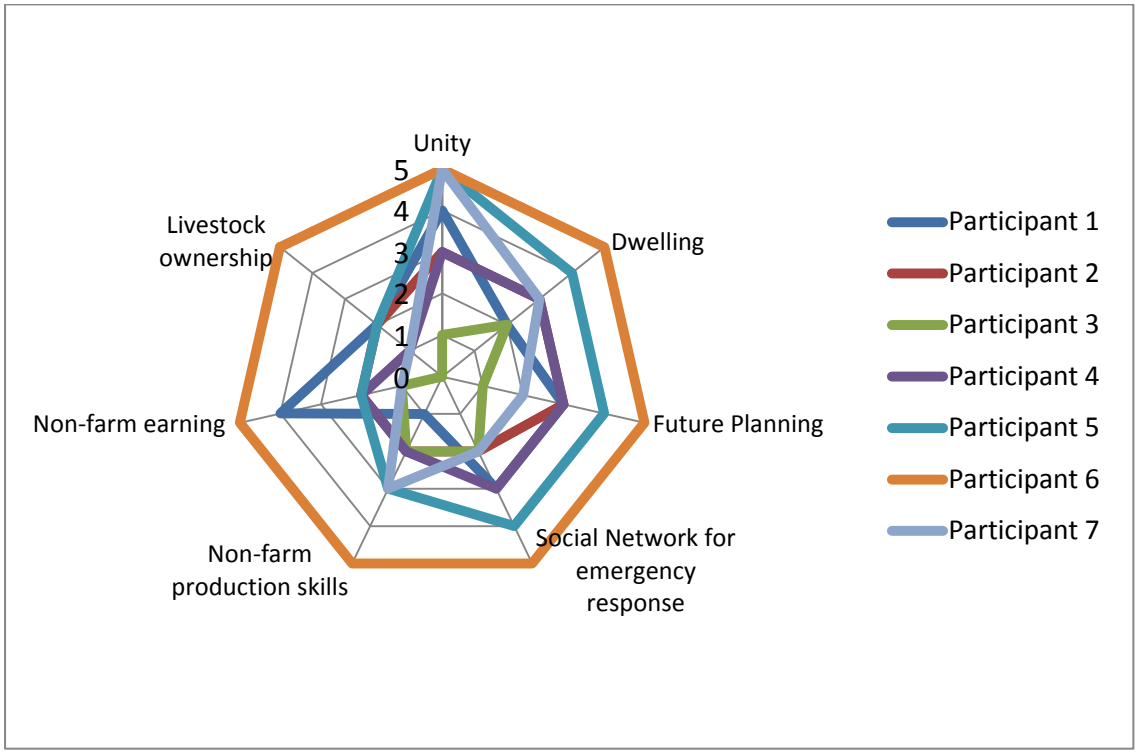

Figure 18: Example of wealth ranking results. Source: author's wealth ranking data

The illustrative map indicates that some participants could be rated as wealthy against these local measures in one dimension, or across multiple dimensions, compared to another community member.

4.3.2.2 Intersectional data involving gender and level of equality within marriages

The following sets of data from multiple sources present data on gender as it intersects with other factors – namely age, marital dynamics and relations to persons of importance such as the village chief. This is useful to demonstrate the heterogeneity of experience of individuals

and households and how these points of differentiations limit or improve their respective response spaces.

4.3.2.2.1 Narratives collected from interviews during homestays and the repertory grid

A theme emerged during interviews on the diversity of marriage dynamics. Although the gendered division of food was an important aspect of these narratives, it will not be presented here as it is covered in Chapter 5: Nutrition and food scarcity. The heterogeneity within marriages was immediately discernable by the way that women being interviewed spoke of their family situations during the homestays I undertook. The homestays often provided an avenue for the most sensitive data I collected, as I spent a lot of time with the families, and typically only the women were home the whole time. The nighttime is also the only time I had a woman interpreter. The following five sets of quotes from different women convey the diversity of marital relationships. All five are from the case study region with similarly aged women who are in non-polygamous marriages. The first two narratives were collected during homestays. Narratives three and four were collected during and following the repertory grid exercise. The fifth narrative was collected during an interview and while completing the participatory activity – the urgent-important planning matrix.

Woman One [FF301]: '*Me and* [name of husband] *are two hands clapping. With only one you will have no sound. He is a hardworking man. He asks me about all decisions. I disagree at times and he considers me* [takes the opinion into consideration]. *Some years ago he did not consider me and so I went to Wa* [neighbouring city] *to be with my sisters. They do brewing there. I went and stayed with them. I said to* [name of husband], *you want to take that bad decision* [related to farming], *I won't be here to feel the hunger. I will just go. He knows we take the decisions together*.' Later in the evening she mentioned men hitting their wives. I asked her if her husband ever hit her. She said no and added further, '*One day* [if] *he*

wants to beat me, I say go and beat me, tomorrow you will not see me', suggesting that in the event of domestic violence she would leave to go live with her sisters.

Woman Two [FF3027]: During a conversation about giving birth and birth control, the respondent indicated that she uses an injection-based contraceptive. She said, '*That one is the secret one'*. When asked why she uses the secret one, she said nothing the first evening, but several days later explained over several conversations that she does not want to get pregnant because it is unsafe to have intercourse directly following a birth. During this time the husband uses sex workers in town as she '*cannot satisfy him*'. She said, '*In these times he will be bringing diseases into the family.*' She explained that her husband is '*reasonable*', later explaining, '*He doesn't go outside the marriage when I satisfy him.*' To her knowledge, the only time he uses sex workers is during the days and weeks directly following her births. She felt unable to ask him not to use sex workers or to ask if he was having protected sex. She feared being hit if she asked these questions or if her husband became aware of her use of birth control. When asked if she thought her husband might find out about the birth control, she said, '*My main worry is* [name of mother-in-law]. *She is meddlesome. She wants many grandchildren to take care of her. She won't hesitate to tell. She is always looking*.'

Woman Three [FF3001]: She described her household finances and division of land and labour, demonstrating a unique arrangement she has with her husband. She explained that she has separate savings to her husband, which is uncommon as '*most women cannot have their own money within a marriage*'. She also farms her own plot of land that is separate to the household land, which is a request she made before the marriage. She has chosen to use the land for ground nut, which she sells in the market. When asked about her having her own land, she also volunteered that she helps her husband with traditionally male tasks by

choice. She was aware that her arrangement was unique. It appears she had thought about how she wanted the marriage to be in advance of the marriage and made negotiations before agreeing to marry. During the grid exercise she placed more cards in the grid cell that indicated she could take the decision to do this action independently than any other woman who completed the repertory grid exercise. When asked if she listens to the weather forecast to make decisions about crops, she replied, '*Obviously. I am a working woman so I need to check to see how the weather will affect my work* [ground-nut business].' She appeared surprised that I would ask her such an obvious question, when none of the other 14 women interviewed reported using weather forecasts. She took the opportunity during our discussion to inquire whether I could help her be selected for a project that was being implemented in the village by MoFA. She said, '*Knowledge has no limit. If I can get more knowledge I will not hesitate to take it. Projects are a learning process, so I join. I can't stand to see the joy of others in a project when I am left out.*' At the end of the interview, like all interviews, I asked her if she had any questions for me. The most typical response by women is to not ask a question but rather to thank me for being interested and asking me if they gave good answers. In contrast, this respondent asked me in a friendly and genuinely curious manner how I didn't have anything better to do with my time than ask people about their homes and farms. She clearly was a woman who kept herself busy with many productive activities. In closing I shared with her a phrase from my culture that I thought she would like: *time is money and money is time*. This appeared to delight her as she smiled and gave me a 'high-five' clap. She communicated that she agreed with the statement by shaking my hand and slapping me on the back. She then quickly got up and started preparing her ground nuts for transport.

Woman Four [FF1201]: She completed the repertory grid exercise which requires the respondent to place pictures of actions showing if she had enough information to decide whether she would do the adaptive action. She placed all actions on the grid cell that indicated she needed more information to decide, except for the card representing attending a training. When asked about her choices she said, '*I don't know how to do anything. I need more information to decide anything. It is my husband who takes the decision.*' When asked about the placement of the card for attending a training, the respondent replied, '*People who attend trainings are wasting their time.*' The interpreter then independently began a line of questioning in the local language that I was unaware of, and would have stopped if I had been aware of what was happening. The interpreter probed her, and later explained that he said, '*Are you having so much phone credit you can always be calling your husband and asking him every small thing? Are you not selling in the market and then using the money to buy sugar and other essentials?*' The woman looked embarrassed, and then agreed that she does on occasion take decisions pertaining to specific things but not about household expenses generally. The interpreter later attempted to justify his actions, which I felt were inappropriate, by explaining that he was trying to '*encourage her and bring her to the realization that she does take some decisions*', implying that if she acknowledges this ability, perhaps in future she could take more decisions.

Woman Five [FF1501]: She described her household dynamics as follows: 'The gender gap is always wide because we are in a rural area. In rural areas we have losses, and the woman is the one to take the loss. I was going to school. I reached junior secondary but had to drop out to take care of a young brother when my mother died. Then with my mother dead the family needed money and they arranged my marriage [for dowry]. The gender difference is

not that big in my house [current married home life where she now has teenage children]. I have the priority over my children's education and I take over what my husband cannot do [when he has migrated south]. I don't fight with my husband because he is very gentle. He would never beat me. Last year the farm [plot] closest to the house failed. It rained too much and the maize became rotten. [Then] I got improved seeds [from MoFA] and I planted those seeds, which survived, and I got something from them. I was happy. If not for the seeds I would have nothing. [But] I only got two bags of maize which won't take us through the year. I am rearing goats and pigs and depend on them. I will sell them when I need to.'

Woman five also completed an import/urgent planning matrix as follows:

Table 8: Woman Five's important/urgent planning matrix

	Urgent	Not Urgent
Important	• Clean the compound each day • Feed children • Bathe (me and children) • Pay school fees • Mind the goats	• Planting trees • Farming in the rainy season (not very time sensitive because it is irrigated with river water by hand) • Attend training course to be a seamstress
Not Important	• Drinking pito	• Quarreling (fighting with neighbors or family) • 'If I had more time I would leisurely do the washing and the cooking'

Woman Five's experience illustrates that her response space was affected by gender, household dynamics, as well the presence of assistance from MoFA. Her daily life was deeply affected by being a woman and having her husband migrate south seasonally as a vulnerability strategy. The responses of Woman Four, conveying she does not make decisions, may be more of an indication of being asked questions she felt were intrusive than an indication that she fully believes she doesn't know anything or needs support to make every decisions. However, comparing the responses of all five of the women does

highlight the very different constraints to supporting women farmers in a given community. It also supports the theory presented in chapter 2, which argues that considering gender differences alone is insufficient in the study of adaptive capacity. Rather it is at the intersection of their micro-differences where the greatest clarity on a person's ability to access response options can be found.

Woman Three and Woman Four are neighbors, similar in age, both married, and have very different perspectives on their own capacities and the value of external supports. In a study which considers gender differences alone, all five of these woman would be considered similarly placed to access response options. This distinction is important for the analysis as finding a programmatic design to engage and keep both of these women involved in an intervention to improve livelihoods would be challenging. Similarly, there is a suite of programming by NGOS and government agencies in the area that aims to empower women to make household decisions. The extents to which Woman One and Woman Two have mastery of their own affairs within their marriages are antithetic.

During another interview with a middle-aged woman [FF1001], it became clear that she was aware of some development industry jargon. I could hear her say the words *gender*, *empowerment* and *gender gap* in English while speaking in Dagaari. I asked her what she understood of those English words. She explained that in her view, gender empowerment means more work for women because women were 'empowered' to do things like pay school fees when you have your own savings, which are traditionally done by men. In her words, they are 'empowered' to do more things so their husbands can be 'sitting doing nothing'. This sentiment is consistent with literature from feminist political ecologists that have argued that women's empowerment interventions, and later climate adaptation

interventions, are placing an additional burden on women (Gonda, 2016; Resurrecciion, 2013).

4.3.2.2.2 Data from interviews with men

During interviews with men, a diversity of opinions on women's status, the role of men, and the dynamics of their marriages were relayed in several conversations over the course of the three field visits. Two themes emerged. The first is fear that if women's roles changed it would necessarily involve a swapping of roles. The second is that some men want to move away from traditional gender roles, usually surrounding the division of labour, but fear negative recourse from male peers or elders of both genders. It is unclear what proportion of men fear change, or fear pressure to maintain strict labour patterns, or even if these ideas are mutually exclusive. It is clear that men in the same village have very different views and responses to the idea of changing the division of household labour. These nuances of dynamic social norms are important for the analysis on social differentiation and equitable adaptation options.

Figure 19: Example of anti-woman suffrage campaign material

Five men interviewed feared that if the roles changed that they would have to do demeaning, repetitive tasks as their wives do now. Descriptions of this envisioned scenario in all five cases involved the idea of women screaming at their husbands or beating their husbands. This discourse is strongly reminiscent of fears over women's emancipation

which have been present over long histories in many parts of the world. One iconic example of the same fears is the cartoons published to counter the women's suffrage movement in England in the 1880s. An example is presented in Figure 19: Example of anti-woman suffrage campaign material (Palczewski, 2005).

Four men provided examples of changing the division of labour in the household. For example, one man [MF3001] who desired a change in gender roles but feared retribution described carrying firewood or other heavy items for his wife (a traditional role of women) while they are far from the village, but then giving her back the heavy items as they approached neighbors on the outskirts of the village so as to avoid 'back-biting' (gossip) and emasculating teasing. He also expressed feeling pressure to make a large purchase in the market and wanting to consult his wife at the homestead, but feeling like he needed to make the purchase immediately while others were looking.

The diversity of perspectives from both the men and women is important for this thesis, which is concerned with more equitable adaptation options. In particular, many of the more equitable marriage dynamics offer a local model on how individuals could expand response spaces and gain greater mastery of their own affairs as it pertains to adaptive actions and coping strategies.

Lastly, the practical application of this research is to inform adaptation policies and programs, such that access to adaptation responses and beneficial adaptation outcomes are more equitable between and within households. The thesis argues that to accomplish this, an intersectional approach which considers micro and macro points of social differentiation, is needed. In particular the data brings to light the differences experienced by women which varies based on the unique dynamics of their marriages.

4.3.2.3 Additional points of relevant social differentiation

One's relationship with the chief and his immediate family emerged as an important context-specific point of social differentiation. This was not explicitly included in the alternative wealth index, presented previously in this section. However, this aspect may be implicit in the community's alternative wealth index, in the ability to gain assistance quickly.

4.3.2.3.1 Data from interviews

The chief plays an important role in village and household life. By way of example, when asked who makes decisions in the household, one farmer [FM205] answered that two people make decisions that affect the household – the chief of the village and himself. He said '*Chief takes the decisions, like no bush burning, or for communal labour to make a toilet, a church or benches, chief can say a certain number from the household must attend. Chief can say if MoFA can come to do a project or have a meeting with the community. I take the other decisions about my household. The wife takes no decisions, but can make decisions about children going to school*'.

The chief can act as a gate keeper to external supports and thus is able to channel funding and opportunity as he sees fit to specific individuals and households. The community mobilization strategy of NGOs and government departments, including MoFA, typically relies on beneficiary selection based on the chief or contact farmer's suggestion. The chief and his advisors (all male) also hold powers in local judicial affairs, including mediating inter and intra household disputes over land and assets. As such, an individual or household's standing in the eyes of the chief has an impact on a number of adaptation options, including access to external supports through MoFA or micro credit associations, and access to communal land for farming or other livelihood activities including spaces for enterprises. One woman farmer [FF3001] said, '*I could not attend the farmer field school, as the chief did*

not consider me. He did not select me. They only needed two women, and he chose the one residing over there near to him and one from his house.' Further, multiple examples were given of men using the labour of the women in their family as reciprocity in exchange for something of their choosing, such as providing the labour of the women in one's family to maintain a good relationship with the chief, who will then consider him for future benefits

One prominent example was raised in multiple interviews and discussions around women's education attainment and separate discussions on remittances of permanently migrated adult children. In one of the villages no girls have completed secondary school, except the daughter of the chief who subsequently became a qualified nurse. She has the highest level of education of anyone who was born in the village and also sends home more remittances than any other permanently migrated person. This anecdote is consistent with the literature on women and migration which states women migrants of the current generation send back more money than men, which in turn has changed family dynamics including bride price (Abdul-Korah, 2011). This singular example also provides an important contrast to data on women having consistently fewer opportunities. It is likely that the micro social differentiation of being the daughter of the chief was an important beneficial characteristic that helped to address a number of disadvantages one might experience as a result of the macro social differentiation of gender.

4.3.3 Responses and response spaces

'*In times of hardship we will sell our goats and pigs. For example, my wife is not well. She is getting treatment. We are selling the pigs for money. This is our insurance*.' Man Farmer, Orbili Village [FF801]

'*You can't dodge farming, but I hope farming will not be their* [my children's] *only profession*.' Woman Farmer, Orbili Village [FF2301]

This section will present data on the actions that are taken to sustain life as subsistence-oriented farming families in the case study amidst environmental change. However the reader must bear in mind that this is not the desired future for many young people, or the aspirations of parents for their children. Transformative change is desired. However, as will be presented, the supports given to these farming families are typically designed to try and maintain current livelihood options by making them 'climate-proof' or 'climate smart'. The aim of this chapter is not to be exhaustive to include all possible coping or adaptive actions, nor is it to pick apart if the response is to shorter term variability or a gradual change or abrupt change to a new state. Rather, it aims to provide sufficient information on the breadth of actions employed within the case study, to provide in-depth data on a subset of those adaptations, to make an assessment of trends associated with that subset of actions, and discuss what those trends mean for the detriment to or facilitation of equitable adaptation. Throughout the section, the data will convey the sentiments expressed in the above two quotes from farmers – that dealing with day to day variability of life requires a complex set of actions that are both productive and protective (farming, livestock rearing, and drawing down on those assets in times of stress), and that so much of the actions taken are not the preferred pathway but often the only option given limited response spaces, since one 'can't dodge farming'.

4.3.3.1 Adaptive actions on-farm

4.3.3.1.1 Data from scoping phase interviews

During the initial scoping phase, 20 farmers from the case study villages and surrounding villages were interviewed about the actions they take to cope with 'changes in weather that affect your crops'. A list of 15 common actions was generated and is presented in Table 9: List of common adaptive actions. The actions on this list we re-confirmed through multiple

data sources, with high levels of repetition. As such, although they are based on a small number of interviews, saturation was reached and the responses were triangulate through other methods. An additional three actions were added to the list following the whole of community workshop (producing shea butter for sale, petty trade and hunting). This list formed the basis of the actions used for the repertory grid exercise at later stages of data collection and the choice of subject for narrative collection. Some actions are not directly related to weather stressors but deal with increasing yields more broadly. The list of adapted actions generated by interviewing smallholder farmers is as follows. The time period in which the actions are typically done is indicated in the three columns on the right. The final column indicates actions done when the farming season has been challenging, and are predominantly coping strategies to deal with low yield.

Table 9: List of common adaptive actions

Actions	**Primary purpose**	**Time: 'wet season' (before or during farming season)**	**Time: 'dry season' (during non-farming season)**	**Time: post-farming season if a 'bad year'**
Dig a water duct	Pools rain water for hand irrigation	x		
Grow vegetables at the riverside	Produce food during dry season for sale		x	x
'Go south' for seasonal work	Gain income in the dry season		x	x
Plant in ridges or raised beds	Increase water to crops, reduce erosion	x		
Use chemical pesticides	Reduce loss from pests	x		
Use chemical fertilizers	Increase crop growth in shorter farming periods	x		
Intercrop and crop rotation	Diversity crops, conserve soil, reduce erosion	x		
Plant 'improved seeds' (most commonly, early maturing maize)	Increase yield, reduce growing period	x		
Intercrop with trees/agro-forestry	Diversify crops, conserve soil, reduce erosion	x		
Produce shea butter	Home cooking and sale	x	x	x

	for income			
Ask family and neighbors for loans, or 'susu' (micro-credit savings groups)	Gather capital to buy farm inputs before the planting season	x		
Day labour in Lawra town or surrounding areas (NGO projects, city businesses)	Gain income during the dry season		x	x
Raise livestock	Invest in an asset which can be sold in times of scarcity	x	x	
Petty trade (most commonly in local markets)	Diversify income		x	
Micro-enterprises (brewing, sewing, selling of household items like matches or broth cubes)	Gain income	x	x	x
Ask family and neighbors for food or cash	Gather cash or in-kind support for subsistence			x
Ration food (reduce meal frequency and size)	Reduce food consumption to allow sustenance for a longer period		x	x
'Go south' for seasonal work	Migration of individuals who would otherwise not travel to gain income or access subsistence food			x
Sell livestock	Access cash to buy food			x
Fell trees to produce timber and charcoal for sale	Gain income		x	x
Hunt wild animals (often involving bush burning)	Gain income through selling meat and skins		x	x
Eat wild fruits and vegetables	Bulk up diet through wild foods, usually considered undesirable		x	x

The actions from this list give an overview of responses. Those that will be analyzed in greater depth through other data sources are 'going south' for seasonal migration (both as a typical livelihood strategy and as a coping mechanism during times of scarcity) and livelihood diversification, including day labour, enterprises and dry season gardening.

Three climate change-themed workshops have been facilitated by NGOs in neighbouring villages. These have been interpreted as instructions on how to protect things against the weather, according to the farmers interviewed who had been exposed to the workshops or knew people who had attended. According to a farmer from a neighbouring village who was interviewed during the scoping study to assess which villages to focus on, the recommendations and teaching points of the training were as follows:

1. Stop bush burning
2. Plant trees
3. Use farming techniques to reduce erosion, such as terracing and bunds
4. Cultivate fast maturing crops that can be harvested within three months to work around gaps in the rainy season and facilitate re-planting where necessary
5. Dig duck-outs to store water which can be used for irrigation to elongate the rainy season, when necessary
6. Listen to seasonal and shorter term weather forecasts in additional to traditional indicators of weather to provide planting guidance

4.3.3.1.2 Data from interviews

A number of adaptive actions are not climate change-driven, but have been advocated for decades to improve yields, and thus reduce vulnerability to hunger. If yield improving actions are successful, they may reduce vulnerability to climatic stressors, such as shorter or varied rainy seasons. One farmer shared his experience moving from planting in mounds to planting in lines, as is promoted the Ministry of Food and Agriculture (MoFA) based on evidence of increased yield through farm trials. He said, '*I do lines. I learned to do lines three years ago. Agric* [MoFA agricultural extension officer] *came and told us to plant in lines. 20 years ago my father told me to plant in lines but I took it with a pinch of salt. He also mixed it with chemicals. Then agric came and told us to do lines and I did it. Some people still sow in circles to preserve our culture. Before the people thought it was cumbersome* [to plant in lines]. *They didn't realize it would improve yields so much*' [FM303].

This example – an older community member making a farming adaptation which is not immediately accepted but later accepted when coming from a government official – provides an important anecdote about the origins of adaptive actions. There can be an underlying assumption that the successful adaptive actions come from outside of the community. This is an example of an autonomous change by an innovative farmer which then required an external authority (MoFA) to bring legitimacy to the idea. Women typically do the bulk of land preparation in the cast study area, although men are also involved in this stage of farming. There was inconsistency in interviews about whether planting in lines or mounds is more labour intensive. As such it is unclear if planting in lines is an adaptation that increases women's labour.

Another example of an action to improve yield which may also function as an adaptive action is improving soil nutrients. On farmer explained, '*Farm yield is down because the soil nutrients are all gone. Now we farm a big space and the yield is the same as year's passed if we farmed a little space. Now we make a manure pit and then broadcast it. We have been doing a little better since we started doing that but we will still have a have a hungry lean season. Agric* [MoFA extension officer] *will come soon. They come twice a year. I will ask them about my soil*' [FM102].

One of the most common on-farm strategies in Orbili village to increase income during the dry season is dry season riverside gardening. The income from this gardening generally goes towards buying staple foods and paying for household needs. This is one of the major differences between Tabier and Orbili villages, as Tabier does not have direct access to a river for garden irrigation and as such very few households are involved in this livelihood activity. Importantly, dry season garden produce is rarely consumed in the home. Rather it

tends to be higher value crops like vegetables that are sold in markets in exchange for dry goods and staples once the home stock has been depleted. These crops provide supplemental income only, according to interviews. One farmer said, '*I don't put much hope in it. If I'm lucky it will give us a top-up during the lean times*' [FM302].

4.3.3.1.3 Data from participatory action research (PAR) techniques

Some households have strategies aimed at minimizing hunger rather than increasing possible income. There may be a relationship between these households and gender equity, although more research is needed to confirm this supposition. Of the 30 adults that completed the PAR activities and long-depth interviews during each field visit, three of the men with the most equitable relationships, who described their relationship with spouses as two hands clapping and were observed to consult their wives on decisions, spoke of only selling staple crops at the end of the lean season once the new harvest begins, thereby ensuring there is no food gap. This is also the time that food prices are lowest. This means that these families may be forgoing income to reduce risk. More research is needed to assess whether there is a relationship between gender equity in the household and risk aversion. Considering the literature presented in chapter 2 on gender and on-farm decision-making, this trend, if substantiated more fully, could build off of and add nuance to existing literature, such as Carr's (Carr 2008a) work on why particular sub-optimal adaptation options are accepted and given legitimacy.

4.3.3.1.4 Data from survey

From the survey data, we see that the decisions made concerning farming are male dominated for both food and cash crop farming (predominantly vegetables in riverside gardens in the case study community). This, in turn, has implication for on-farm adaptations.

The gap in decision making is greatest concerning the use of income generated from farming, as seen in Figure 20 and Figure 21 below.

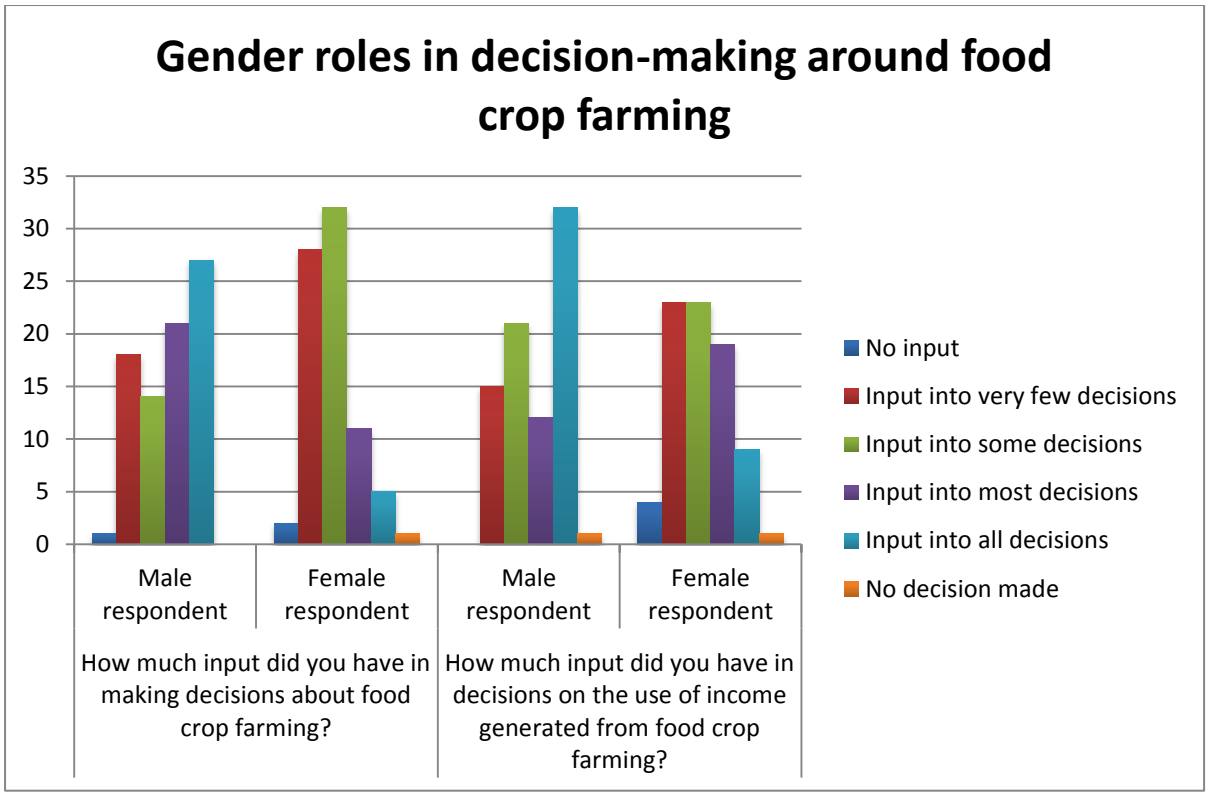

Figure 20: Gender roles in decision-making around food crop farming
Source: author's household survey data

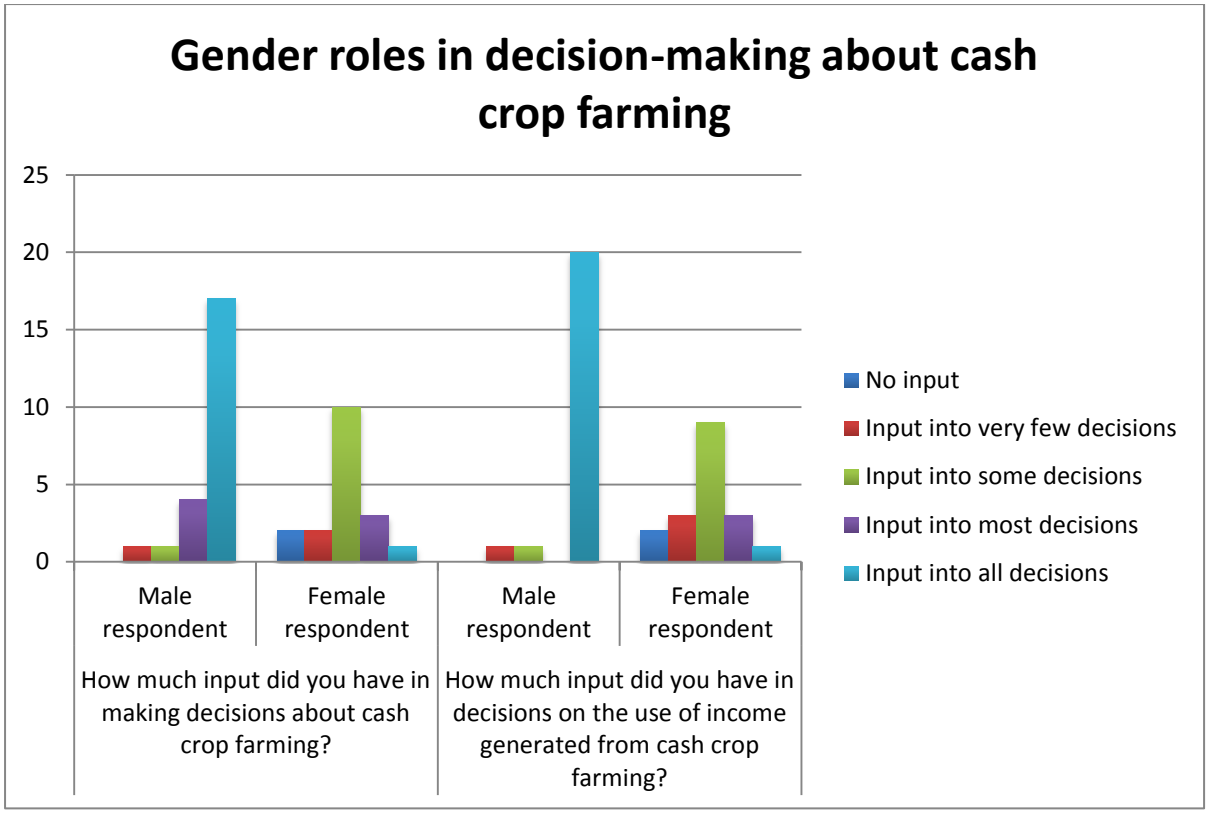

Figure 21: Gender roles in decision-making about cash crop farming
Source: author's household survey data

The ability to make decisions of food crop farming and cash crop farming as well as what options and response spaces are available thus appear affected by the individual.

4.3.3.2 Adaptive actions off-farm - enterprises

The decision-making around enterprises appeared even more gendered.

4.3.3.2.1 Data from the survey

The disparity of who makes decisions for the existing non-farm businesses is highly gendered, with women rarely being considered the owner of or decision maker concerning existing off-farm businesses within Tabier and Orbili Village. Figure 22: Primary decision maker for non-farm businesses, below, demonstrates how male heads of household are the primary decision makers on non-farm businesses.

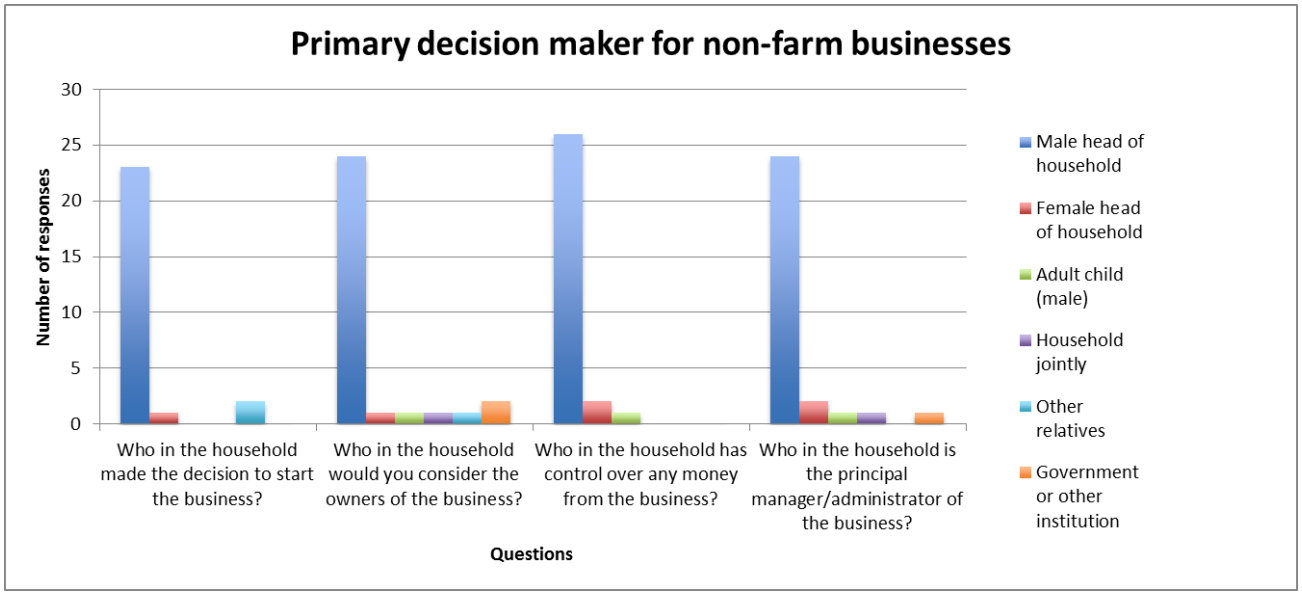

Figure 22: Primary decision maker for non-farm businesses
Source: author's household survey data

4.3.3.2.2 Data from interviews with women entrepreneurs in Lawra Town

Diversifying household income through small off-farm enterprises is considered a best practice to smooth out income volatility associated with both farming for subsistence and selling harvests in the market for income. Enterprises in particular are relied on during the lean season to reduce hunger. As there are few women managing off-farm enterprises in the villages of the case study, I interviewed women involved in small businesses in the neighbouring town of Lawra.

Small enterprises in towns within Ghana's Upper West Region are as gender segregated as household chores. Men are carpenters, construction workers, bike mechanics, butchers, shop keepers, assistants to unload and offload trucks and drivers. Women are tailors, hairdressers, handicraft producers, launderers, caterers, bakers, soap makers and cleaners. According to interviews with women entrepreneurs, their profit margins are slim as compared to the enterprises typical of men. Multiple women spoke of their earnings as 'chop money', meaning money for food and sometimes small expenses. They also recounted fringe benefits: soap makers and bakers reported keeping a part of what they produce for

home use; tailors reported keeping scraps they can use to produce things for their children; caterers reported feeding themselves and their families with left-over food. None of the women interviewed expected to make enough money from their businesses to be able to afford to pay their rent, despite working full-time. As such, women entrepreneurs are not typically single. One single entrepreneur said, '*As for the business, everything is fine. It's only that I don't have someone to pay my rent and my chop money'* [BF001]. Her expectations for the profitability of her soap making and baking businesses were low.

Following slim profits, the most prominent theme that emerged was around social benefits accrued by the women who engage in businesses – namely socializing with other women and gaining respect from their families and communities for being productive, hardworking women. '*Sitting doing nothing*' or '*roaming around*' are negative descriptions reserved for unproductive women who live in towns. Involvement in formal groups for business women is a source of pride and in some cases financial benefit, as NGOs and government departments engage these groups for training, sometimes including valuable per diems. The income or fringe benefits they receive from the enterprises they engage in often represent a small but important point of agency. They use these small amounts of money or goods to barter, gain favour with relatives, give to people within their social network that they may in turn need to rely on in the future, or pay dues within a loans and savings group. Many women also described using small amounts of money to absorb mini-shocks – for example, a mobile phone being destroyed. Buying a new phone with cash is unthinkable for unemployed women, according to those interviewed, but women in business can manoeuvre both social and financial capital to deal with an unexpected cost.

4.3.3.3 Adaptive actions off-farm – migration

It is typical for adults within the Upper West to migrate both seasonally and permanently to southern cities, farms and mines for work. The data collected on migration pertains to seasonal migration as this is an action used to cope with seasonal variability and low farm productivity. Data was not collected on individuals who have migrated permanently and settled in the south, apart from quotes about remittances people receive from permanently migrated family members. The literature on migration from the Upper West – both who migrates and how frequently – was covered in the background section. This results section will focus on the benefits from seasonal migration (income, independence, avoiding hunger) as well as the risks associated with these migrations (exposure to violence, crime, exploitation).

Like off-farm enterprises, the work that is accessible to Upper West farmers when they migrate seasonally is gendered and tends to be low skill and sometimes high-risk. Data was not collected on the frequency of seasonal migration within the case study, nor exactly which jobs were completed by who in which years, as this was not the main focus of the thesis project. Rather, narratives were collected by people who migrated south, 'going south to work' was one of the actions used within the repertory grid, and the subject came up during interviews about what happens in the dry season. As this was not a central part of the analysis, the data is limited, but the theme of gendered vulnerabilities and benefits emerged clearly. Importantly, the benefits and risks of seasonal migration determine whether the action is considered coping or adapting. As the data will suggest, for some, dry season migration is capitalizing on an opportunity to earn income, and for others, it is an act of destitution to avoid hunger, despite incurring risks.

4.3.3.3.1 Data from interviews

In interviews, the difference in earning potential was frequently mentioned. Men appear to be much more likely to go south and be able to bring cash or goods back to the homestead afterwards. Women spoke of earning enough money to subsist while working in the south and usually talked of going south to '*avoid hunger*'. In contrast, several men spoke with pride about assets they were able to acquire through savings and two men mentioned disputes with their fathers over what the money brought home should be used for, feeling like they owned the money and should have greater say in how it is used. The first man [FM501] said, '*When you arrive* [back to the village] *everyone will be asking you to consider them* [give or lend cash or goods]. *They will be giving you headaches. They want to take, but they have been resting here* [in the village] *instead of working*'. The second man [FM1602] reported moving out of his family home where he arrived back to the village and beginning to build his own homestead with the cash he saved up, as his father '*had a different idea*' of how to spend the earnings. These anecdotes of disputes are consistent with the study completed on the Upper West (Abdul-Korah, 2011) on the changing labour patterns of migrating south and the ensuing change in household power dynamics, particularly between generations, as the control of wealth changes.

One man [FM1401] interviewed stated, '*Going south is good. Otherwise we just waste our time*.' This was a commonly expressed sentiment amongst young men. In the dry season, there is little productive work to be done on the farm. This is especially true in Tabier Village where they don't have access to the river for riverside gardening and fishing. Another man from Tabier [MF3045] said, '*If you have the connection to a job in Lawra* [Town], *or if there is a project for the men, then you can have something to do and you will have something* [money/food] *to take at the end*.' Another man from Tabier [FM3038] said '*As for me, I*

don't go south these days. I have project work to occupy me.' This is commensurate with the study in Burkina Faso (Nielsen & Reenberg, 2010) which cited piecemeal work for NGOs as one of four major livelihood adaptations to deal with low farm productivity. These quotes suggest that individuals would prefer productive work at home, but short of this, they migrate south.

The only woman [FF3007] who spoke of being able to bring assets back from the south was a young woman who recently married into the community from a different district in the Upper West. She migrated south seasonally to work at a large-scale launderette. She reported being able buy the large cooking pots and other expensive household items she would need before getting married in anticipation of marriage. She said the items she bought would normally be provided to a new bride, but in recent years some women have had to gather their own household goods before marriage, and so she made sure she had what she needed. She indicated that her employer provided shelter and so she never slept rough, but knew of others who slept in the open. She spoke with a lot of pride about managing to acquire these assets independently and felt her husband had respect for her. She met her husband while living in the south. Her husband migrated seasonally from Tabier Village. When asked about the cooking pots, the husband indicated that he could see she was a hard working woman and this is one of the reasons he fell in love with her. They now have a baby and the mother no longer has plans to work seasonally. No other women who shared their experiences of going south reported bringing back substantial assets or cash. Two young women reported doing work for relatives who had permanently migrated south. These relatives then send remittances to the family.

Another woman [FF3024] interviewed stated she would discourage her own daughter from going south, even though she had done so for several years before having children. I asked her why she would not like her daughter to ever go south for work. She replied, '*Women go south and sleep rough, so they get pregnant* [through rape] *and die of bad abortions.*' She added that she personally knew young women that this had happened to while doing seasonal labour to gain income. None of the women reported being assaulted while going south but were aware of the general concern of this happening. This may not have been shared due to perceived stigma. I did not ask women directly if an assault had happened to them personally while working in the south, as I did not feel I could provide sufficient emotional after-care.

4.3.3.4 Adaptive action - using social networks

Relationships of reciprocity are an important part of adaptive strategies in the case study area. These relationships are implied in the alternative wealth ranking as one's ability to get support quickly in an emergency. The relationships are a traditional social safety net and need continual maintenance. As the data demonstrates, maintaining these relationships can be stressful and prevent households from making productive investments, as income beyond the essentials is often used to maintain relationships. Examples of both bonded and bridged ties emerged during the interviews.

4.3.3.4.1 Data from interviews

One farmer [FF1601] explained: 'giving food is insurance'. Another [FM301] elaborated, '*One day you will be needing but not having* [cash or in kind] *and some other person will be having and not needing. Then they will consider you in your time of need. At another stage, you will consider them in a time of need*.' 'Consider me' is a common phrase used. An interpreter described it's meaning in relation to relationships of reciprocity as an individual

reflecting both on your situation, asking '*how vulnerable are you?*' and reflecting on your reciprocal relationship to them, asking '*How deserving are you? How much have you helped me in the past? How much might you be able to help me in the future?*'

When asked, what do people think about when they are deciding whether or not to consider you? One quote from a male farmer [FM205] aged 38 summed the responses well. *'To decide to consider you, he will be thinking, is the man needy? Is he in a bad situation? Is he to blame? Did he try and solve his own problem? What do I have in my pocket to give him? Has he given from his own pocket in my needy times?'* This quote reveals a complex decision which is simultaneously based on means, moral judgement and level of participation within reciprocity in the past. Absent from this quote, but equally present within interviews is the level of expected participation within future reciprocity, which includes a consideration of status and future social mobility.

Two examples from individuals hired to complete work for the research team illustrate an interesting point about income. Both expressed a discomfort with having physical cash from the research team and simultaneously declining requests from others. One said [EM003], '*How can I have money heavy in my pocket and turn someone away who asks for support?*' During their time working for the research team, the demands for support increased by their fellow community members on the assumption that they were making a lot of money from working with the foreign visitors. The other [EM004] said '*All the people are thinking we must be rich these days. They are wanting to participate in the earnings*'. Both research assistants had aspirations for their income. They hoped to use this one-off influx of cash to make a worthy investment for their futures. One wanted to pay a fee to take a course to increase his skills. To deal with the constant demands from other in his social network, he

requested to be paid all at once on the day he needed to pay his course fee. This liberated him of the guilt of using his income exclusively on himself and turning people away when he did have money in his pocket.

Several individuals spoke with pride about being self-reliant – not needing to ask others for support, but providing it to needy people. Being a reliable person who can be turned to in times of need appeared to be a strong point of identity for two of the individuals, who also ranked high in the alternative wealth index. One of these individuals [FM701], who is known for having the highest numbers of goats and pigs explained: '*In times of hardship we will sell our goats and pigs. For example, my wife is not well. She is getting treatment. We are selling the pigs for money. This is our insurance. We don't need to be going round and round to houses asking people for chop*'.

Another elderly male farmer [FM1001] spoke of having once identified as a person who is self-reliant and didn't ask others for assistance, but after a number of set-backs and losses, he now has to rely on his network for support. He experienced a severe crop failure as a result of late planning due to labour shortages when his adult children were not able to return from working in the south of Ghana in time to assist with planting, exacerbated by a bad rainy season. In the past he had supported a disabled member of his extended family, and many others in his social network, but became unable to do so following the crop failure. He struggled emotionally with watered eyes to talk about the changes in the social dynamics he has experienced going from being a net contributor to a net taker within his community. His adult son [FM1001-3] described him as follows: '*He is a good farmer, a reliable one. This is why he is tired. He worked, worked, for years and years. Even MoFA knows. When they needed someone, he would be the person they visited. We his children*

never knew hunger. It is only in the recent times, with so many problems. Now the neighbors are looking at him differently.' Thankfully, he reports, he has been assisting others for many years and so they in turn are being generous with him following the down turn in his productivity and income in recent years. However, it remains emotionally painful for him.

4.3.3.4.2 Data from repertory grid

While placing the *Ask for assistance from neighbors and family card* on the grid, one woman [FF701] explained, '*If I give when someone is not having, someone will also give to me when I am not having*'. In the repertory grid exercise women overwhelmingly prioritized the card *Ask for assistance from neighbors and family* more than men respondents. When men were asked about the low priority given to asking for assistance, their responses typically (11/15) included a mention of loss of pride, or sharing the experience of an individual who they asked for support, in turn telling others that they were asked, spreading gossip and embarrassment. One man [FM205] said '*You could ask someone for assistance and then they go back-biting you. They will tell everyone you are on hard times and they may not even have something* [cash or in kind] *for you. So you went and did it all for nothing*'. The women on the other hand, when asked about gossip or embarrassment in response to asking for assistance seemed less concerned, although they agreed it was embarrassing and gossip sometimes followed. One woman [FF1501] said '*What can I do? If my children are hungry I need to ask. Neighbors will be knowing they are hungry from the cries when they should be sleeping*'. Another woman [FF401] said '*You can't be* [self-reliant] *all the time. You will need to seek help from relatives. No shame on relying on others*'.

These responses highlight the importance of relationships of reciprocity and the complicated emotions people feel about having to rely on them and maintain them, which appear to be heavily affected by gender. These relationships help people maintain an

invaluable social safety net despite high levels of fluctuation in farm productivity and unexpected losses and expenses. They do simultaneously make it difficult for individuals to make larger investments, creating a social leveling affect. It is reasonable to expect that these relationships will continue to have an important role within adaptive and coping strategies in a changing climate. Understanding their role within a response space will be essential to providing adaptive supports to this population.

4.3.4 Programmatic challenges

The dynamic, complex, context-specific nature of response spaces, combined with the inherent uncertainty of a changing climate, poses a number of programmatic challenges to supporting affected individuals and households. Examining the programmatic challenges in the case study region is important because it helps us understand how programs to help support adaptation differ from mainstream livelihood and poverty alleviation interventions. The data presented below provides insights in the unique challenges of supporting adaptation and highlights the ways in which programming design may be limiting the impact of government and NGO interventions in the area.

4.3.4.1 Data from observations

During the second and third field visit, Tabier Village was buzzing with the news of a new large-scale climate adaptation program designed to build resilience to climate change. It involved several different livelihood supports including improved goat breeds, livestock shelter, improved seeds, business training and credit. Tabier was chosen as one of the beneficiary communities based on a standard vulnerability and capacity assessment. This assessment was done with the village as the unit of analysis. Orbili Village was not identified as a particularly vulnerable village in this process. Within Tabier Village a subset of households were selected as programme beneficiaries. On several occasions I observed the

meetings of the programme as they prepared for each iteration of the program, beginning with the construction of shelters for the new goats. The households who received the new goats were selected based on attendance at meetings. Individuals who had the highest attendance rates at meetings were shortlisted to have their households as programme beneficiaries. This was observed at the meetings firsthand and was confirmed by asking community members and later staff within the program.

The process used for beneficiary selection within this program is commonly applied in the region. This strategy assumes homogeneity of poverty and climate vulnerability at the sub-village level. Given the differences between and within households presented in the data above, the design is flawed. Most notably, the vulnerability assessment is done at a different level to implementation. In so doing, biases were inadvertently introduced into beneficiary selection.

4.3.4.2 Data from repertory grid technique

Data from the repertory grid technique was difficult to analyze but one obvious trend became clear by simply visually inspecting the grids. First, women and men view their ability to receive farming advice and support from MoFA differently. Second, the contact farmer has a strong role including making decisions for other household members. The contact farmer is an individual member of the community through which external organizations are able to demonstrate new livelihood actions. Supports are given the individual contact farmer, such as new seed varieties, or building materials to make a demonstration raised chicken coop. The intention is for others to observe and see the benefit of the demonstrated technologies or approaches, and in turn adopt them in their own households.

Respondents were given cards of different adaptation actions and asked to place the cards in relation to other cards given particular parameters. The card representing the action *Get advice from an extension officer* was placed on the far corner by all 15 women respondents – indicating the action was not their decision to take. In direct contrast, most men respondents (11/15) placed the *Get advice from an extension officer* card in the opposite far corner, indicating that this *was* their decision to take. The four male respondents that didn't place the card in the far corner instead placed their cards around the middle. When the women were asked who makes the decision related to getting advice, all but one said it was their husband. The remaining woman said it was the MoFA contact farmer who made the decision. All four men who said it was not entirely their decision also said it was the MoFA contact farmer who made the decision about whether they could take advice from the extension officer.

4.3.4.3 Data from interviews with MoFA and NGO officials

There is some limited evidence to suggest that the term drought, as used by community members and as discussed above, is being interpreted by officials within NGOs and government agencies as meteorological or hydrological drought in the more common scientific meaning. In interviews with the Ghana Red Cross, MoFA and Oxfam, senior level staff persons in charge of climate change adaptation or disaster risk reduction programming appeared to believe that the Upper West was experiencing a meteorological drought during the time of the first field visit in 2013, when in fact the precipitation levels were within a normal range for the region. Their perceptions were based on reports from the field, where the term drought is often used to describe dryness. As such, the staff persons interviewed were under the impression that the area was experiencing droughts each year and were unable to distinguish the years of above average dryness from the years when precipitation

was in the normal range. As such, at least one of the staff persons was providing similar supports in response to a drought in each dry season, even though the need varied considerably from year to year.

There is also evidence to suggest that individuals who are implementing climate adaptation and resilience programming (including expatriate aid workers and diplomats) do not sufficiently understand climate science or agricultural science to be able to robustly design and implement such programs. For example, it became clear while speaking to senior expatriate officials implementing climate adaptation programs that they were under the impression that 'drought tolerant seeds' could produce harvests during a meteorological drought. In reality these seeds are only tolerant of below average dryness, and would not be suitable in the weather scenarios envisioned by the projects. As such, it appears likely that the extent to which farms could be 'climate proofed' through the distribution of drought tolerant seeds is being over-estimated by senior management.

The two most common intervention models implemented by MoFA are the contact farmer model and the farmer field schools. One farmer [FM1401] summarized the farmer field school he participated in as follows: '*They* [MoFA agricultural extension officers] *came to the village. They made a specific plot. Now they are using it to do a lot more crops. First they were using it for three month maturing white maize and queen mother maize, which is also three month fast maturing. Now they are also doing millet, groundnut and soybean*'. Multiple farmer field school plots have been instituted in the case study area and increasingly these interventions are implemented under a climate adaptation or resilience building program. However, although this intervention model is considered locally as a best

practice, the limited impact of farmer field schools is well documented in the literature using rigorous impact evaluations and systematic reviews (Waddington & White, 2014).

The contact farmer model may also be complicating access to extension services. The assumption with the contact farmer model is that the knowledge spreads from the contact farmer throughout the community through observing first-hand the experience of the contact farmer who lives within the village. It relies on information dissemination similarly to farmer field schools, which assumes individuals are able to gain mastery of a skill through observations and few other additional supports. This assumption within the farmer field schools has been deemed an unsafe assumption through independent evaluations (Waddington & White, 2014). The contact farmer model has not been evaluated, as farmer field schools have, but it is likely that the assumption of knowledge dissemination is equally improbable.

Multiple farmers took the opportunity during interviews to share their grievances about the contact farmer model. Individuals felt the supports given to the contact farmer were unfair. '*MoFA only considers Willie* [the contact farmer for Orbili]' was a commonly heard phrase, followed by a list of supports the contact farmer had received from MoFA including fertilizers, improved seeds, a pig pen, piglets and a diesel powered water pump. No individuals interviewed felt they had benefited in any way from the contact farmer receiving these assets. The complaints were in turn misinterpreted by MoFA staff. The staff felt the community members did not understand the contact farmer model, rather than a complaint indicating the model wasn't working. One MoFA staff person [GF007] said '*They say we are favoring Willie. But they don't understand, Willie is not just Willie, he is the contact farmer*'.

This limits the extent to which external supports may meaningfully improve the response spaces of the case study area.

Lastly, discrimination against women continues to be present among certain senior level officials, including those responsible for the well-being of women and marginalized persons that engage in direct programming. This is relevant because this thesis is presenting unequal adaption, including the diversity of capacities and vulnerabilities among women. However, there is a real gap between the theory, as presented in this thesis, and the practice – namely officials who hold views that are anti-women and implement programmes as such. Two examples highlight this challenge.

1. A senior level official [NM010] from the Ghana Red Cross stated on the record as follows: '*Women's empowerment has now gone too far. Now you go to a village and see a man walk out of his house and his wife calling after him asking him where he is going. Why does she need to know where he is going*?' This quote implies he feels women do not have a right to ask what their spouses are doing or where they are going. In later discussions it became clear that he felt this was an infringement on the husband's command over the household and that his actions and decisions should be unquestioned and later stated it would be permissible for a husband to beat his wife if she disrespected him by asking him where he is going. This individual is responsible for the largest program of the Ghana Red Cross that provides support to women, entitled the Mother's Club.
2. The Director [GM012] of a government office responsible for public services in Lawra Town was openly critical of an adolescent girl with a developmental disability making a police report about a rape she experienced by her family member with multiple

witnesses. When he learned that I had supported the victim upon request, he was enraged. He said '*How can she ruin his life? She knows he has a wife and new baby. How can she* [the victim] *hurt the wife in this way*? *You think she is not troublesome because she is retarded, but then look at what she has done to her family*'. This line of thinking is victim blaming.

4.4 Discussion

The results of this study are a novel contribution to the body of research specific to socially differentiated impacts (Nyantakyi-Frimpong & Bezner-Kerr, 2015; Maberry et al., 2014; Amanor-boadu et al., 2013; Arora-Jonsson, 2011; Nielsen & Reenberg, 2010; Tschakert, 2007; Tsikata & Seini, 2004), as well as to the field of climate change adaptation more broadly. The primary contribution of this chapter lies in its specific consideration of the way in which response spaces have been shaped differently based on social differentiation, and in so doing it moves the literature beyond how environmental change and related stressors impact people differently. The differences in response spaces have the potential for a succession of consequences: those differing response spaces can in turn exacerbate existing inequalities and in some cases alter the micro social differentiations present within the case study, producing further inequalities. Finally, the chapter provides new insights on the ways that external interventions have or can contribute to unequal adaptation.

The discussion section is presented under two overarching themes. The first is the limitations of response spaces, which vary between and within households of the case study area. The second is adaptation and coping with simultaneous stressors. Both themes draw on figures presented within the conceptual framing - are presented with visual frameworks - Figure 9: Limits to response spaces and **Error! Reference source not found.**.

4.4.1 Limitations of response spaces

Building off of Figure 9 in the conceptual framing, the data presented in this chapter has demonstrated that response spaces for all households are limited by a number of factors: low levels of infrastructural development (especially for irrigation) to improve farm-based yields and incomes, no connection to the national electric grid and limited market opportunities for off-farm work. These are social leveling effects that impact all households in the case study area in similar ways, leading to little access to credit and irrigation technology, a susceptibility to crop and livestock pests and disease, limited access to markets in the wealthier southern regions of Ghana and so forth. However, response spaces are limited further in different ways between and within households.

As the data above has shown there are large differences in the responses people have access to among individuals living in close proximity and even under the same roof. The findings showed that women tend to have more limited response spaces as they have less control over farming decisions, farm based-income, and off-farm income. They also must take greater risks when engaging in the most common coping strategy (going south to work seasonally or semi-permanently) with less income-generating potential. This is due to the lower value of the labour that migrant women typically engage in while in southern Ghana (brewing, washing, farming, petty selling, lower-end mining roles) as compared to that of migrant men (construction, farming, higher end mining roles). Further, the main source of livelihood diversification accessible to individuals in the case study region without migrating are small enterprises, which are in turn highly gendered. Typical women's businesses (hairdressing, catering, tailoring, petty trade) in local villages and the neighbouring town Lawra have a low return on investment as compared to men's typical businesses (small ruminant trading, fishing, carpentry, construction).

The literature suggests that relying on social networks or relationships of reciprocity is a gendered pattern, with more individual women and women-headed households relying on these informal social protection mechanisms, and more individual men and men-headed households relying on formal institutions, such as bank loans (Quaye et al. 2016; Karlan et al. 2014; Osbahr et al. 2008). The data collected during this thesis is in agreement with this overall, although it finds that very few men are accessing formal financial services, and that informal networks of dependence are critical to individual men as well, especially following a personal tragedy or as they become elderly.

We have seen that women's acts of reciprocity to maintain social networks (provision of women's labour, child care, housework, preparation of food) may be undervalued and as such the actions they could expect in return are less than a man's acts of reciprocity of equal effort. Further, men may use the labour of the women in their family as reciprocity in exchange for something of their choosing, such as providing the labour of the women in one's family to maintain a good relationship with the chief, who will then consider him for future benefits. The relationships within networks thus form both 'bonded' ties of loans and labour exchange of family and friends of equal standing as well as 'bridging' ties to the chief or contact farmer of higher social standing.

The above trends are easily identifiable in the data between men's and women's response spaces. However, dividing the population by gender alone ignores important differences between individuals and between households. By taking an intersectional approach, additional points of social differentiation that are relevant emerge, including age, equality in marriage, existing networks, and proximity to the chief. This is relevant for the design of

programmes and policies that seek to support the most marginalized persons and for the consideration of more equitable adaptation options.

We have seen in the data that families in the case study area have diverse marital dynamics with some families sharing decision-making on how the household operates, while other families exemplify highly inequitable gender relations whereby women have little control over multiple aspects of their lives. These dynamics in turn have an effect on the sets of responses that households are able to access. Households that are adverse to the risks associated with sending women south to work are also foregoing any benefits the household might have accrued through their migratory labour. Households where women have a greater say in decisions may also be relying more on social networks of dependence to reduce household hunger, as women tended to be more open to asking for assistance when needed while men were more likely to report reservations about asking for support, not wanting others to know the family is struggling. This may be related to different food rationing patterns among men, women and children, which are elaborated in Chapter 5, whereby women and children experience greater hunger and dietary deficiencies than adult men within the household during lean periods.

Households that have more equitable gender relations may be taking fewer risks and reducing their overall income, for example by only selling excess produce once the next harvest has begun when the prices are low, thus ensuring their food supply does not run out before the next harvest. However, households with more equitable familial dynamics that create the conditions for women to engage in NGO projects and small enterprises may benefit from these small alternative sources of cash and in-kind income. As such, the way in which greater equality within the home among women and men affects response spaces is

multi-directional, with equality both limiting and enabling access to available responses. This is in contrast to the pattern observed by Carr (2008a) in central Ghana who documented a clearer trend. Carr documented women's land being capped as part of a male-dominated power structure, which in turn reduced overall household income and adaptability.

We have seen that women and men tend to engage with the formal services of MoFA differently, with men being more likely to have direct contact with an agricultural extension agent for support on farming. Importantly, it is through MoFA's extension agents that the bulk of NGO programming is administered; as such, this gendered pattern has greater significance than the pattern of whom is getting consistent farming advice and access to inputs. However, accessing MoFA programmes can be an important strategy for individual women who are particularly enterprising and who are part of a household that is permissive of women being engaged in formal programming, as MoFA typically requests representation of a small number of women in their programmes. Gaining one of the spots, or 'being considered', for a MoFA programme reserved for a woman generally occurs through nurturing relationships with MoFA agricultural extension agents, the chief, and the local MoFA contact farmer.

4.4.2 Adaptation and coping with simultaneous stressors

The data has shown that vulnerability created by stressors and underlying poverty is not experienced equally in the studied population because the population is socially differentiated, and as such their vulnerability to stressors varies. In response to stressors, the population in turn has access to differing response actions – as was covered in the previous section on limitations of response spaces. Building off of Figure 10 in the conceptual framing, the response actions one can take affect how successful an individual or

household will be at adapting to the stressor, which produces socially differentiated outcomes. Those differing outcomes in turn have a feedback loop, which either positively or negatively affect underlying vulnerability. The impact pathway outlined in the conceptual framing has been made clear through the data presented in this chapter. Specifically, micro and macro stressors are experienced by a socially differentiation population that has access to differing responses which produce differentiated outcomes and lead to positive and negative effects on vulnerability.

The data on stressors showed a clear pattern of individuals and households struggling when they are faced with both challenging seasonal conditions and an individual or household-level disturbance of some kind. These disturbances were of a wide variety, including injuries, family deaths, asset losses due to accidents, ill health, unexpected costs, and unanticipated reductions in household labour capacity. In all of the interviews, there was never a period of crop failure that was attributed entirely to poor seasonal agricultural conditions. The disturbances reported were typically unexpected, throwing off the plans in place for the agricultural season and then exacerbated by below average rains, a gap in the rainy season, or an unseasonably late start or early end to the rainy season. When combined, these simultaneous stressors, which stem from climatic and socio-economic vulnerabilities, can produce extreme hardship, which in turn requires households to rely heavily on social networks and utilise assets to reduce hunger during difficult periods. As such, households are not adapting or coping with specific shock events alone, although the shocks are related to specific rainfall conditions. Rather, individuals and households are adapting with varying levels of success to sets of interdependent micro and macro stressors of a wide variety, which together produce the conditions of chronic underlying vulnerability.

This chronic vulnerability is characterized primarily by (1) a production system reliant exclusively on rainfall with little to no irrigation capacity to buffer crops from rainfall variability and (2) challenging socio-economic conditions whereby the bulk of the population is living at subsistence-level where they can move into hunger periods with small changes in their economic circumstances. This second condition is characterized by all risk being uninsured (except informally through social networks); no government-provided social safety net with substantial coverage; and by accidents and injuries being common as people must engage in dangerous work, rely on dangerous road infrastructure, and are exposed to public health risk factors. For the case study population, both productive and social lives are characterized by inter-annual variability and instability.

The underlying sensitivity to micro stressors is consistently linked to the co-stressors of living in poverty more broadly, like unexpected deaths in the family, high levels of stress, lack of ability to charge a phone, or hunger. Each of these have been shown to negatively impact farm performance, whether as a result of restricted credit, temporary low labour or high cognitive load. This is commensurate with the literature explored further in chapter six on how stress impedes cognitive function and decision-making. The community members felt limited in their ability to take on the adaptive strategies discussed in the background literature by both aspects of social differentiation as well as by the limitations of poverty.

The bulk of adaptation programming in the region has focused on changing on-farm behaviors and providing farm inputs as well as promoting off-farm income-generating activities to diversify the income base and reduce the seasonal variability of overall household income. The data presented in this chapter shows that while improving farm yields and diversifying income sources are relevant to adaptation needs and are likely

important programmatic supports to households, they do not directly target one of the major underlying areas of vulnerability. There is a dearth of programmatic support to help individuals and households deal with the varieties of personal losses and stresses that have been outlined in the data as occurring in tandem with environmental stressors to produce crop failure. There are also no programmatic supports directly related to seasonal migration to make this strategy safer or more efficient, apart from a small number of community-based organizations advocating for the rights and safety of head porters in major cities.

The kinds of programmatic interventions likely to be helpful to reduce the impacts of personal losses and socio-economic variability fall under the category of social protection or adaptive social protection. Social protection systems such as crop insurance, life insurance, and other forms of social safety nets including cash transfers, are becoming increasingly common in sub-Saharan Africa. Widening access to these systems could be a viable strategy for reducing the underlying volatility that smallholders experience, which impedes their ability to make good decisions, save money and seeds, make timely investments, and so forth. The suitability of social protection mechanisms to achieve the outcome of reduced vulnerability and instability will be discussed in further detail in the concluding chapter of this thesis.

Lastly, as we have seen from the quotes of senior officials within district level government and the Ghana Red Cross, we cannot take for granted that individual staff members involved in climate adaptation and disaster management work are in favor of the emancipation of women. Prominent individuals tasked with implementing gender-sensitive programming may also believe that ‘women’s empowerment has gone too far’. This is an important consideration for the design of programming and policy and highlights a crucial gap

between policy and practice – specifically between the theory behind gender-sensitive programming and some of the individuals tasked with carrying out those programmes at community level.

4.5 Limitations of the study

This study has focused on the lived experience of persons living in a small case study area which is largely ethnically homogenous. As such, it has not explored ethnicity as a point of social differentiation, although there is clarity within the literature that ethnic group can be a strong predictor of poverty (Cooke et al., 2016). For example, the Fulani (semi-nomadic people in the region, but not in the case study area) experience high levels of deprivation in the region. However, as a result of the study design, I am not able to comment on the ways the Fulani's adaptive capacity and response spaces are shaped, or any other ethnic groups besides Dagao people in a majority-Dagao region.

This chapter has presented data that has a wide breadth, attempting to cover many aspects of life for the case study region. Many of the sections of the analysis, such as enterprises or migration, could have been fleshed out into additional chapters. However, boundaries needed to be drawn around what was the most relevant and could be covered within the space and time limitations of the thesis. The remaining empirical chapters focus more in depth on two specific subject areas that have been only briefly covered in this chapter – managing food scarcity and hunger in Chapter 5 and managing poverty-induced stress with negative coping strategies in Chapter 6.

4.6 Conclusion

In this chapter I have presented multiple examples of response spaces being limited because of natural, social, human, or financial capital, or a combination thereof, and in so doing have built off the literature of Osbahr et al. (2010) and Lipton et al. (1996) and others. In many

instances the deprivation of one of these assets is exacerbated by a co-stressor, and in each instance the response space is enabled or limited in some capacity by the intersection of the points of social differentiation held by the individual. For example, unexpected farm labour constraints may cause late planting, which if followed by a gap in the rainy season, produce crop failure.

Gender emerged as the most prominent point of social differentiation affecting response spaces. However, several additional themes emerged providing alternative characteristics of social differentiation that are context specific: People without health insurance, the elderly, male headed households (with absent or deceased wives), persons with disabilities and their families (covered in Chapter 6), young people contemplating their future, persons without children, households with no off-farm income generating activities, persons without access to remittances, and relationship with the chief and MoFA contact farmer. Generating sufficiently comprehensive data on each of these points of social differentiation was challenging and requires further research.

With the application of critical systems theory and systemic reflection, as outlined in Chapter 2: Literature and theory, we examine and re-examine taken-for-granted assumptions and what is and is not included within the system under analysis. What emerges is a food system on the margins, which is not robust to the multiple interdependent macro and micro-level stressors that the case study population experiences. For individuals and households with further limitations to the possible response actions they could take to protect their livelihoods – as a result of their gender, marital dynamics, social connectedness, access to assets, and so forth – the food system they have access to is marginal to a greater degree. Differing vulnerability combined with differing response

spaces produces unequal adaptation in the case study area, which are of both moral and programmatic significance, and will be discussed further in the concluding chapter.

This thesis seeks to understand how adaptation, and response spaces more broadly, differ between and within households. This involves attempting to understand the differences in productivity, wealth, and familial dynamics of households. It also seeks to explore differences beyond the front door to understand the limitations that are experienced differently between spouses. In later chapters of this thesis, this analysis will also include the limitations experienced by children, young adults, and persons with disabilities.

This chapter has significant policy relevance. There is increasing interest by development and humanitarian donors, such as the UK's Department for International Development (DFID), to help farming families 'step out' of farming (Wiggins & Keats, 2015). This chapter has documented multiple vulnerabilities associated with off-farm work, disproportionately for women, including dangerous working conditions whilst migrated, less decision-making power within the household for non-farming productive tasks, and low returns on women-specific enterprises. These differing disadvantages must be fully considered within policies and programs that aim to support the transition of farmers with low productivity into non-farm work. It has also highlighted the case study population's vulnerability to personal losses and shocks, which a transition from farming without a formalized social safety net could exacerbate. This chapter has also documented a reliance on intervention models that have a poor evidence base, such as farmer field schools and the contact farmer model. This also includes senior-level development and humanitarian practitioners that have a poor understanding of weather events, and the overestimation of the potential of climate-smart

agricultural practices, such as improved seeds, which may negatively affect programmatic results.

In the next two chapters, a subset of coping strategies will be presented in-depth. This includes the use of food rationing, foraging, and the 'hunger period' before the harvesting season, which will be discussed in Chapter 5. Then, the use of alcohol as an emotional and physical coping strategy to stress, hunger, and unclean water will be discussed in-depth in Chapter 6. Both chapters build off the case study introduction in Chapter 1 and the adaptation and coping strategies covered in this chapter. The upcoming chapters will provide insight into which local drivers limit or exacerbate differences in adaptive capacity and response spaces, and the implications of socially differentiated adaptive capacity and response spaces for humanitarian, development, and government programs.

5 Nutrition and food scarcity

Nutrition in the context of food scarcity emerged as a priority research area during the first wave of the data collection for this thesis because of the observable high rates of oedema of the abdomen among children and frequent reference to the 'lean season' when adults and children become thin, weak or tired leading up to harvesting season. Although the nutrient intake, feeding practices and health requirements for healthy cognitive and physical development of children and minimum dietary needs of adults are well understood from a clinical perspective (Hoddinott & Horton, 2015; Horton, 2008; World Health Organization, 2008; Smith & Haddad, 2000), the socio- cultural norms and power structures that govern who eats what in the household and the ways in which food scarcity pushes families to make difficult rationing and distribution decisions is not well understood. Broad inequalities that disadvantage women's health during times of food scarcity have been documented globally (Gottlieb et al., 2009; Hyder et al., 2005), but the causes of these observed poor health outcomes are context specific and are therefore insufficiently clear (Malapit & Quisumbing, 2014; Colecraft et al., 2006).

Designing appropriate supports for the case study region to increase food security and improve their ability to live well in a changing climate will require first ascertaining if a specific population is not attaining sufficient dietary diversity and/or minimum acceptable diets; secondly identifying which components of the food system are not functioning sufficiently; and thirdly, discerning how and through what patterns food scarcity affects individuals differently. As such, this chapter focuses on the acquisition of food to the household, documents scarcity and outlines how scarce food is managed and distributed between household members. It adds further evidence to the need to consider a food

system in it's entirely rather than focusing on production alone (Ingram et al. 2010; Ericksen et al. 2009). The chapter highlights inequality behind the front door and the mix of limiting factors that impede all persons within the household from attaining food security. It is an in-depth examination of nutrition amidst food scarcity and its implications for adaptive capacity, now and for future generations.

The chapter begins by highlighting the complexity of improving nutrition through the case study of Valentina and Matthew.[1] Then, background literature specific to nutrition, including health impacts of malnutrition, global and Ghanaian rates of malnutrition and the relationship between nutrition and empowerment, is presented. This is followed by an analysis of data on nutrition from observation, interviews, focus groups, the WEAI survey, and child growth charts; it follows the issues of nutrition from production to acquisition to consumption of food, with an emphasis on differentiation in consumption within the household. Finally, conclusions and further implications for adaptive capacity are discussed.

5.1 Introduction

A case study of Valentina, Matthew and their family

This chapter opens with a case study from the fieldwork to introduce the topic of nutrition and food scarcity in the field site. By examining the case study, one feels viscerally many of the factors at play on a micro-scale for this one family, which are then replicated to create macro social inequalities and implications for adaptive capacity. This case study will be referenced throughout the chapter, including definitions of the terminology used and discussions of the literature, and analysis of the data.

[1] All names changed.

Valentina [FF3012] and Matthew's [FM3012] four young children appear younger than their years, and the most recently weaned child, Thomas, has a distended abdomen. Although this is a symptom of protein deficiency, the young boy's belly is viewed as a sign of greediness in comparison to his siblings, as children typically eat from a large shared bowl. His irritability – a characteristic frowned upon, which sometimes results in the withholding of food - may also be a symptom of his nutritional deficiencies. Although Valentina and Matthew's children rarely go to bed hungry, their meals usually consist of a large serving of starch (cassava, yam or sorghum), dipped in a small portion of palm oil based stew, including a few grams of pounded fish, to add flavour.

Valentina's home-cooked meals typically do not include meat, eggs or vegetables and are therefore lacking in a spectrum of nutrients. If she has time to collect wild plants, she uses them to supplement her stews. Knowledge of nutrient content in food is low in the largely illiterate adult population. In the weekly market, she and her husband Matthew sell the eggs their chickens lay and any vegetables they harvest. In a typical week her hens will produce between 12 and 20 eggs. When her children were asked if they liked eating eggs, only one child could remember having tried an egg. Valentina explained, '*You get a good price for eggs. We sell the eggs and buy tinned tomatoes, maize, cassava, many things. How can you eat this?* [holding up an egg from her basket destined for the market] *You can't. You would rather buy more maize* [gesturing that the maize has greater bulk than the egg] *from the market and make TZ* [Tuo Zaafi: pounded maize eaten with stew].'

Valentina and her children rarely consume animal source foods (ASFs). This may be because her husband and other male relatives typically consume meat outside the home, in social groups of men their age. Matthew explained, '*If you have money, you can buy meat to bring*

home from the market. If you have only 200-300 cedes, then where will it go if you bring it home? You will hardly taste it. You can't do that. You would rather eat it there.' When asked if he thinks that children should eat meat and fish, he replied, '*If you have money, then yes. They will enjoy. They love it. But as mine are small boys and small girls* [young], *they do fine. Their job is playing. You don't need so much strength for playing. They are satisfied without*.'

Valentina wishes she could provide a more varied diet for her children – most notably meat. She is prevented from improving her children's diet because of poverty, and cultural norms surrounding food distribution within the home that disadvantage women and children. Her decisions might also be different if she had greater knowledge of children's dietary needs for healthy development. Valentina and Matthew make difficult choices each day about food use and food expenses that to the best of their knowledge make the most out of limited resources. Their children are likely a part of the estimated 38.1% of rural children in the Upper West of Ghana that have stunted growth or the estimated 10.8% who are categorized as wasting (Amanor-Boadu, 2014). The case study shows the complexity of nutrition and food scarcity in Ghana's Upper West. It also demonstrates how looking through a social differentiation lens highlights the ways that social differences (e.g. gender, age, wealth) cause differences in nutrition which in turn cause social differences in terms of health, educational attainment, well-being outcomes, and adaptive capacity.

5.2 Background

This section provides a background to nutrition challenges. A broader background on food systems, social differentiation, and adaptive capacity is provided in Chapter 2. As discussed in Chapter 2, the literature that links food security and adaptive capacity is scant both in how it considers nutrition and also focuses on the production of food, rather than other food system activities such as the consumption of food (Ericksen et al., 2009). No discussion

on nutrition can begin without understanding terminology; thus, this section opens up with the relevant nutrition definitions. The subsequent sections cover why the topic is important: the implications of malnutrition – including for adaptive capacity, the rates of malnutrition globally and the rates of malnutrition in Ghana. Finally, the chapter presents nutrition related literature on social differentiation, including empowerment and politicized bodies. The background serves as a grounding to focus on nutrition and food scarcity through a social differentiation and adaptive capacity viewpoint. Specifically, the analysis will cover the consumption of food through its acquisition and distribution, which appear prominently to affect nutrition and food security outcomes in Ghana's Upper West.

5.2.1 Definitions

The case study also illustrates the necessity of understanding the dimensions of nutrition. This section introduces basic definitions of nutrition terms, which serve as a basis for discussion of the dimensions of nutrition and social differentiation (Malapit & Quisumbing, 2014; Unicef, 2013a; World Health Organization, 2010; World Health Organization, 2008; Kennedy et al., 2002). The definitions are split into those that apply to all ages, to children, and to adults.

All ages:

Malnutrition is an abnormal physiological condition caused by deficiencies, excesses or imbalances in energy, protein and/or other nutrients.

Under nutrition is when the body contains lower than normal amounts of one or more nutrients, i.e. deficiencies in macro-nutrients (food) and/or micro-nutrients. Under nutrition encompasses stunting, wasting and deficiencies of essential vitamins and minerals, especially iodine and iron (collectively referred to as micronutrients).

Stunting refers to short stature (or low height for age) and is an indicator of long-term nutritional status.

Wasting refers to acute loss (or low weight for height) and is an indicator of short-term nutritional status.

Hunger is often used to refer in general terms to Millennium Development Goal 1 (to eradicate extreme poverty and hunger) and food security. Acute hunger occurs when lack of food is temporary, and is often caused when shocks such as drought or war affect vulnerable populations. Chronic hunger is a constant or recurrent lack of food and results in underweight and stunted children, and high infant mortality. 'Hidden hunger' is a lack of essential micronutrients in diets (Kennedy et al., 2002).

For children:

Dietary diversity score for children is the number of food groups consumed in the last 24 hours out of seven food groups which include (1) grains, roots, and tubers; (2) legumes and nuts; (3) dairy products; (4) flesh foods; (5) eggs; (6) vitamin-A-rich fruits and vegetables; and (7) other fruits and vegetables (World Health Organization, 2010)

Ages 0-6months:

Exclusive breast-feeding is a child's diet, which consists exclusively of breast milk with no other liquids or foods consumed. This term is typically used in reference to diets of children up to six months of age (World Health Organization, 2010)

Ages 6-23 months:

Minimum diet diversity is consuming at least four food groups out of the seven food groups if not breast-fed and out of six food groups (excluding dairy products) if breast-fed, in the

last 24 hours. This score is also typically used to rank the diets of children aged six to 23 months (World Health Organization, 2010).

Minimum acceptable diet is having achieved the minimum diet diversity and minimum meal frequency for solid, semisolid, and soft foods in the last 24 hours. Minimum meal frequency is defined as consuming at least two feedings for breast-fed children aged 6–8 months, at least three feedings for breast-fed children aged 9–23 months, and at least four feedings for non-breast-fed children aged 6–23 months, of which at least two feedings must be milk feeds (World Health Organization, 2008)

For adults of reproductive age:

Dietary diversity score is the number of food groups consumed in 24 hours out of nine food groups: (1) starchy staples like roots and tubers, (2) green leafy vegetables, (3) other vitamin-A-rich fruits and vegetables, (4) other fruits and vegetables, (5) organ meat, (6) meat and fish, (7) eggs, (8) legumes and nuts, and (9) milk and milk products (Kennedy et al., 2010).

Body Mass Index (BMI) is the ratio of weight (in kilograms) to the square of height (in meters). A woman is considered underweight or thin if her BMI is less than 18.50 kg/m^2 (WHO, 1995).

These definitions provide technical terms for the nutrition issues families like Valentina and Matthew's experience in the Upper West. They provide a global vocabulary to discuss nutrition in this chapter, but they do not provide the richness of context from the research, or a discussion of the implications of nutrition in the context.

5.3 Implications of undernutrition

'It is difficult to think of a greater injustice than robbing a child, in the womb and in infancy, of the ability to fully develop his or her talents throughout life.' –Anthony Lake, UNICEF Executive Director

Literature on the link between nutrition and healthy physical and cognitive development, particularly within the first 1000 days of life from the beginning of a woman's pregnancy to the child's second birthday, is strong and conclusive (Hoddinott & Horton, 2015; Unicef, 2013b). Childhood nutrition plays a central role in community resilience because of its impact on a wide spectrum of life outcomes, which affect adaptive capacity to environmental change. In particular, maternal under-nutrition and child under-nutrition prior to age three has effects on mental, cognitive, and motor development that can persist into adulthood (Walker et al., 2007) and that may reduce future earning potential and limit education attainment (Hoddinott & Horton, 2015; GPDD & The World Bank, 2009; Glewwe et al., 2001). Child stunting, in particular, has been consistently correlated with mental development (Grantham-McGregor, 2002; Grantham-McGregor et al., 1996). Increasing evidence suggests that acutely malnourished children experience higher levels of chronic illness and disability as adults and are less physically and intellectually productive (Smith & Haddad, 2000).

Undernourished girls are more likely to give birth to underweight babies when they become childbearing age. This has been described at the intergenerational cycle of poor nutrition and poverty (Anon, 2008). Parental stress has been correlated with reduced infant cognitive stimulation and increased consumption of alcohol during pregnancy (Hackman & Meaney, 2011; Baker-Henningham & Lopez Boo, 2010). The latter is discussed further in Chapter 6.

5.3.1 Rates of malnutrition globally

The World Health Organization Growth Standards, from which the data of this research project is compared, is based on length/height, weight and age, developed from cohorts of healthy breastfed children from around the world, including a cohort from Ghana (WHO, 2006). This seminal reference study proved that with absence of risk factors, birthweight and growth trajectories of children are the same the world over, allowing global comparisons on malnutrition to be made, despite ethnic difference in children. Different growth trajectories for male and female children are used to account for slight observed differences in birthweight and growth by sex worldwide.

Every country in the world is affected by one or more of the three major nutrition-related epidemics – stunting, obesity and anaemia (IFPRI ,2014). Traditionally, obesity has been an exclusive problem of industrialized states, but the landscape of the burden of malnutrition is changing. Increasingly, low and middle income countries are experiencing the double-burden of malnutrition with children becoming both stunted and overweight (Unicef, 2013a). 12% of the global population are undernourished and not meeting their daily energy requirements, totalling 482 million people, while 500 million people are obese (Graziano-da-Silva, 2014) A 'stuffed and starved' dichotomy of malnutrition is emerging at a global scale (Patel, 2013).

The UN Food and Agriculture Organization (FAO) has attributed nearly half of the six million deaths of children under five annually to malnutrition (Graziano-da-Silva, 2014). A quarter of all children in the world under the age of five are stunted, including 40% of all children under five in Sub-Saharan Africa. Globally, boys and girls are equally likely to be stunted, except in Sub-Saharan Africa where boys are more likely to be stunted (42% of boys and

36% of girls). Rates of stunting are higher in rural areas than urban areas consistently in both African and Asian countries (Unicef, 2013b; Unicef ,2013a).

Global rates of protein-energy malnutrition, characterized by distended bellies (oedema of the abdomen) are not known, most notably because of the frequency of the condition in its extreme form within data-poor humanitarian crises settings. The globally accepted non-medical term for this severe condition is Kwashiorkor, which actually originates from Ghana. It is the traditional word used in the Ga language to describe the belly that develops when a child is weaned when a new baby is on the way. This time (when the child is weaned – typically between 1 and 2 years old) is the most vulnerable time of the child's life to mental and physical stunting.

Attacking malnutrition in all its forms is a top priority with the post-2015 Sustainable Development Goals (SDGs). Interventions to reduce child stunting in particular have been considered to have the most favourable cost-benefit ratio within the development sector, according to the Copenhagen Consensus (Hoddinott & Horton, 2015). Yet, few climate adaptation interventions for small-holder farmers are sufficiently nutrition-sensitive to mitigate the avoidable long-term detrimental effects of poor nutrition. According to UNICEF, the three major determinants of nutrient intake of children are care, household food security and a healthy environment (UNICEF, 1990). All three of these determining factors are important for fostering adaptive capacity.

5.3.2 Rates of malnutrition in Ghana

Malnutrition, particularly among women and children is pervasive in Ghana, but varies substantially by region. One cannot understand Ghanaian malnutrition without specific consideration of the regionally differences that dominate the country's socio economic

demographics – most notably the north-south divide in Ghana described in Chapter 1 (Jatoe et al., 2012; Shepherd et al., 2006). In response to the discrepancies between northern and southern regions, the Savannah Accelerator Development Authority (SADA) has been tasked to address regional inequalities. SADA's programmatic area is the three northern regions as well as a small, impoverished coastal region called Brong Ahafo. SADA has been the major agency through which climate adaptation interventions are implemented in Ghana. Data on malnutrition has been specifically collected in the SADA regions to better understand the regional discrepancies in under nutrition.

Comparing the most recent (2011) Multiple Indicator Cluster Survey results on malnutrition nationally with the SADA Population Based Survey of Northern Ghana 2012 baseline (Maberry et al., 2014; Amanor-boadu et al., 2013) is a helpful starting point. Such an analysis was completed by Malapit and Quisumbing (2015), comparing the prevalence of undernutrition of children under five years of age in the SADA programmatic regions to the country-at-large. Higher poverty rates in all dimensions were reported. Table 10 below (Percent of children stunted, wasting and underweight in Ghana in the SADA regions) summarizes under nutrition-related results for Ghanaian children (Maberry et al., 2014; Malapit & Quisumbing, 2014; Zereyesus, 2014; Ghana Statistical Service (GSS), 2011).

Table 10: Percent of children stunted, wasting and underweight in Ghana and the SADA regions

Percent of children	Stunting	Wasting	Underweight
Nationally	23%	6%	13%
SADA regions	41%	11%	20%

Source: table produce by author with data from the Multiple Indicator Cluster Survey

A strikingly low percentage (15.5%) of children within the SADA region are receiving a minimum acceptable diet (Maberry et al., 2014; Zereyesus, 2014) - consuming at least two

feedings for breast-fed children aged 6–8 months, at least three feedings for breast-fed children aged 9–23 months, and at least four feedings for non-breast-fed children aged 6–23 months, of which at least two feedings must be milk feeds (World Health Organization, 2008). No statistically significant differences in stunting, wasting or underweight were found between boys and girls in Ghana in their study, despite a regional trend in sub Saharan Africa of boys having higher rates of undernutrition than girls.

Concerning women's anthropometry, 11.8% of adult women of reproductive age in the SADA region are underweight with the Upper West region having slightly higher rates of underweight adult women of reproductive age – 13.2%. Only 17.4% of women of reproductive age within the SADA regions have high dietary diversity, consuming more than five food groups. Women's dietary diversity reduces as household size increases. More educated women have higher dietary diversity. Women in single headed households are less likely to exclusively breastfeed their children (Maberry et al., 2014), perhaps as a result of competing demands for time (Davis et al., 2003). There is a paucity of data on men's anthropometry, as they are not considered a target group for tackling under nutrition by government and development partner organisations. At household level, over half of all households (57.5 %) in the Upper West region reported food scarcity categorized as moderate to severe hunger during the SADA survey period. This is above the SADA region average of 39.4% of households experiencing moderate to severe hunger.

5.3.3 Relationship between nutrition, empowerment, and politicized bodies

This section draws heavily on the theory reviewed in Chapter 2 on empowerment and politicized bodies, which linked empowerment to improved health outcomes and identified empowerment as a viable public health strategy to improve the health outcomes of marginalised persons in particular (Brandstetter et al., 2015; Harcourt, 2012; Wallerstein,

2006; World Health Organization, 1986). Body politics in particular is a relevant lens through which to look at the data presented in this chapter most notably because the categorization of some bodies as productive and other bodies as not, or less so, impacts food access and nutrition status. Further, as food production and food distribution both nourishes (calories in through consumption) and depletes the body (calories out through farm labour and food preparation), specific consideration of how cultural norms affect women's, men's, girls' and boys' bodies differently is critical (Harcourt, 2009).

The relationship between empowerment and the nutritional status of women and children is explored by Malapit and Quisumbing (2015) from the International Food Policy Research Institute (IFPRI) using the WEAI. Nutrition related indicators used were children's height for age (HAZ), weight for height (WHZ) and weight for age z scores (WAZ), as well as exclusive breastfeeding, dietary diversity scores of women and children, minimum dietary diversity and minimum acceptable diet, and women's body mass index. Their results did not expose an easily digestible message about empowered women having more nourished children. Rather, they found that different dimensions of empowerment affected nutritional status in different ways, including some differing impacts on boys and girls. The work highlights the complex and culturally specific limitations to good feeding practise.

The following points from their 2015 paper highlight this complexity. Firstly, the paper found that 'None of the empowerment measures are significant for boys, whereas a strong association between women's empowerment and IYCF [Infant and Young Child Feeding] practices is found for girls' (Malapit & Quisumbing, 2015, p. 60). There were often specific correlations, however, between empowerment dimensions and feeding practice for girls. For example, for breastfeeding, the only significant positive correlation related to

production decisions (and not overall empowerment, credit decisions, or gender parity). In households where the female-decision maker was more involved in production decisions, girls were 9% more likely to be exclusively breast-fed. On the other hand, in households where the female was more empowered, girls were less likely to consume diverse diets. This study highlights the complexity between women's empowerment and nutrition status in the household and the need for further research. A partial explanation for intuitive results may be found by examining the relationship between knowledge and action in regards to nutrition.

In their evaluation of the UNICEF-funded Communications for Development (C4D) program in northern Ghana, Innovations for Poverty Action (IPA) conducted a study that included questions on exclusive breastfeeding and giving birth in health clinics or hospitals. They found that although knowledge levels were high on target health behaviours, there were many barriers that prevented respondents from acting on their knowledge. Specifically, they found that although three quarters of respondents were aware of the benefits of exclusive breastfeeding, but one third of those respondents' children (< six months old) had been given water in the previous 24 hours, raising their risk of diarrheal disease. In focus groups, respondents answered that their children had been given water by older family members with more traditional views on infant and child feeding practises.

Further, while 92% of respondents indicated they believed giving birth in a health facility was better than giving birth at home, nearly half of respondents delivered at home. Respondents reported that they often require permission to leave the home, including going to the hospital, by in-laws and their husbands, among other delays and transport barriers that prevented from birthing in health facilities (Indravudh, 2014) .

The iterative framing cycle for systemic reflection on empowerment outlined in Chapter 2 is helpful to understand these dynamics and much of the data presented within the results section of this chapter: *Empowerment of who? To do what? Over what barriers? From whose perspective? According to what values? To what end? And over what time frame?* Rather than viewing empowerment as a binary (empowered or not empowered) or a spectrum (disempowered in all dimensions on one end and empowered in all dimensions on the other end), this chapter visualizes empowerment as a spider web or fuzzy map, with strong and weak lines of the web or map that differs for each person based on the intersection of micro and macro differentiations and the societal powers that regulate them. For example, it is plausible, and commensurate with the literature, that a Ghanaian women may be empowered to take out a loan to have her own small business, enjoy leisure time, and attend a parenting class, but be unable to speak up when her mother-in-law feeds porridge with untreated water to her new-born child.

5.4 Contributions of the current study

This chapter draws on qualitative primary data from Ghana's Upper West Region to catalogue a) patterns of under nutrition, b) food acquisition to the household, c) distribution of food within the household, d) limitations to healthy child feeding practises, and d) implications of these outcomes for adaptive capacity in Ghana. The ability to triangulate multiple varieties of data to begin to unpick the complexities of household under nutrition in the case study region is the study's main strength. These methods have been covered in detail in Chapter 3.

This chapter builds off the work of the Oxford Poverty and Human Development Initiative (OPHI) who developed the WEAI and Hazel Malapit et al 2015 in particular who has used the tool extensively in multiple case studies, including in Ghana. One novel addition to the WEAI

used within this study is the addition of longitudinal child growth data. Other studies have included child anthropometric data in tandem with livelihood surveys, including the WEAI, but child anthropometric data has been collected for only one point in time within these studies (Malapit & Quisumbing, 2014; Bhagowalia et al., 2012). In this thesis project, photos were taken of hand written measurements recorded in the antenatal books of all children with Tabier Village and Orbili Village. This provides a record of monthly weight from birth to five years of age, which captures the time period children are most at risk of stunting, as well as seasonal variation within their individual growth trajectories. The chapter adds additional insights into the patterns of nutrition and dimension-specific empowerment identified within their Ghanaian study.

5.5 Results

5.5.1 Food scarcity

5.5.1.1 Data from livelihoods survey:

The standard WEAI includes a module on food consumption. Additional questions on hunger were added for this thesis project. These questions elicit self-reported accounts of hunger within the household. These responses could be biased in either direction (over reported to elicit support or under reported to avoid shame). Training with the enumerator was completed to get the most reflective answers possible, but biases may still be present and therefore the survey data should be triangulated with observation data and interviews.

The following rates of self-reported hunger from the livelihoods survey show very high rates of hunger within both communities. 40% of households (n=36) reported that in the past year there was a time when there was no food to eat of any kind because of lack of resources to get food, and 60% of households (n=54) reported that this had not been the

case. Of those households reporting no food to eat[2], 73% (n=27) reported this happened rarely (1-5 times a month), 22% (n=8) reported this happened sometimes (5-15 times in a month), and 5% (n=2) reported that this happened often (>15 times in a month). Similarly, 35% of households (n=31) reported that a household member went to sleep hungry at night in the past year because there was not enough food, and 27% (n=24) of households reported that a household member went a whole day and night without eating anything at all because there was not enough food. Although these issues with consumption and hunger are reported for a minority of households, the prevalence of the respondents who indicated 'yes' to these is very high, and the responses were triangulated with interviews and observation.

The rates of household food insecurity differed drastically between the two villages, as also discussed below from interviews and data. Specifically, when examining the first food insecurity/consumption question on whether there was a time in the last year when there was no food to eat of any kind because of lack of resources to get food, a majority of households in Tabier village reported that this had been the case verses a minority in Orbili Village.

Table 11: Households reporting hunger in Tabier Village and Orbili Village

In the past year, was there ever no food to eat of any kind in your house because of lack of resources to get food?			
	Tabier village	**Orbili village**	**Total**
Yes	28	8	36
No	23	31	54
Total	51	39	90

Source: author's household survey data

[2] n=37 households

Figure 23 shows self-reported food consumption in the 7 days prior to interview for 90 households in Tabier and Orbili Villages. This figure is limited because we only have data for consumption at household level and not who is eating what foods. This module of the WEAI would have disproportionately been answered by male household heads. Both dog meat and wild greens (called wild vegetables locally) are both consumed but were not included in the survey as their consumption was not known to myself until later in the research project. It is likely that these were intentionally not included in the initial exploratory research phase because westerners are known to dislike the idea of consuming dog meat and in the past, community members have been discouraged from supplementing with wild greens by government authorities as a result of sanitation concerns. Dairy is not part of the Upper West diet and was not included in the survey for this reason.

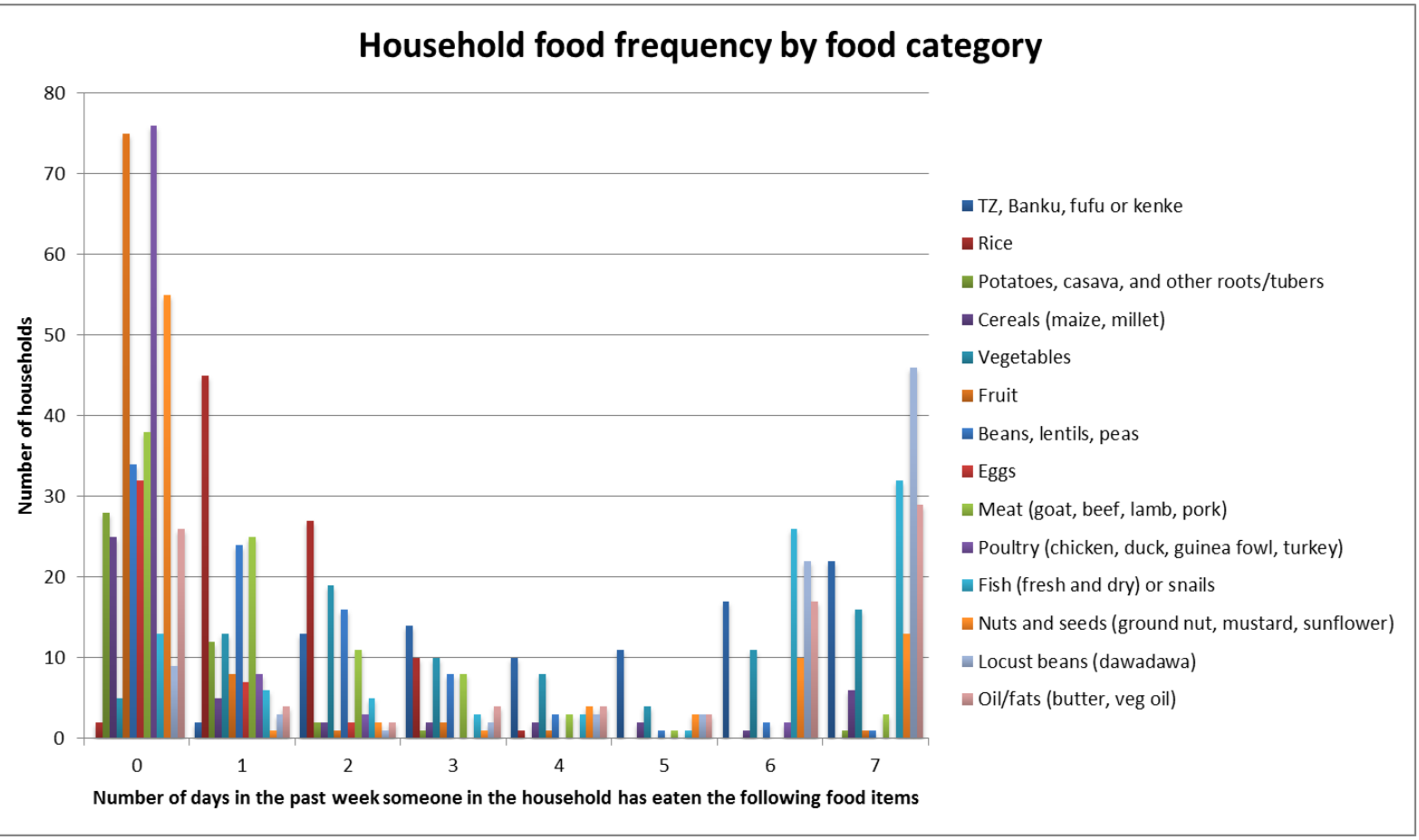

Figure 23: Household food frequency in last 7 days for Tabier and Orbili Villages
Source: author's household survey data

From the figure, we can see very low levels of fruit, vegetable, beans (other than locust beans), cereals, egg, poultry and meat consumption. The local pounded starches (TZ, banku, fufu or kenke) feature prominently for varied numbers of days in a week. Smaller numbers report consuming legumes (beans, lentils or peas) at varied numbers of days in a week. The majority of households (72%) consumed rice 1 or 2 times in the past week.

64% of households reported consuming fish or snails six or seven times in past week. These are most likely dried kitiboys, which are small fish that are pounded and added to stews. 68% of households consumed locust beans ('dawadawa') six or seven times in the week. Locust beans are a traditional seasoning added to stews similarly to a stock cube. Locust beans are known locally to prevent a number of ailments including hypertension however

these medicinal properties have yet to be established in peer-reviewed publications (Nyarku & Adams, n.d.) They have high levels of protein when eaten in sufficient quantities. Both kitiboy fish and locust beans are likely only eaten in small quantities, as they are highly flavourful and used predominantly for seasoning. Nearly half of all households reported using cooking oils or fats six or seven times in the week. This figure broadly indicates that households are not regularly consuming minimum acceptable diets and have low dietary diversity.

5.5.1.2 Data from interviews

Food scarcity, especially during the lean season or in times of emergencies, emerged as a dominant theme within interviews. The following quotes from illustrate the local context.

From Tabier Village resident [FF3022]:

> '*Hunger is my biggest problem. My small children will be screaming if they are hungry and it will be paining my head. It will make you* [referring to herself] *feel so bad*. *You will be wishing you went South for the season* [refers to seasonal migration for work]*. Even though you may be working in bad conditions, you will have something in your stomach*.'

From Orbili Village resident [FM205]:

> '*When you have nothing you will be forced to beg your neighbours to give you small-small. You'll have to ask them to consider you. The bad part of it is you don't know what they will tell others when you ask. They could be back-biting you – telling everyone you have nothing for your family to eat*.'

From MoFA staff [GM001]:

> '*During that time* [the lean season] *I won't even go for a meeting. They won't be concentrating. The ones that have not prepared for the lean season, they will be just thinking thinking, what am I going to eat? And not minding you or what you are saying*.'

The final quote illustrates a limitation to planning in particular as a result of the high cognitive load of poverty and hunger.

5.5.1.3 Data from health records

Figure 24: Anaemia cases at Lawra District Hospital by month and Figure 25: Malnutrition cases at Lawra District Hospital by month are based on Table 12: Hospital admissions data from Lawra Hospital. Digitized records are only available beginning in 2010, however the first two years of digitization only included the primary presented health concern, according to the hospital statistician who was stationed in the hospital in 2012. If persons were hospitalized, they would be categorized as having one presenting health concern on the digitized system, such as malaria, while being treated for a number of conditions such as malaria, anaemia, and eye infection, for example. This issue was fixed for the 2012 records with the placement of a statistician within the district hospital full time. The difference is observable in the charts. Data was collected from the statistician directly in 2013. During the final field visit the following year, I attempted to get 2013 records but found that the statistician had been re-posted to a new district hospital and not replaced. As such only a small number of years can be analysed.

The district hospital statistician produced the graphs below in 2013 following a request. The numbers represent hospital admissions so for both the data on anaemia and malnutrition, the condition would have had to be severe or acute. Non-acute conditions would have been treated as an outpatient and not captured within this data set. On the graph there is a visible relationship by season with the admissions for anaemia, with the admissions rising during the lean season (August to November) and lowering again beginning at the typical harvesting period. The seasonal pattern is clearest in 2012 when full rates of anaemia treatments were captured within the data. The data on malnutrition has less of an observable seasonal trend, perhaps because the sample size is very small. Data is not collected on where these patients are coming from so they could be coming from anywhere

within the hospital's catchment zone, which includes Lawra Town, the case study villages and all villages from the surrounding 25 districts, as well as persons living across the border in Burkina Faso (where health facilities are less available) with access to Ghanaian identity cards. Food scarcity is characterized by above average rates of anaemia in places like Upper West Ghana where scarcity is typically coped with by rationing and substituting a varied diet for a predominantly a starch-based diet (Maxwell et al., 1999).

Table 12: Hospital admissions data from Lawra Hospital

LAWRA DIST HOSPITAL MALNUTRITON DATA REQUEST MEGHAN BAILEY (Univ. of Oxford) **Number of Cases**						
	Malnutrition			**Anaemia**		
month	**y 2010**	**y 2011**	**y 2012**	**y 2010**	**y 2011**	**y 2012**
JAN	2	2	0	4	23	27
FEB	0	0	0	19	8	38
MAR	0	0	0	4	7	24
APR	0	3	0	6	16	16
MAY	2	6	0	9	15	13
JUN	0	2	0	8	15	72
JUL	0	1	1	16	27	62
AUG	2	2	1	22	34	82
SEP	0	0	1	15	31	109
OCT	2	0	0	2	34	107
NOV	0	1	2	10	34	114
DEC	0	4	3	18	30	60
TOTAL	**8**	**21**	**8**	**133**	**274**	**724**

Source: Lawra Hospital Statistical Office

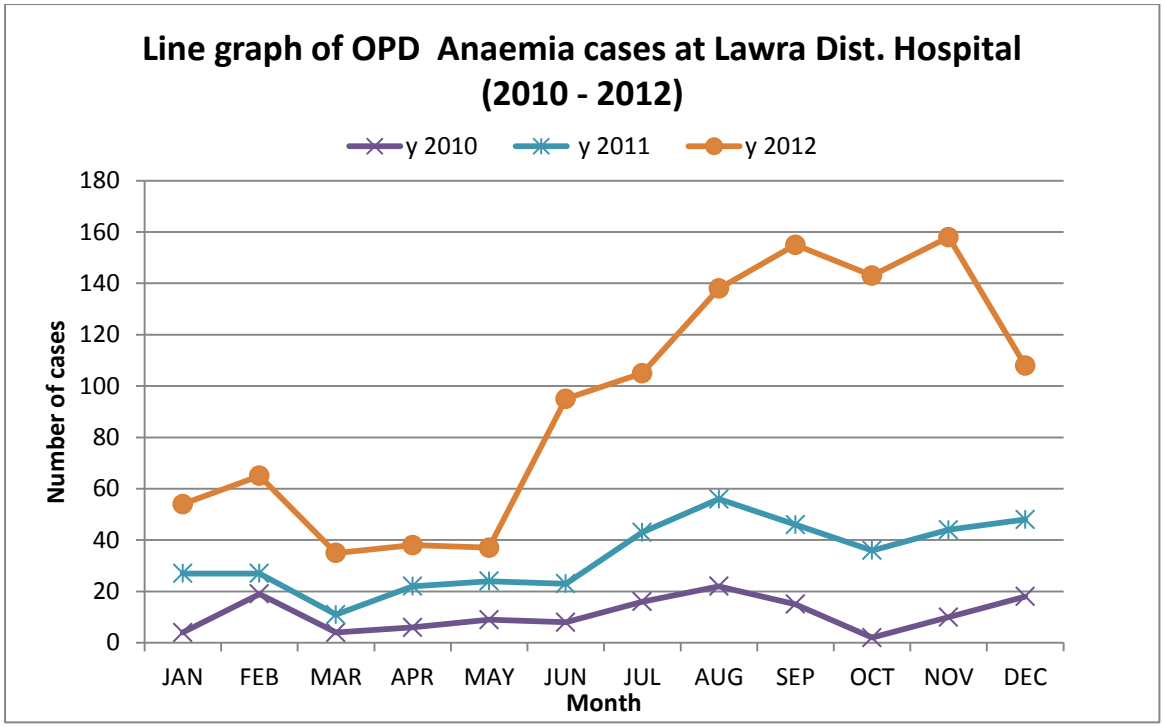

Figure 24: Anaemia cases at Lawra District Hospital by month
Source: Lawra Hospital Statistical Office

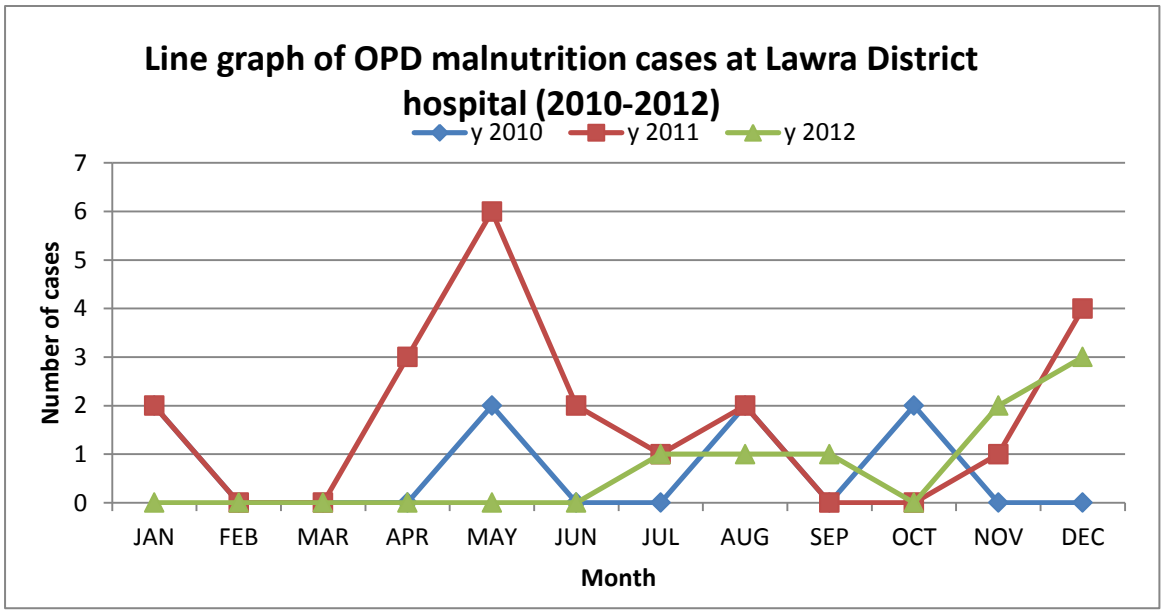

Figure 25: Malnutrition cases at Lawra District Hospital by month
Source: Lawra Hospital Statistical Office

5.5.2 Nutrition status and development of children

5.5.2.1 Data from growth charts

Malnutrition can also be seen from child growth charts. The following figures represent the weight for age growth trajectories of all children in Orbili and Tabier village for whom

growth charts were available, totalling 192 children from birth to five years of age. A practitioner from the Ghana Health Service (GHS) visits rural communities and weighs children monthly. Their weights are recorded within an antenatal book, which is kept with families. The book is meant to be a health record, which is brought to each health appointment. The data is not stored centrally or digitized by GHS. I visited each household one-by-one to gain permission to use the data contained within the health charts. The data set was digitized by taking photos of each of the 192 charts and copying the hand written numbers of each weighing onto an excel sheet.

In the following figures, growth (weight for age) is presented (data collected specifically for this thesis project) compared to WHO trajectories of desirable growth (expected growth with risk factors absent). WHO desired growth trajectories equals zero in Figure 26 and Figure 27. Generalized estimation equations (GEE) have been used to account for non-independence of the observations with an exchangeable correlation matrix. All numbers have been sex-adjusted to account for the slight natural variation between male and female infants (girls being slightly lighter at birth and through early stages of infant development).

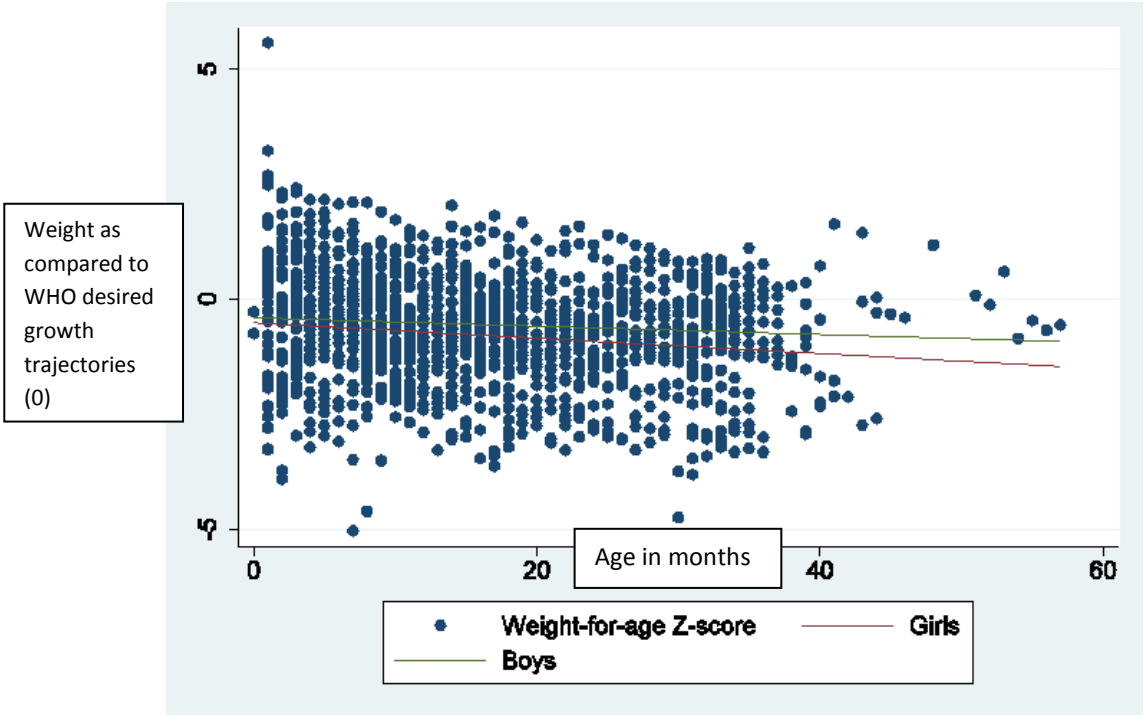

Figure 26: Male and Female Children in Orbili Village as Compared to WHO desirable Growth Trajectories

Source: author's own analysis, based on digitized paper records of growth charts held privately within each household (N=192)

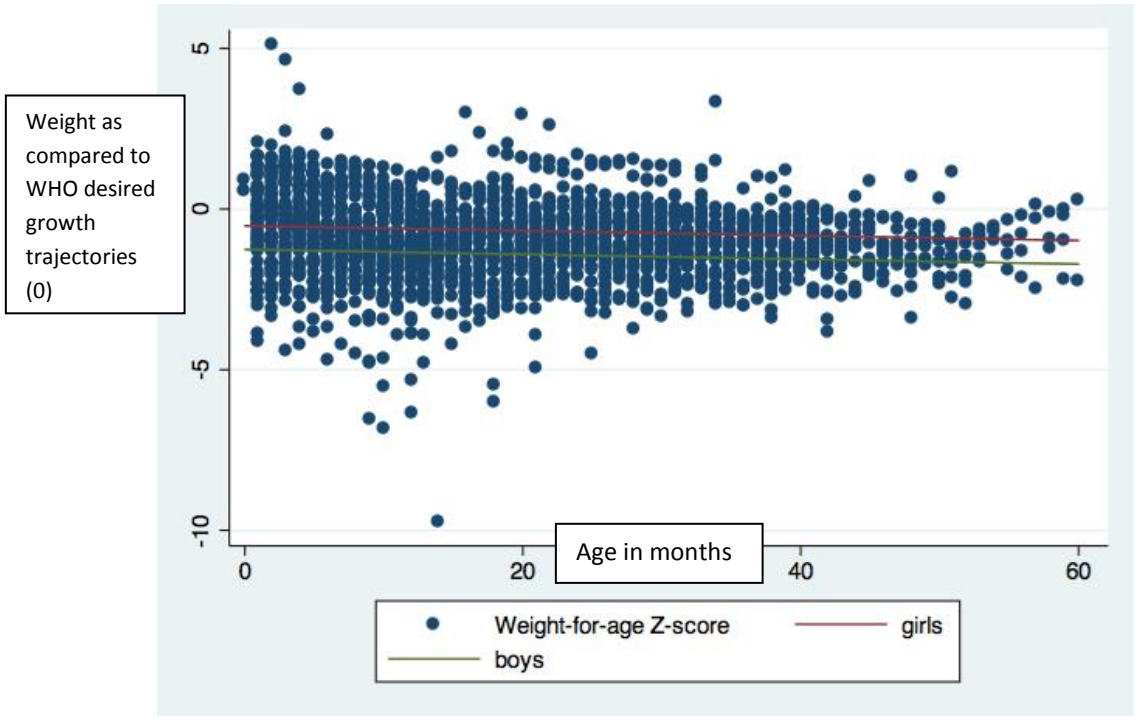

Figure 27: Male and Female Children in Tabier Village as Compared to WHO desirable Growth Trajectories

Source: author's own analysis, based on digitized paper records of growth charts held privately within each household (N=192)

By WHO standards, children are malnourished at birth and become relatively more malnourished as compared to WHO standards as they age. Girls are more malnourished than boys in Orbili Village, and boys are more malnourished than girls in Tabier Village. Both of these patterns are statistically significant. The difference between boys and girls grows slightly over time in Orbili Village and remains nearer to constant in Tabier Village. If the children were growing as expected with absence of risk factors, they would remain at 0 on the x-axis. Deviation below 0 represents undernourishment. The data clearly indicates that undernourishment is widespread in both communities at rates that are associated with increased the rates of chronic illness and reduced physical and intellectual productivity (Smith & Haddad, 2000).

The severity of the undernourishment may be underestimated in this data set, as oedema of the abdomen (as a result of protein and nutrient deficiencies) is not adjusted for. The oedema may be adding to the child's mass. It is not possible to account for the oedema within this data as one would need to know if the oedema is present and for which of the monthly observations it was present over each year. This data is not collected within the Ghana Health Service antenatal books. Other healthy growth measurements (height for age, height for weight, and mid upper arm circumference) would provide a clearer picture of growth and account for oedema contributing to mass of the child, but this data is also not collected within the GHS antenatal books.

5.5.2.2 Data from observation

Oedema of the abdomen (also called distended abdomen or kwoshikor) was referred to in the case study and is likely a major public health issue in the region. Distended abdomens were commonly seen by myself in Tabier Village, which is known as the poorest village in the district, and occasionally seen in Orbili Village, which is known as one of the wealthier

villages in the district. The conditions observed were in many instances most likely undiagnosed mild to moderate oedema of the abdomen. This appeared to be especially common for recently weaned children with new born siblings who are in the highest age risk bracket for stunting. This is consistent with the literature on rapid weaning as their protein and nutrient rich diet of breast milk is substituted for starches. Distended abdomens were also occasionally observed among children from middle class households within Lawra Town. For example, the daughter of a gainfully employed carpenter [BM020] in Lawra Town, who was doted on lovingly by both parents, had one of the most severe distended abdomens and thin arms observed by myself. Her diet was exclusively starch-based in the months leading up to and following the birth of her younger sibling, despite the family having means to buy more nutritious foods.

The following photos demonstrate the level of oedema observed during community visits. Permission was sought from parents of the children photographed to be used for the purpose of demonstrating health conditions. The photos were taken by community members of Tabier Village as part of a photo project of the Systemic Integrated Adaptation team for small holder farmers to document their lived experience of a changing climate.

Figure 28: Young children with distended abdomens in Tabier Village
Source: photos taken with research project cameras by farmer participants in the photo project described in section 3.4.5.4 page 102

5.5.2.3 Data from interviews and focus groups

Several of the answers from the focus groups concerning child development and nutrition were difficult to understand and interpret. For example, the observation that was frequently made is that female infants are more demanding breast feeders. Their behaviour was described as '*sucking harder*' than boys at the breast. This was agreed upon by all 12 members of a women's focus group. When asked why they think this might be, one participant [FF3010] responded through an interpreter "*because they know they will be mothers one day*". Others in the group agreed on this response but no one could really extrapolate on this to make the answer more clear to me. When asked if children and adults need to eat different foods, all agreed that children have different food needs. Specifically, they need more frequent smaller meals that are easier to eat like porridge (traditional or commercially produced), and less chilli within stews.

The consideration of children's jobs being playing was brought up frequently and with pride in Orbili Village. In in-depth interviews it became clear that young children doing a job of playing, and not working, is something the current generation of parents are very happy to have achieved. They have been able to ensure leisure time for their young children that they did not experience as children. One father [FM203] shared, '*As for us, we had to help on farm and help our mothers when we were small. We shelled the g-nuts* [ground nuts]. *It took time! Now my small boy is playing. That is his job*'. He then pointed to his five-year-old son who was pretending a bench was a motorcycle gleefully while another adult man made motorcycle sounds for him.

Children's jobs being playing was also used as an explanation as to why children are typically not served meat, eggs or fish other than ground 'kitiboys'. Such luxury food items are typically reserved for persons doing activities that 'require strength' – in the words of focus

group participants. It is possible that young children's diets are less diverse as a result of no longer having a productive role within the homestead.

5.5.3 Acquisition of food to the household

5.5.3.1 Data from livelihoods survey

As Orbili Village is located adjacent to a river and Tabier Village has no river access, the food production among the two villages varies enormously in the dry season. Organizing small-scale irrigation for the expansion of dry season vegetable gardens has been the focus of several interventions in Orbili Village of the local Ministry of Food and Agriculture (MoFA). However, vegetable consumption, excluding tomatoes and chilies, is typically low within Orbili households, despite dry season vegetable gardening being common (>50% of households). Household consumption of vegetables does not appear to have a relationship with vegetable production. In the survey, households producing vegetables in the dry season did not report higher vegetable consumption within the dry season. This is likely because most vegetables are sold in the market, and only a small amount of tomatoes and chilies are allocated for home consumption.

Households (all farming) are buying much of the foodstuffs they reported consuming within the survey (see Table 13: Food acquisition to the household in previous seven days, based on the WEAI household survey to all households). This is consistent with the literature that has documented how farmers buy large portions of food in the market place, as opposed to producing and consuming in a closed loop (Colecraft et al., 2006).

Table 13: Food acquisition to the household in previous seven days

	Own production	Bought using cash	Other manner of obtaining (e.g. gifts)
TZ, Banku, fufu or kenke	77	12	0
Rice	27	55	2
Potatoes, cassava and other roots/tubers	10	6	0
Cereals (maize, millet)	17	2	0
Vegetables	78	3	1
Fruits (orange, banana, mango, pawpaw)	6	8	1
Beans, lentils, peas	45	8	1
Eggs	3	5	0
Plantain	1	2	0
Meat (goat, beef, lamb, pork)	4	47	1
Poultry (chicken, duck, guinea fowl, turkey)	3	8	0
Fish (fresh and dry) or snails	8	68	0
Oil//fats (butter, veg oil)	10	52	2
Nuts and seeds	29	4	0
Dawadawa	20	59	4

Source: author's household survey data

5.5.3.2 Data from interviews

Buying food to consume and selling what is produced on the farm is more common than one might expect for small-holder farmers. According to interview responses, households rarely slaughter one of their own animals. Rather, they will sell an animal in a time of need for cash, and men will use small amounts of money from farm profits, petty trade or labour jobs to purchase cooked meat at the market. Animals were described in interviews as something like a living emergency savings account rather than as a food source. Some participants reported selling cassava and maize harvests while sharing stories of food scarcity. Two adults [FM1201 & FM1301] interviewed from different households reported selling maize and cassava harvests at harvest time when the price was low, then going through the portion they saved to consume more quickly than expected, then having to buy maize and cassava at the end of the season when the price was higher, running a loss.

Luxury foods like eggs, meat and vegetables are not consumed in a typical farming household– rather they are produced to be sold in the market – as was illustrated within the case study of Valentina and Matthew. In interviews, both men and women were asked about the most commonly purchased goods from the profits of vegetable gardening and farming. The answers were generally consistent among each of the 30 persons interviewed. The most commonly purchased items with farm and garden profits are cooking oil, soap, alcohol, meat (men only), salt, maggi cubes (vegetable/beef stock), and small fish (kitiboys).

During weeks of good harvest with favourable market prices, excess money beyond what is needed for the forthcoming week is typically spent on flashlight batteries, kerosene (for lanterns), phone credit, exercise books and pencils for school children. Additional sums are saved for fertilizer, school uniforms, clothing, shoes and improvements to the homestead. These items are essential to household functioning. The ability to sell garden and farm harvests and not keep all harvests for household consumption is important. This pattern appears unlikely to change unless income is gained from additional sources.

5.5.4 Distribution of food within the household

Examining the distribution of food within the household combined with food acquisition creates a more complete picture of the causes of malnutrition. Distribution appears to align strongly by the social differences of gender and age. Unequal distribution of food between men and women was highlighted within the case study of Valentina and Matthew.

5.5.4.1 Data from observation

Observations showed that protein consumption is highest among men after group work projects. Communal work projects that are done for an individual homestead are often followed by sharing food or drink. If the communal project is large and requires work from both men and women (e.g. building walls), the alcoholic drink pito (discussed in the next

chapter) will be provided by the family accruing benefit from the labour. If the communal project is hard manual labour for a smaller number of people, this will be completed by men and will be followed by consumption of meat, generally goat or chicken. This is the most frequent occasion for the consumption of goat or chicken meat, and women and children are not typically included.

Day-to-day consumption of protein within private homes is typically a small serving of fish called 'kitiboys' or groundnuts, which are both ground into a powder and stirred in to thicken stews that accompany a starch main. A very small portion of the stew is consumed per person. It is more of a garnish than a side dish. Protein and iron levels within these dishes are low. However, as illustrated by the case study, high fat, high protein foods are eaten almost exclusively by men outside of the home, including work projects and social areas. Animals are slaughtered not in the home, but in 'spots' - social areas within the village where men spend leisure time. Men purchase small amounts of cooked meat with cash and eat it on the spot in the company of other men. Meat is rarely cooked in the home brought home and shared with women and children.

Women and children occasionally consume small amounts of meat during traditional festivals. There is no taboo against women eating meat, including pregnant woman, as there is in other regions of Ghana. However, other cultural normal limit their consumption of food items that are considered luxury foods. This gender difference in consumption indicates, as discussed before, that men are favoured as productive bodies as well as benefited by gender roles that preference the social space for men in terms of both nutrition and prized food. The result of the differences may also reflect favoured status.

During homestay observations it was observed that young children are given small meals throughout the day which are predominantly pounded tubers with non-animal source foods (non-ASF) based stew (usually made of palm oil, chilli, salt, tomato paste and maggi cube). If ASF is served within the home it will be prepared for the evening meal. Adults typically eat two large meals a day. If ASF is prepared in the home, the children will also get a portion, but these portions will be small as are their more frequent meals throughout the day.

5.5.4.2 Data from interviews

The gender differences were further confirmed as men reported meat consumed within the home more frequently than women in interviews.

Examples of preferential treatment of sons in the domains of education, assets, social inclusion and personal freedoms were outlined in Chapter 2. Examples of daughter preference are more seldom. However, two themes on daughter preference emerged in interviews which are relevant to feeding. Firstly, the idea that girls are cuter, more precious and more dear to their fathers emerged frequently which could result in being given more food. As withholding food for bad behaviour is a common practise, it was thought that girls may be getting more food as they are acting up less by nature (less physical fighting with siblings and more motivated by the desire to be helpful).

Women and men talked about women favouring daughters as the daughters will '*consider them*' in times of difficulty. This means that if mothers of adult married women are in need, they can request cash or in-kind support from their adult daughters, especially if they are widowed. Following on, it is thought that women have a special desire to bond with daughters who will marry (potentially marry men of higher social standing) and so this may affect feeding patterns. A common explanation as to why '*daughters consider their mothers*'

is described by one elderly grandmother [FF701] in Orbili – '*Sons will take wives and they will need to consider them first* [before their mothers].' This means that adult married men (who are the primary holders of household income) will need to satisfy the needs of his wife (or wives) before giving cash or in-kind to his mother. Adult daughters are perceived to always have a small amount of money squirreled away that they can secretly give their mothers. Non-disclosure of this money to husbands on both ends was reported to have caused disputes. Women are broadly considered to be more secretive and better secret-keepers than men and so the practice of secretly bestowing money fits with this broader trope.

5.5.4.3 Data from focus groups

When a mixed sex focus group was asked which actions 'require strength' a list of typically male roles was offered by male participants – hunting, putting on roofs, making bricks for houses, taking animals to the market, preparing fields, loading lorries and long journeys. After prompting the group for women's roles that 'require strength', the group offered pounding cassava, carrying water and child birth. Women's activities typically require less dynamic force but are often sustained over a longer period of time, such as cooking over fire, tending fields, carrying water and carrying children. These varieties of sustained work appear to be perceived as less strenuous and therefore require less of the types of food that better facilitate hard labour.

A variety of practices and patterns, from production to acquisition to consumption of food appears to lead to increased likelihood of malnutrition in the Upper West. It is therefore worthwhile to specifically consider good feeding practice for children who may be at the greatest risk of malnutrition in the case study region as a result of these practises.

5.5.5 Limitations to good feeding practice

The three primary limitations that emerged from the data coding process, excluding food access constraints reported earlier, are 1) nutrition knowledge, 2) disempowerment of carers, and 3) time constraints of mothers.

5.5.5.1 Nutrition knowledge

5.5.5.1.1 Data from observation

Distended bellies are not recognized as a symptom of malnutrition. Rather, parents like when children have big bellies. While eating with a family during a homestay, a mother was asked how she knows when her children have had enough food for the night. She [FF901] replied, '*Our local belief is that children are not full until they have a big hard belly. It is a sign the child is well fed and has a good family*.'

I regularly observed mothers feeling their stomachs to see how hard they were before the child would be excused to play before bed. Often the child would eat so much starch they would appear to waddle away. On multiple occasions mothers and I would giggle together at how cute the child looked while waddling away with a full and protruding belly. This is because their centre of gravity would change slightly and so they would be leaning backwards slightly while walking in a way reminiscent of the gait of an adult man with a rotund waste line. Persons with rotund waste lines are typically considered affluent and are more commonly seen in cities than in villages.

The jokes mothers would affectionately make about their big-bellied children reflected the social status associated with big bellies and not an association with malnourishment. '*Look at my fat boy, going to his office!*' one host mother [FF1501] teased, referring to her two

year old boy who was waddling away happily to play after a big meal of pounded cassava, with the boy's new baby sister nursing at her breast.

5.5.5.1.2 Data from interviews and focus groups

There is little awareness that child growth rates and nutrition have an impact on life outcomes. During interviews the majority of women in the two focal villages reported meat cooked within the home and consumed by women and children less than once in two to three months. While having heavy infants and large children is a source of pride for parents, the relationship between consuming protein, iron, or other nutrients and success in schooling does not appear to be common knowledge. Rather, in interviews of parents and teachers, children were typically categorized in a binary fashion – sickly or normal, clever/serious or troublesome. Teachers and parents explained underperformance of students as a result of the students '*not being serious*'. As children are generally first-generation students, parents may underappreciate the struggles of day-to-day school life.

Lows levels of nutrition knowledge is consistent with other literature on Ghana, for example Davis et al (2003) found that women in the Kumasi region broadly felt feeding children multiple different varieties of food was unhealthy for them. Rather they preferred to feed porridge as the only supplementary food to breast milk. Only ill children with low appetites would be given different varieties of food to try and stimulate their appetites. However, even with an increase in knowledge of carers, this does not necessarily translate into improved feeding practice due to disempowerment.

5.5.5.2 Disempowerment of carers

5.5.5.2.1 Data from observation

On multiple occasions I observed the dynamic of grandparents controlling feeding and parenting habits more broadly. The older generation are more likely to favour traditional

feeding methods which include supplementary feeding with water, tea with traditional medicines as well as maize and cassava based porridge from birth. Each of these foods typically include non-treated water which raised young children's exposure to diarrheal disease. The affinity of grandparents to these feeding practises has been described as 'old habits die hard' mentality. It may also be because the older generation has not been the target for health education programming and behaviour change communication. Grandparents may be a key overlooked target population for education, especially as more and more mothers are taking occasional work outside the home and rely on grandparent child care. Grandparents may also be more in favour of traditional medicines over visiting the hospital; however, affinity for traditional medicines appears to be common with the current generation of new parents as well.

One on occasion I was holding a four-month-old baby while the baby's mother went to retrieve a chair. The baby was not wearing the typical cloth diaper and the baby defecated on my lap. The faeces were an unusual bright yellow colour. When the mother [FF1301] returned she was embarrassed but also very upset. Later it was discovered that the unusual colour was an indication that the baby had been fed a lot of mangos by its grandmother against the will of the mother. She was extremely frustrated, knowing this was against the recommendations of the doctors from her last health visit. She confided in me some weeks later that this is an ongoing problem between her and her mother-in-law.

On another occasion I observed a grandmother shaking a baby upside down with full force holding one ankle to relieve gas while the baby's mother was on a training course. The mother [BF013] later told me that she was extremely upset when she learned of the incident but felt unable to communicate this to her mother-in-law.

5.5.5.3 Time constraints of mothers

5.5.5.3.1 Data from observation:

Women who work off-farm often leave parenting and feeding to teenage daughters, grandparents, disabled adult members of the family and disabled adult neighbours. This pattern was observed regularly. During one homestay, the mother [FF1501] of the family who works at a school feeding program returned home late in the evening after the evening meal had already been prepared by her 13-year-old daughter. Wild greens were not included in the meal as would normally be done by the mother. The teenage daughter explained that she is less familiar with identifying safe wild plants to forage and she didn't have time to collect the ones she does know how to identify because she had to begin cooking as soon as she returned home from school. Cooking at schools for feeding programs is one of the only positions held for low skilled women that are not self-employed. These jobs are time-intensive as schools purchase the lowest quality food to save money, which in turn require more labour for food preparation. Women who have these coveted jobs often need to leave before their children wake in the mornings and get home late. As such, they transfer much of their household feeding and caring responsibilities to others who may be less capable because of age or disability.

Women who work off-farm may not be more able to provide for their families as profits on enterprises typical of women, such as hair dressing, food stalls and tailoring are very low. The few women from Tabier and Orbili Village who work in enterprises typically travel to Lawra Town daily to do so. As was outlined in Chapter 4, women's enterprises are characterized by high levels of competition and low profit margins. Women's involvement in business accrues multiple social benefits, such as status, ability to socialize with other women, ability to bring children to more urban schools and access to news and television in

towns. However, the cash income in-hand derived from these ventures may only cover their costs. Their payment may also be in kind or working off debts. As such, they may spend less time caring for families but may not be substantially more able to provide for their families financially. At least one woman [BF007] known to me was running a loss unknowingly in her business selling Maggi (vegetable/beef stock) cubes. Her business involvement could be having a detrimental effect on the food and income security of her household.

5.6 Discussion

The results provide further evidence of the benefit of a food systems approach (Ingram et al., 2010). Clearly, improving production alone is not the answer to improving food and nutritional security in a changing climate. Under-nutrition in the case study ultimately stems from poverty, low levels of knowledge on the nutritional needs of children and the prioritization of 'productive bodies' when food is scarce. High levels of food scarcity and malnutrition have been documented in multiple forms. Households in both villages are not achieving a minimum acceptable diet and have low diet diversity scores. However, multiple data sources demonstrate that there is more severe food scarcity in Tabier Village than in Orbili Village. Scarcity affects nutrition status in complex, varied and often unexpected ways. The two villages – Orbili and Tabier – offer some interesting comparisons that provide both answers and further questions.

If an underlying preference for sons or daughters exists in the case study region, it does not come out clearly in the present data, nor in the existing literature (Maberry et al., 2014; Malapit & Quisumbing, 2014; Davis et al., 2003). This may be because knowledge limitations on nutrition and feeding practises limit the extent to which preferential treatment leads to improved outcomes for the preferred sex. It may also be a result of limitations to the data itself. Although Tabier has far higher levels of poverty and hunger, and Orbili produces food

in the dry season through riverside gardening, we do not see a substantial difference in the way that their children develop in the child growth data, except for higher observation of distended abdomens in Tabier Village. Children on average in both villages are born underweight and become relatively more malnourished as they age.

Considering the child growth data alone, the negative long term consequences of stunting are likely to be experienced roughly equally in both communities with boys experiencing more negative health consequences in Tabier and girls experiencing more negative health consequences in Orbili. However, as we have seen higher rates of distended abdomens in Tabier village, it is possible that we are seeing heavier girls in Tabier as a result of their distended abdomens. If this is what is happening, the case for preferential feeding of male children would be made clear and a more intuitive result on child growth (the children of the wealthier more food secure village having better health outcomes) would come out. At present, no such case for preferential feeding of male children can be made confidently.

In contrast, unequal distribution of food between men and women and between adults and children is abundantly clear. Several gendered patterns that limit food access that are specific to the case study help elucidate the broader trends of poor health outcomes among women globally in the literature (Hyder et al., 2005). In Ghana's Upper West social norms favouring adult male bodies, male spaces and male-typical productive roles are pervasive and powerful. The perception that male-typical productive roles are more strenuous tips the food distribution scale in favour of men. Further, a profound respect for the social ritual of all male groups consuming animal source foods together further entrenches the unequal distribution.

Malapit et al (2015) found multiple relationships between different empowerment domains and different dietary outcomes of boys and girls. At first glance, these results seem spurious and unintuitive. However, on reflection the results present an overarching message that rings true for the data of this chapter as well. That is, persons are prevented from providing optimal diets for themselves and their children because of many different aspects of their poverty, which are unique to each family. These are micro and macro differentiations and their intersection are where the most comprehensive understanding for the social determinants of their health can be found.

Each child's development trajectory captured within the growth charts is the result of multiple limiting factors that stack up on to each other to produce the outcomes observed. These limiting factors may include: the productivity of the household's farm; the household's ability to plan for the lean season; if off-farm income is coming into the household; if the carer is aware of and using recommended infant feeding practices; if the mother herself was an underweight baby; where the child falls in the birth order of the household; the sex of the child; the sex of the child's siblings; how close the child is in age to the siblings directly before and after; whether the carer has both the knowledge and power to make good feeding choices and is present to make those choices, and so on and so forth.

From a clinical perspective, the negative health impacts of a poor diet are well-understood and measureable with clear reduced physical and cognitive function and higher levels of chronic ill health (Walker et al., 2007; Glewwe et al., 2001). As such the levels of food scarcity and poor nutrition for the entire population, which are in turn heightened by the preferential food access patterns documented in this chapter, pose significant threats to future coping and adaptive capacity. The food access patterns are part of a larger trend of

incremental disadvantages to children and women as well as a broader political and socio-economic pattern that disadvantages the Upper West and other northern regions of Ghana (Jatoe et al., 2012Quaye, 2008).

The overall level of food scarcity appears to be increasing dramatically during the lean season. Certainly hospital admissions for anaemia are rising sharply during the lean season and qualitative interviews confirming the strain of seasonal food scarcity triangulates this finding. Environmental change may be exacerbating these patterns of seasonal availability of food, now and in the future. Smoothing out access and consumption of food throughout the calendar year is an urgent necessity. This will also likely involve address season food price volatility. Increased seasonal food scarcity may be further exacerbating discrepancies in food consumption within the household.

The conceptualization of farmers as buyers of food and not exclusively sellers of food is important for understanding their dietary and distribution choices. Only a small number of studies in Ghana have looked at this phenomenon in detail (Quaye, 2008; Davis et al., 2003). The data presented within this chapter has confirmed that farming families in the case study region are buying large portions of their daily food. Farmers also sometimes make poor decisions on reflection, such as selling too much of their harvest and having to buy it back at higher prices. These choices may be impeded by the high cognitive load of hunger and poverty more broadly (Mani et al., 2013). The difficulty of these choices is also likely impacted by high inter-annual variability of seasonal rainfall and the resulting inter-annual variability of food production – both of which are likely to become more variable as a result of climatic change (Mcsweeney et al., 2010).

Several novel qualitative findings within the data presented are worth reiterating. The data on each finding is limited and as such more qualitative research must be completed to make confident statements. Firstly, results on the disempowerment of carers raise the issue of programmatic targeting as well as limitations to important personal freedoms. Parenting interventions typically target young mothers although they may not be the ones controlling the health care and feeding practises of their children. Limited nutrition knowledge of carers who may not be empowered to make all the feeding and care decisions they would like because of low status or because of time constraints, will be an important consideration for the design of nutrition-sensitive interventions.

Secondly, it is possible that young children's diets are becoming less diverse as a result of children performing fewer productive roles in exchange for more playtime. While greater leisure time for young children is broadly positive, as is reflected in the Convention of the Rights of a Child, this potential unintended consequence deserves greater consideration. Thirdly, a number of children from families with secure incomes have also been found to have distended abdomens, most likely because they are eating sufficient quantities of food but lack particular nutrients. It follows that income is necessary but not sufficient for ensuring good nutrition and the theory of change behind interventions seeking to address income and under nutrition simultaneously must reflect this dynamic.

5.7 Limitations of the study

Several imitations have already been covered within the results sections. These are 1) oedema of the abdomen potentially biasing child growth records, 2) having only weights for age anthropometric data, 3) dog meat and wild vegetables not being included within the food consumption module of the WEAI survey, and 4) the survey not capturing who eats what within the household.

The sensitive nature of questions on childcare and household dynamics between spouses and with in-laws limited what could be asked and observed. For safety reasons, homestays were not completed in the households where men were known to drink heavily at night or where incidences of domestic violence were known. This may have biased the observation data collected during homestays. As only two villages were studied the village-level comparisons are not generalizable to the broader population for broad external validity. As such, the greatest strength of the data is in its richness and multiple sources and the resulting comparisons that can be made at individual and household levels.

Direct observations were not made in all seasons as fieldwork occurred over several visits over two years rather than in one long session. To account for this, interviews often specifically focused on the time period that the researcher was away. It is possible that if the observations had been made consistently through one calendar year that there would be more qualitative data on seasonal variability of food. This is relevant because, in my view, one of the key steps to making the most common agricultural interventions nutrition sensitive may be to identify if adults and children are chronically undernourished in both 'good' and 'bad' years of crop and livestock production. The answer to that question may tell us whether there is need to work out how to smooth out variability of seasonal production and provide supports during difficult years, or if the set of staple foods being consumed needs to be improved through fortification or supplemented with alternative foods in all years. This is an important area for future research that could not be covered within this thesis research project.

5.8 Policy relevance

The trends presented call into question the theory of change that guides many food security and climate adaptation interventions in the region – the belief that greater food access at

household level leads to nutritional benefits for all household members. The dilemma between selling and eating nutritious foods is complex. Increasing dietary quality and diversity will be heavily contingent upon sufficient decreases is multiple domains of poverty with simultaneous diversions from the social and cultural norms around child feeding and women's food allocation that impede their food security. Education of some variety would likely be a necessary and enabling factor to make those changes happen.

The following recommendations can be made based on the data presented and broader literature:

Target very young children. Improvements in under nutrition and reductions in nutrient deficiencies in children under three years of age or within the first 1000 days (Gillespie et al., 2013; Green, 2012) (from conception to two years of age) of life have the strongest evidence-base for reducing long- term physical and cognitive developmental disabilities (DFID, 2009). Improvements within this age group are strongly correlated with reduced morbidity and mortality (Horton, 2008; Anon, 2008). Although school feeding programs are a popular intervention with many benefits (Bundy et al., 2009), they do not target the age group most at risk. Targeting children before they enter school is complicated in areas where distribution of food in the home is inequitable between genders. In Ghana's Upper West, program designs will need to take this dynamic into account.

Consider social differentiation. Often the most vulnerable groups are the product of intersectional (multiple overlapping) forms of oppression, dominance and discrimination (Crenshaw, 1991) and the risk factors for under nutrition are no different. When designing interventions to address the risk factors for under nutrition, particular attention should be paid to the unique needs of individuals based on defined points of social differentiation,

including: recently weaned children and their mothers, women with disabilities of child bearing age, children of parents with disabilities, childbearing aged women in villages, childbearing aged women in cities, persons with alcohol addiction, persons using alcohol to deal with stress, illiterate persons, women experiencing domestic violence, women without the choice to use family planning, persons who are landless or herdless and so forth.

Collect sex and age segregated consumption data. Data is not typically collected on consumption of harvests by farming families, and sex and age segregated consumption data is rare. Exclusion of consumption data in the broader sub Saharan African context may be hiding inequitable food distribution within and between households and ill informing policy. Current tools to measure food security may be overestimating women and children's access to protein and underestimating that of men. Tools such as the WEAI must be adapted to collect individual-level consumption data to reflect the uneven distribution of food within households.

Make interventions nutrition sensitive. Making complementary development interventions nutrition sensitive can address a wider set of risk factors for under nutrition and is an endorsed practice of the SUN (Scaling Up Nutrition) model to address both acute and chronic under nutrition. This is also aligned with the UNICEF framework that conceptualizes both immediate and distal determinants of nutrition. We know that women's combined roles in agriculture, dietary choices and healthcare matter a great deal to child nutritional status, but few agricultural interventions target all three domains. Agricultural interventions, which prioritize production, including the set of practices currently being promoted as 'climate smart agriculture', are particularly nutrition insensitive.

5.9 Conclusion

This chapter has presented a) patterns of under nutrition, b) food acquisition to the household, c) distribution of food within the household, d) limitations to healthy child feeding practises, and d) implications of these outcomes for adaptive capacity in Ghana, demonstrating how nutrition and adaptive capacity are inextricably linked and have direct effects on either limited or extending the actions accessible within the response space. This chapter has reviewed the evidence and presented novel data. It concludes that adaptive capacity begins at the antenatal stage of life and must be nurtured through each life phase.

The results tell us something about inequality within the home; preferential feeding of adult males; limitations of knowledge, access and empowerment; and prospects for future inequality and adaptive capacity. Childhood nutrition plays a central role in community resilience because of its impact on a wide spectrum of life outcomes, which affect adaptive capacity to environmental change. Looking through a social differentiation lens has highlighted the ways that micro and macro social differences cause differences in nutrition which in turn cause social differences in terms of health, educational attainment, well-being outcomes, and adaptive capacity.

The household has been viewed as a 'black box' within development discourse with little clarity on the culturally specific dynamics playing out within it. While understandings have improved, there is still so much unknown about how food distribution happens within the household, among other behaviours. This study has added some novel qualitative and quantitative data to the discussion, but in many ways it creates more questions than answers. A clear and compelling example of the benefits of looking 'beyond the front door' (Melamed, 2015) is for the design of interventions that can improve child nutrition outcomes that 'leave no one behind'.

Under nutrition and food scarcity is a challenge to equitable adaptation, both in terms of equality and the capacity to adapt. With all that is known about the long term physical and cognitive limitations associated with malnourishment, how social norms on food acquisition to the home and distribution within the home regulates bodies now and for the rest of their lives, must be central to the consideration of adaptive capacity.

6 Alcohol consumption, developmental disabilities, stress, and poverty

When examining the complex systems of society and their ability to adapt to changing climates, one must consider societal norms that hinder or facilitate the process of adaptation (Clark, 2012; Nielsen & Vigh, 2012; Ensor & Berger, 2009). Using the grounded theory methodology (Sheridan & Storch, 2009; Strauss & Corbin, 1998), alcohol consumption emerged as a norm with a multi-directional relationship to adaptation, through stress and poverty. Literature in the field of climate adaptation fails to consider the causes and consequences of alcohol consumption, with few studies specifically focusing on alcohol consumption and broader community resilience (Eaton et al., 2014; Lundgren & Adams, 2014; Hodgson, 2008). The importance of considering alcohol consumption, stress, and poverty is highlighted through the case study of Mary[3] in Upper West Ghana. The case study was written following multiple interviews and observations with Mary and her family members over the course of four months.

6.1 Introduction

A case study of Mary and her family

Although she is pregnant, Mary [FF2901], who lives in Ghana's Upper West Region, continues to drink alcoholic *pito* throughout the day, as the English may take tea. Like most women, she views it as cleaner than water, since it does not give her diarrhea. It gives her a sense of fullness when there is little food and reduces stress. Mary is following what she views as advice from experts and her community on the consumption of *pito*, but her practices may cause fetal alcohol spectrum disorders (FASDs). She brews *pito* at home, which she sells as an income-generating activity. She also gives this fermented sorghum

[3] All names changed

drink to her children, including eleven-year-old Albert, who prefers *dagarada*, the older fermented variety, to *patase*, the non-fermented variety.

Mary's children appear younger than their years, and the most recently weaned child, Dery, age 12 months, has a distended abdomen. Her 13-year-old daughter Patience appears developmentally delayed but has never been medically diagnosed. Rather, the family was told she has a learning disability by her primary school teacher. She was later dismissed from school for not progressing past year two and now assists her mother in the production of *pito* full-time.

Her husband Dery [FM2901] often chooses to eat and drink outside the home to socialize with other male peers, especially when there has been a dispute in the home. Mary and her children's diets may be restricted by her husband Dery eating outside of the home, as the limited funds of the household are controlled by and in possession of her husband. When Dery chooses to spend income on food outside of the home, the food is not shared by other members of the family. If food was purchased at the market and prepared at home, Mary and her children would have greater access to it as there is a cultural expectation of sharing food within the home with all family members.

When asked, "*What are the major causes of disputes between you and your husband*?", Mary immediately responds, "*No money, no food, too much drinking*". She shares that the most recent dispute followed the discovery that insects had destroyed a sizeable portion of their ground nut harvest, which was already below the expected yield as a result of 'failed rains'. Tensions had been high already in the family after their shared cell phone was dropped in a bucket of water by Precious. These shocks, big and small, climate-related and not, have been putting strain on their marriage. For them, and most other families in the

region, poverty is stressful and many of the coping strategies that are used to manage stress may have longer-term detrimental effects in their ability to develop cognitively and adapt to the changing environment.

6.2 Background

This chapter is a deep dive into the complex problem of alcohol consumption within the case study region. Drawing on grounded theory, (Sheridan & Storch, 2009; Strauss & Corbin, 1998), additional focus groups were added to the research plan to better understand an observable trend of developmental disabilities, visibly pregnant women drinking alcohol, and frequent reports of family and community disputes as a result of alcohol consumption. The results of this research reveal a complex situation that is not only a public health issue but is also an important consideration for adaptive capacity and community and individual level resilience. Poverty, stress and (in many regions of the world) the consumption of alcohol at high levels, are interconnected. If adaptation interventions are to be effective, this relationship must be understood, especially as it pertains to the prevention of fetal alcohol spectrum disorders (FASDs), other developmental disabilities, and healthy cognitive development more broadly.

If adaptation interventions do not account for disabilities, they may have detrimental effects on overall subsistence of the population in this region. Specifically, they may limit the communities' ability to adjust their agricultural practices to a rapidly changing climate and agricultural markets. At present, no climate adaptation or food security interventions in the region specifically target healthy cognitive development. Priority is placed on production rather than on consumption and nutrition, and the absence of health risk factors. Just as early childhood development is recognized globally as integral to long-term population-wide

economic and social development, a more holistic, intergenerational approach to climate adaptation is needed.

The chapter explores multiple explanations for the prevalence of alcohol consumption during pregnancy and high levels of alcohol consumption among young adult men. It details the impact on adaptive capacity and poverty with specific treatment of the prevalence of fetal alcohol spectrum disorders (FASDs), chronic undiagnosed ill health, and physical weakness that reduces the land area which can be manually farmed. It will argue that maladaptive strategies to manage stress and the prevalence of FASD related disabilities may be a much stronger impediment to building communities with high adaptive capacity than previously considered. A greater focus on these stressors is needed in both programming and research.

This chapter will provide background on (1) alcohol consumption in Ghana; (2) what is known about developmental disabilities nationally; (3) how developmental disabilities and ill health complicate adaptive capacity for farming families; (4) the contributions of the current study through presenting novel data on (a) high prevalence of developmental disabilities, (b) alcohol use during pregnancy, and (c) high prevalence of adult ill-health; concluding with a discussion on how these patterns may increase inequality and social difference within the case study region for current and future generations of farming families.

6.3 Alcohol consumption in Ghana

Drinking is a social norm in Ghana and drinking in groups is an important social ritual in both urban and rural areas. As in many parts of the world, alcohol is a medium of social bonding and is also used for coping with stress. Data on alcohol consumption in Ghana is limited. One study in the Upper West region comprised of six gender-segregated focus groups

concluded that socializing and coping with the stresses of poverty, with specific mention of failed harvests, were the two most prominent reasons given for drinking gin (Luginaah & Dakubo, 2003). Another study in the southern Ashanti region of Ghana found a 20% rate of alcohol consumption among pregnant women following pregnancy recognition (sample: 397 pregnant women at 10 ante-natal clinics) (Adusi-Poku et al., 2013; Adusi-Poku et al., 2012). Pre-pregnancy recognition rates of alcohol consumption were not captured. No studies have captured rates of alcohol consumption by pregnant women or the broader population in the Upper West Region. Communities of the Upper West have traditionally brewed *pito* exclusively. *Akpeteshie* – a locally produced gin originating in Southern Ghana – is thought to have been introduced in the early 1980s to the Upper West Region (Luginaah & Dakubo, 2003). Commercially produced sachets of gin arrived in the Upper West via Burkina Faso in the early 2000's according to government officials in Lawra District.

Increasingly, Ghanaian men and women like Mary are substituting *pito* for sachets of hard liquor, which have recently become available in small village stores in the Upper West at a cheaper price per sachet than a calabash full of *pito*. Informants reported that the cost of sachets was prohibitive for women until recently, but cheaper varieties imported from Kumasi area (southern Ghana) and Burkina Faso has driven down prices. The consumption of both *pito* and hard liquor is poorly understood in terms of its health implications for pregnant women, with alcohol content within *pito* varying per batch and with little data on consumption prevalence of the hard sachets. One attempt (Duodu et al., 2012) to document the mineral profile of *pito* in Ghana found that, while *pito* may actually be a good source of some essential minerals (potassium, sodium, iron, zinc, and copper), concentrations of nickel, cadmium, and, perhaps most alarmingly lead were well above the WHO

recommended maximum, suggesting that metal contamination arising from the preparation process may represent an additional health concern above and beyond the alcohol content.

Public health messaging and advice about *pito* consumption frequently does not make the distinction between fermented and non-fermented varieties. This is an important distinction because only the fermented variety is alcoholic. In public health sessions observed and according to interviews with Ghana Government Health Service (GES), pregnant women and children are encouraged to drink the unfermented variety as a source of hydration and energy. Other women feel strongly that they should follow cravings during pregnancy, including cravings for alcohol, which are interpreted as the wishes of the baby, regardless of health practitioners' advice. More effort has been made to communicate to women the risks associated with drinking hard liquor while pregnant through community health workers, but women also report cravings for hard liquor which may be the result of addiction. Abstaining from alcohol while pregnant is further complicated by the fact that family planning was found to be uncommon in interviews and in household survey responses, and so women may not know they are pregnant during the early stages of pregnancy.

The relationship between alcoholism and idleness in low-resource settings is frequently cited within grey literature and makes intuitive sense, but peer-reviewed studies on the subject are scarce. Idleness in this context is defined as non-activity in a frequent state of boredom, and is used without a negative moral connotation, as does Schroeder (Schroeder, 2001). Increasingly, alcoholism and idleness are a focus for mental health research and programming for persons experiencing trauma or displacement (Lai, 2014; Lundgren & Adams, 2014). These considerations are relevant for the case study region, especially young

men without off-farm employment or domestic responsibilities during dry seasons or periods of crop failure and other losses.

6.4 Developmental disabilities

The World Health Organization (WHO) uses the term disability to cover impairments (a problem in body function or structure), activity limitations (a difficulty encountered by an individual in executing a task or action), and participation restrictions (a problem experienced by an individual in involvement in life situations) (World Health Organization & The World Bank, 2011). Conceptualization of disability is changing within the WHO and UN agencies to focus on the relationship between capacity and performance and more specifically on the gap between the two. Broadly, when capacity of an individual is greater than their performance, this is a signal that barriers need removing and additional supports for functioning should be facilitated.

The term 'developmental disabilities' encompasses a wide range of physical and mental conditions, including attention, sensory, intellectual, and behaviour abnormalities that most often begin during gestation, but can develop and often manifest during early childhood. A study using the Demographic and Health Survey (DHS) Multiple Indicator Cluster Survey (MICS) data in 18 low and middle-income countries screened 21% of children in Ghana ages 2-9 years positive for disability. This was slightly below the study average of 24% (Gottlieb et al., 2009). The Ghanaian Statistical Service (GSS) results for 2006 peg the rate of children 2-9 years with at least one disability at 16%. Multiple Ghanaian case studies have been written about disabilities in different regions of Ghana, tackling different aspects of disability, such as teacher perception of disability (Obeng, 2007) or discourse on the construction of disability (Agbenyega, 2003). However, the definition used for disability is often unclear – sometimes including the need for glasses, allergies, poor behaviour at school, etc. – which

do not conform to internationally recognized understandings of disability. These imprecise definitions limit the guidance which can be taken from much of the qualitative literature on disability in specific regions of Ghana, as it is unclear which physical or mental impairments are being assessed.

The exact causes of poor developmental outcomes in northern Ghana are unknown, but potential risk factors include poor parental health, maternal alcohol or drug use, exposure to environmental toxins, genetics, or complications during pregnancy (Center for Disease Control and Prevention, 2013). Regular consumption of alcohol during pregnancy, as observed in Ghana's Upper West region, can cause a range of mental and physical disabilities in children from that pregnancy, including problems with learning and behaviour. A relatively high prevalence of disabilities linked to alcohol use during pregnancy have been reported in rural areas of South Africa and are associated with food insecurity, as food insecure women are more likely to consume alcohol during pregnancy (Eaton et al., 2014; Olivier et al., 2013; May et al., 2005).

Of particular concern here are Foetal Alcohol Spectrum Disorders (FASDs), including Foetal Alcohol Syndrome (FAS), alcohol-related neurodevelopmental disorder (ARND), and alcohol-related birth defects (ARBD). The bulk of Africa-based studies on FASDs were completed in South Africa, where rates as high as 40 per 1000 children were documented in the Western and Northern Cape provinces (Rosenthal et al., 2005). Little is known about rates of FASDs in other African countries. The following outlines the possible types of FASDs:

- **Foetal alcohol syndrome (FAS):** Abnormal facial features, problems with learning and behaviour, nervous system dysfunction (most severe of the FASDs);
- **Alcohol-related neurodevelopmental disorder (ARND):** Spectrum of problems with learning, intellectual tasks, and behaviour; and
- **Alcohol-related birth defects (ARBD):** Skeletal, internal organ, or sensory problems.

FASDs last a lifetime and have no cure. Management of the disorder centres on providing a supportive home and learning environment tailored to the individual's needs and capacity (CDC, 2015).

In addition to maternal health behaviours during pregnancy, environmental factors also shape child health and risk of developmental disabilities in a variety of ways. Intestinal parasites, malaria, diarrheal diseases, and HIV/AIDS prior to age five may cause developmental disabilities or reduce cognitive capacity by either directly affecting the brain or causing other effects, such as under-nutrition, that may impede cognitive function (Walker et al., 2007). With the exception of HIV/AIDS, all of these conditions are endemic in northern Ghana. Additionally, children who have limited cognitive stimulation, opportunities for learning, or family attention and support during infancy and early childhood are at risk for lower cognitive functioning (Walker et al., 2007). Parents with a developmental disability or reduced cognitive capacity may be less able to care or provide intellectual stimulation for their children, potentially creating a cycle of cognitive impairment (Azar et al., 2012).

Currently, the quality of outreach for children with FASDs in Ghana is low. In the Upper West region, ad hoc charitable groups have popped up, usually with foreign volunteers, but these institutions have limited geographic reach and are not institutionalised for long-term presence. There are disability offices in several of the main towns, yet many are non-functional. As a consequence, disabilities that do arise are poorly monitored, and limited assistance is available to disabled individuals and their families.

6.5 Adaptive capacity and disabilities

Developmental disabilities complicate adaptive capacity in multiple ways. The ability to make informed decisions and adapt farm practises is strained by cognitive and physical disabilities. Many adaptation options require the weighing of complex options, such as planting timing and seed variety based on probabilistic forecasts and agro-ecological conditions, which becomes difficult with cognitive disabilities or a high cognitive load. The cognitive stress of poverty alone constrains the ability to make complex decisions. One study on the cognitive function of farmers documented lower cognitive performance pre-harvest whilst poor than post-harvest whilst rich (Mani et al., 2013). The researchers argued that poverty-related concerns consume mental resources, which explains why the poor often behave in less capable ways. The ability to use information for climate adaptation will be contingent on support systems surrounding information dissemination and programming that allow adults with developmental disabilities to participate. Individuals with major developmental disabilities may place a care burden on families that is costly and time consuming as well as increases the cognitive load of caretakers.

Several important adaptation-themed interventions to strengthen poor rural communities and increase resilience to climate change have been instituted in the region, as was outlined in Chapter 1 in the case study introductory section. However, none of these programs specifically focus on the impact of disability or cognitive load on present or future adaptive capacity. Moreover, it remains unclear how the uptake and success of such programs may be impeded by physical or cognitive impairment or high cognitive load.

6.6 Contributions of the current study

In spite of evidence that alcohol consumption is widespread in Ghana's Upper West Region, there is a dearth of information about the link between alcohol consumption during

pregnancy and the incidence of developmental disabilities in the region. Additionally, the implications of this public health issue for the adaptive capacity of communities in the context of rampant climate change remain underexplored. The life-long effects of potential antenatal exposure to alcohol have important implications for the adaptive capacity and resilience of communities in the region. These effects are not yet well-understood, but can be reasonably expected to severely impact both present and future generations (Stone & Lofts, 2009). This chapter draws on qualitative primary data from Ghana's Upper West Region to catalogue a) patterns of alcohol consumption, with a focus on consumption during pregnancy, b) incidence of developmental disabilities, and c) implications of these outcomes for adaptive capacity in Ghana.

6.7 Results

6.7.1 High prevalence of developmental disabilities

6.7.1.1 Data from observations

I and fellow SIA research team members observed developmental disabilities among adults and children in large numbers in multiple villages in the Upper West. In an adult sewing class in Tabier Village, the women spoke freely about peers who are 'not normal'. They spoke with pride about how their class is open to all women and how the difference in ability is fine because their course is set up for them to work at their own pace. '*We all started hand stitching on paper and when our stitches became straight, we moved to [fabric] scraps and then to the machine. The class goes like that, slowly by slowly*,' explained one informant [FF3028] who has been attending adult sewing classes in Tabier Village for over a year. According to their own categorization, six out of twenty students are 'not normal'. Their instructor estimates 90% of her students have learning disabilities.

Among the approximately 15 children who regularly come with their mothers to the class, three have visibly severe developmental disabilities – undiagnosed and not under any medical observation. One child struggles to hold the weight of its head, another has legs of different widths and strengths and an asymmetric facial structure, and the last struggles to respond to basic commands. According to multiple sources, including Ghana Education Service officials, local teachers, and religious and traditional leaders (Paramount and local chiefs), no efforts have been made to diagnose or treat those who are likely disabled.

Traditional beliefs about the causes and treatments of epilepsy may also reduce the cognitive function of affected individuals. One epileptic adolescent boy [child living in the household of BF004] in the area can only say and understand basic commands. Although he has been prescribed anti-seizure medicine, which is covered under public health insurance, he is not being given his medicine by his care-taker, who instead prefers to use traditional medicines. Traditionally, epileptic seizures are understood to be a product of curses (Agbenyega, 2003). As a result of lack of medical treatment, he regularly has epileptic attacks, which is likely affecting his cognitive abilities.

Minor developmental disabilities also appear to be widespread throughout communities, although it is more difficult to use observational data for minor, less visible disabilities, as I and my fellow SIA researchers are non-specialists. Observed minor developmental disabilities include inability to remember a two-digit number for five to ten minutes in a participatory exercise during the SIA community workshop in June 2013. Approximately one in three participants was unable to remember their number within a five to ten minute time period. Participants confirmed that '*Some don't hold things in their minds easily*'.

During observations of women selling in the local market, it became clear that many women set up shop in pairs, with only one woman providing change or negotiating prices. The second woman refers to the first and mostly is responsible for bagging, dusting, carrying, and watching the goods. They do, however, keep their goods separated on the mat or table and keep segregated profits. In two pairs interviewed, the women indicated that they established this arrangement because one of the women struggled with pricing and making change. One woman [BF032] described her co-seller as '*easily fooled*'.

6.7.1.2 Data from semi-structured interviews

During the initial field program, two expatriate special needs education specialists [NF040 & NF041] placed within the Ghana Education Service were working in the region and were visiting schools assessing needs. Both believed cognitive delays were pervasive in local schools but were unsure of causes. They suggested FASD, undernutrition, and malaria were contributing factors to poor school performance. One Ghanaian Ghana Education Service staff [GF044] suggested that some of the delays may be from injuries to the head from being beaten. She was also running an education campaign to discourage teachers and parents from disciplining by beating children on the head, in favor of beating on the legs or arms instead.

6.7.1.3 Data on institutional responses to disability

The Ghana Education Service (GES) is charged with sensitizing teachers and students on the prevention of disabilities. I observed three GES seminars within primary schools, which were delivered to the entire student bodies at once (all ages from toddlers to teenagers together). The content varied in each presentation and was not based on a written curriculum. Outdated information was presented extensively, such as the possibility of lead

poisoning from pencils or metal bowls. Non-evidence based information was presented, including instructions on how to use the speaker option on mobile phones to reduce radiation exposure. Safety during pregnancy was discussed during two of the three sessions, but alcohol was never mentioned. Similarly, nutrition was not covered in any of the sessions. In one instance, severe birth defects were attributed to failed abortions by the GES disabilities specialist [GF044].

The office in Lawra town where the SIA team was based had one highly committed physically disabled volunteer staff person [NM045] who identifies disabled persons and appeals to religious groups with connections abroad to send wheelchairs. The government does not provide any wheelchairs. The volunteer also runs the logistics of a foreign sponsored program for low-functioning children and their mothers called the Special Needs Awareness Program (SNAP, 2015), which meets monthly to provide skills and psycho-social support for over 30 mother-child pairs in the surrounding farming villages.

6.7.2 Alcohol use during pregnancy

6.7.2.1 Data from observation

For pregnant women, drinking hard *pito* is common and is done without secrecy. Consumption of harder varieties of alcohol is generally frowned upon for pregnant women and appears to be far less common in villages than in towns. This may be because sachets of hard liquor were until recently difficult to purchase in villages. The availability of hard liquor in the form of sachets of whiskey and gin has increased in recent years. During the initial SIA field program, these sachets had to be purchased from the neighboring town but have subsequently become available through village-level stores at a cheaper price than *pito*.

Community members drink *pito* during all rituals such as festivals and funerals and after group work projects. For example, after all adults in the community assist to add a roof to a

home, the residents of that home are expected to provide *pito* for a bit of relaxation after the labour. This practice was observed multiple times and in all instances there were visibly pregnant women drinking alcoholic *pito*.

Although most observations and discussions about alcohol use were pleasant and did not appear to cause any offence, one interaction between the wife of a translator and myself was of an unexpected antagonistic nature. After listening to an interview on the topic of alcohol use during pregnancy, the wife of the translator [EM005], who was seven months pregnant with twins said '*No, women don't drink hard pito while pregnant,*' and then immediately drank a full calabash of hard *pito*. It was clear from her body language that she wanted me to witness the consumption. I remain confounded by this interaction and have no firm explanation as to why it might have happened.

6.7.2.2 Data from formal interviews and focus groups

Few women self-report consuming hard liquor sachets while pregnant, but accounts of it happening are common. All adults interviewed on the topic of alcohol consumption (10 men and 10 women) agreed it was a growing problem for both men and women and more than half had personally seen a pregnant woman consume hard alcohol. One story of a woman who would go into town to drink while visibly pregnant and fall asleep on the roadside on her way home was repeated during four separate interviews. She was widely condemned for this practice and was eventually divorced by her husband.

After I mentioned conducting interviews on alcohol consumption in the area during an interview with a staff person [NM033] of a local NGO working to develop group farming projects, his eyes lit up. He said, "*I am so pleased someone is asking about this! I have been thinking about this a lot lately. When I have a meeting with farmers nowadays, I can see that*

many have been drinking the sachets. I can see it from the way they speak. When women open their waist cloths [to take out coins which are wrapped inside] *to pay their membership fees, I can see the empty sachets fall out on to the ground before they brush them aside. Even the pregnant women are carrying the empty sachets in their waist cloths*."

In multiple interviews, women indicated they prefer to heed cravings as the best way to care for a growing fetus, often speaking about whether their baby wants *pito*, other alcohol, or particular foods. Interpreting signs from both the environment and bodily feelings is part of a wider set of cultural traits typical of communities in the region practicing traditional religion – ancestral veneration and animism. In their view, babies communicate with mothers about what they need through cravings and smell-induced nausea. Multiple women could list which of their babies (in-utero) liked *pito* and which didn't. "*If my baby wants* pito*, what can I do*?" responded one woman [BF051] interviewed.

The variability of alcohol content within the fermented type of *pito* adds further confusion. Health practitioners interviewed encourage children and pregnant women to drink the unfermented variety as a source of water and energy, although some women interviewed appear to interpret that advice as also including 'softer' fermented varieties, which include lower levels of alcohol. As such, the advice is interpreted as 'avoid hard *pito* with high levels of alcohol' – a distinction made by taste, which is typically an inaccurate test.

Other health practitioners, still, give entirely different advice. One community health volunteer [GF047], who is responsible for health information dissemination in her village, mentioned during an interview that she only warns women of the risks associated with

drinking sachets of hard liquor that contain 42% alcohol while pregnant, which are widely available. 'Pito *is fine because it also has nutrition. There is nutrition created in the fermentation process that you don't get if you don't drink dagarada* [fermented alcoholic variety],' she said.

The level of awareness about drinking during pregnancy varies; during individual interviews with women in their homes, roughly equal numbers of respondents said 1) The risks are known but people drink anyway; 2) The risks are unknown or are confusing; or 3) There is no risk ('*We've always drank during pregnancy so we will continue to do so.*').

Approaches to alcohol and pregnancy varied slightly in each interview, which makes designing an outreach intervention complicated. There does not appear to be a common understanding or accepted wisdom on the topic, nor a defined target group for intervention. Few women said exactly the same thing when describing their drinking practices, although women in towns appear to be more likely to drink whiskey and gin for relaxation and women in villages appear more likely to drink *pito* as a source of water and energy. One woman [FF3026] living in a village said she has not consumed alcohol of any kind since converting to Christianity (from Ancestral Veneration), while another woman [BF038] who identifies as Christian in the neighboring town said she will be teased by peers for '*acting like a Muslim*' if she doesn't take *pito.*[4]

Another woman [BF048] viewed drinking alcohol as fine as long as it is not consumed to excess. This is her consistent approach, regardless of whether she is pregnant or not. She

[4] It is also common to see Muslim men in skullcaps and tunics (attire typical of Muslim men in the area, particularly on Holy Days) drinking bottled beer publicly at bars but not whiskey or gin. This behaviour is atypical of African Muslims, generally, who typically abstain from all forms of alcohol, and exemplifies the extent to which social groups in the area are setting their own standards of social practice. These behaviours need to be better understood before health practitioners will be able to design effective health promotion interventions.

has heard a nurse caution against women drinking, but believes this advice comes from a moral position rather than nurses being educated on health. According to the informant, the nurse is an evangelical Christian and encourages her patients, who are traditional believers (of Ancestral Veneration/Animism), to get baptized when they visit the clinic in the district capital. Health messages are being mixed in this instance, which may be indicative of a trend of blurred professional boundaries and unclear messaging within the Ghana Health Service.

Abstaining from alcohol while pregnant is made difficult by the absence of family planning, as women may be unaware that they are pregnant during the first trimester. During women's focus group discussions on menstruation, mentions of missed periods were common (perhaps due to women being underweight or anemic), which further complicates knowledge of pregnancy. In a focus group of two women [FF3031 & FF3023] who have, respectively, four and six children, both could recall a pregnancy when they only knew they were pregnant five months before delivering full term infants. Aversion to family planning appears to stem from two common perceptions: firstly, that deciding when to be pregnant is unnatural (not an individual's or couple's decision, but the decision of a higher power); and, secondly, that birth control may jeopardize future planned pregnancies.[5] No one spoke of using family planning for birth spacing.

6.7.2.3 Data from livelihoods survey

In a village household survey that interviewed spouses separately, only two of 48 couples indicated that they have used family planning of any kind. In the other village, a high

[5] Stories of women using birth control and later becoming barren are salient and widespread. This fits within a larger fear of barrenness that is pervasive in the local culture. A woman who is unable to birth children is a very low ranking woman and will not remain married. In many Upper West communities, traditional marriages are not finalized until a woman has birthed a child - sometimes two children. If a new bride does not deliver a child within the first 1-2 years of marriage, the marriage is typically annulled and the dowry repaid to the husband's family. A small number of women indicated in private discussions that they use birth control secretly. The only women who openly used birth control describe their family planning as a decision taken jointly with their husband as a result of them already having enough children – usually six or more.

number of respondents abstained from this question, making it difficult to interpret the results for both villages.

6.7.3 Alcohol use broadly

6.7.3.1 Data from participation

Similar to how tea is offered to guests on arrival in the United Kingdom, I was offered *pito* during every interview and in nearly every home that I spent time in. Initially the *pito* offering was accepted with some reservation so as not to offend the hosts, but the fermented taste soon became agreeable and it did indeed reduce hunger during long days of fieldwork, and never caused an upset stomach. Water on the other hand occasionally made me sick. This impressed upon me that it was likely cleaner than water or at least easier to digest, as is often suggested by community members. Further, it is helpful during times of food scarcity or long days labouring without break, as it eliminates the sensation of hunger for 1-2 hours. Over the course of two-hour interviews, I would slowly consume one calabash of *pito*. Women tended to drink one calabash, as well, and men would consume three to four calabashes during this time. I was never offered sachets of hard liquor and never consumed them.

6.7.3.2 Data from observation

Pito was typically consumed by participants during interviews in their homes which appeared to make them relax and more content to sit down for longer periods of time. Only rarely would interviews end early, when participants became incoherent or if there was a question as to whether they could continue to consent to the interview. Once long interviews were completed, women tended to rush off to prepare meals and men tended to move to the 'spots' (places where men gather to socialize, usually under a centrally located large tree) and would then move on to consuming hard liquor in sachets for the course of the evening. During homestay observations, adults and children typically began the day with

a calabash of unfermented (non-alcoholic) *pito* in the morning, then adults moved on to the fermented variety by late morning during breaks from farm work, or continually if not working. Men tended to switch to hard liquor by mid-day if not working, and by late afternoon if working.

I did not typically observe men during homestays in the late evening, as it was expected that I be inside the homestead, and would have been considered intrusive if I sat with all male groups drinking in the dark. For safety reasons, I did not have home stays in the homes of men who were known to be heavy drinkers so observations were limited in some aspects.

During a participatory exercise entitled 'Urgent and Planning Matrix', 30 participants (15 women, 15 men) were asked to come up with actions that fit on a 2x2 grid. The four boxes of the grid represented 'urgent and important', 'urgent but not important', 'important but not urgent', and 'neither urgent nor important'. In the latter box, respondents tended to place the actions of other people rather than their own actions. The most frequently cited answer for actions done that are neither important nor urgent was '*making noise*', which is an expression that means a person is not being productive but simultaneously causing a disturbance, usually involving alcohol if used to describe the behavior of adults. The second more frequently cited answer was playing the board game 'Ludo'.

During the dry season (when much of the research took place) the only agricultural work undertaken is riverside gardening for those who have plots by the river. These are small plots (approximately 5x8 meters) and so maintaining them does not occupy much of the day. Men tended to spend one hour at the riverside in the morning and check back before dusk to ensure the fence had not been damaged by livestock. This period of the year is called the lean season and is associated with rationed food and few labour responsibilities

short of childcare (for women), and lasts until one must prepare the field for the following rainy season. One observably frustrated grandmother [FF1001] summarized the lean season's options as follows: '*You can go south for job or you can be sitting here doing nothing.*' I did not observe anyone doing no productive work for an entire day, but the abundance of leisure time during the dry season for men is easily observable. The villages of the case study are not electrified and so leisure activities which are frequently enjoyed in towns such as television are not available.

6.7.3.3 Data from livelihoods survey

Within the food consumption module of the WEAI, which asks a household head to indicate the numbers of times particular commodities had been consumed in the previous seven days (92%, N=72), nearly all households indicated alcohol had been consumed in the seven previous days with 36% (N=28) indicating alcohol was consumed in the home 5 or more days in the previous 7 days. Data on who in the household was consuming each commodity was not collected. These numbers may be an underestimation as the survey asked household heads about items 'consumed at home'. From ethnographic observations, alcohol is more typically consumed outside of the home – in markets or at social gathering spots within the village.

Regular off–farm work was rarely reported within the survey; less than 10% of village households contained a family member who engaged in off-farm paid work. The survey was conducted during the dry season when the only on-farm work opportunity is riverside gardening.

6.7.4 High prevalence of adult ill-health

6.7.4.1 Data from formal interviews and focus groups

In multiple interviews with elderly members of the communities, the older residents lamented how the younger generation is 'weaker' physically and sometimes mentally. This is typically attributed to the worsening of diet and the high consumption of whiskey and gin. One of the oldest women [FF801] in the village summed it up as follows: '*We ate what we had and they [the younger generation] eat what they have now, so we can't blame them, but our food made us strong – especially* pito *made us strong. It nourishes. But the drinks* [hard liquor sachets] *these people* [younger generation] *take make them weak. When you see a man or a woman with thin legs, that is because he has been drinking a lot over many years. Those men cannot work a field for a long time. They cannot maintain fields the same size as their fathers. If they hit themselves with a hoe* [accidentally] *they will not heal fast. Some will even sleep outside and not go to their wives and children. The sachets make you comfortable to sleep outside.*' She also listed behavior patterns common among some men and women that may be categorized as alcoholism.

In contrast, in multiple interviews with members of the younger generation (who make up the bulk of the current farm workforce in the community), the change in diet was attributed to reduced productivity of fields and poorer quality of seeds. '*The older seeds made you stronger, but they have very low yields now as compared to when the older generation was farming. In those days the fields were fertile and you could grow enough. Now you'll get very little if you use those old seeds on the fields as they are,*' said one young informant [FM2302]. He, and all others interviewed, perceive the current generation to be less strong than their forefathers to some extent, although explanations varied as to why.

6.8 Discussion

The stress of poverty manifests itself in multiple, often unexpected ways. Although the data presented on this subject is limited, it does make a strong case for the conclusion that the high levels of alcohol consumption impact the productive capacity and health of the population within the case study region. No single explanation can be attributed as the cause for the patterns observed directly, seen within the observation data and in responses to interviews, survey, and focus group questions. Concerns of idleness as a result of few employment opportunities and no electrification (Lundgren & Adams, 2014); poor public health outreach, and low levels of awareness/education of the health implications of over-consumption and consumption during pregnancy; a lack of family planning and high rates of anemia that make it hard to discern when pregnancy begins; limited access to clean water; and the need to suppress feelings of hunger are likely all latent contributing factors. These factors are then further exacerbated by disturbances to livelihoods and food security, both of which are sensitive to environmental change.

The risk of high rates of FASDs in particular poses an inter-generational challenge to adaptive capacity and community resilience that is entirely preventable. The breadth of cognitive and physical impairments associated with FASDs and other developmental disabilities (Mani et al., 2013; Grothmann & Patt, 2005) may limit the communities' ability to adjust their agricultural practices, now and in the future, to a rapidly changing climate and agricultural markets (African Development Bank et al., 2002). Extant literature has suggested that the prevalence of Fetal Alcohol Spectrum Disorders (FASDs) may be much higher globally and in the region than previously expected (CDC, 2015; Eaton et al., 2014; Olivier et al., 2013; May et al., 2005; Rosenthal et al., 2005). However, owing to the dearth

of resources available to address the disabilities or their possible causes, the role of disability in community adaptation to climate change remains unclear.

Adaptation interventions in the region typically aim to facilitate intensification of farming and the adoption of on-farm technologies, including climate information services, and value addition processes. In many instances this increases the complexity of farm and livelihood decisions (Jones et al., 2013). The need to make educated, informed, and motivated farming and livelihood decisions may increase for farming families striving to compete in local and regional agricultural markets. For persons with minor developmental delays, such as those on one end the FASD spectrum, this could increase the disadvantages they experience in terms of activity limitations and participation restrictions, as defined previously. For persons with major developmental delays, a difficult care burden may be placed on family members, straining limited resources and reducing time and energy to devote to productive work.

At present, developmental disabilities are overlooked in climate adaptation intervention design and implementation in West Africa and globally (GPDD & The World Bank, 2009). Developmental disabilities in low-resource settings are not well documented or understood, and further research is needed to investigate the causes, prevalence, and effects (World Health Organization & The World Bank, 2011). Including programs to reduce disabilities for future generations such as anti-stunting and anti-FASD interventions, within the auspices of climate adaptation (fundable through climate finance), would make programs more relevant to needs in affected regions.

Chronic undiagnosed ill health and physical weakness was observed and documented, some of which may be related to high levels of alcohol consumption, among other poverty-related risk factors. In interviews, a broad consensus existed that the current generation was

weaker, with poorer quality food, less productive farms, and greater exposure to health risk factors than previous generations. This has practical implications, such as a reduction in the land area that can be manually farmed, but also forces one to step back and think about what this broader trend means for intergenerational adaptive capacity. This pattern is striking given that Ghana has experienced tremendous growth since the oldest members of these communities were the ages of their adult children, to whom they are being compared.

At a national level, Ghana has seen huge technological advancements in telecommunications, transportation infrastructure, and the provision of medical and veterinary services as well as universal primary education and a national health insurance program. Concerning agriculture, new seed varieties have been introduced (some developed in Accra) with the aim of boosting harvests and performing better under varied conditions including drought. Further, Ghana's public infrastructure is substantially more developed than that of neighbouring countries. However, there remain vast differences sub-nationally.

The unequal growth between the north and south of Ghana, which is characteristic of middle income countries (Hoy & Samman, 2015), contributes to the limitation of response spaces available to households, as was elaborated in Chapter 4. The pattern puts forward the impression that the case study area has been left behind, or is regressing, in its pursuit to alleviate poverty, ill-health and food insecurity. Given this landscape, the case study illustrates well the limitations on residents to adapt in a changing climate, as compared to more wealthy and productive districts in southern Ghana. This is the case concerning the ability to adapt livelihoods, as well as the ability to avoid dangerous negative coping strategies, such as the reliance on alcohol to manage poverty and climate-induced stress.

6.9 Limitations of the study

This study has several limitations. First, the findings are limited to qualitative accounts of a specific region of northern Ghana, and are therefore not generalizable in all ways to the broader Ghanaian context, as regional differences exist. Second, relatedly, while the study provided substantial evidence of a high prevalence of alcohol consumption during pregnancy and developmental disabilities in Ghana, I am unable to precisely quantify the exact extent of these problems. Additional research is needed to understand how prevalent these issues are in Ghana. Third, although the research team spent an extensive amount of time in the region and every effort was made to reduce observer effects, there is always a risk with ethnographic work of this nature that individuals have modified their behaviour while under observation. Additionally, the findings may be subject to social desirability bias, as individuals may be disinclined to disclose information about drinking behaviour, child feeding, and the like that may be viewed negatively by the research team.

However, several of the trends outlined in this chapter are generalizable beyond the case study area. Across Sub-Saharan Africa, assistance to persons with developmental disabilities is limited. They are a chronically underserved population concerning health, education, and income across the sub-continent. Many of the issues observed in northern Ghana may exist in other low and middle-income country (LMIC) contexts, as many are linked to rural poverty. Consumption of alcohol during pregnancy (Olivier et al., 2013), child under-nutrition (Horton, 2008), lack of early childhood stimulation (Baker-Henningham & Lopez Boo, 2010), infectious diseases, the stress due to poverty, and gendered food distribution (Hyder et al., 2005; IASC, 2005), exist in other LMICs. Given the existence of data showing links between these issues and developmental disabilities, where these problems exist it is

possible that there could also be a high prevalence of developmental disabilities, as in northern Ghana, to which the findings of this study are informative.

LMICs are also disproportionally affected by climate change, making adaptive capacity essential for many LMIC populations (Nielsen & Vigh, 2012). That adaptive capacity, however, could be severely limited by developmental disability or reduced cognitive capacity. As a result, the need for researchers, policymakers, development workers, and local authorities to be cognizant of risk factors for developmental disabilities, the need for adaptive capacity, and the effects of developmental disability on adaptive capacity extends well beyond northern Ghana to any poor, rural LMIC setting.

6.10 Policy relevance

This study has several important policy implications. Key policy recommendations to reduce risk factors include:

- ***Integrate prevention of developmental disabilities into existing health programs:*** Behavioural interventions to prevent disabilities, such as efforts to prevent drinking during pregnancy, family planning and education on nutrition, and parenting practices should be integrated into existing health programs, particularly primary care, maternal and child health (MHC), and sexually transmitted infection (STI) systems. Building off of systems that are already present in Ghana and reaching high-risk individuals during key times, such as before, during, and after pregnancy, is resource efficient and may increase recruitment to and retention in services. Systematic integration necessitates that policy-makers include prevention of FASDs as part of national guidelines on maternal and child health (MHC), and that all MHC guidelines include attention to mothers who may be intellectually disabled. It also necessitates that primary healthcare workers are trained in prevention and management of intellectual disabilities, including FASDs—this content must be integrated into the curriculum of medical schools and other health professions training programs.
- ***Employ best practices for education and prevention programs:*** Policy-makers and health care workers acting to integrate disability prevention into existing systems can model such efforts on existing, effective behaviour change programs. For instance, considerable evidence exists on HIV-prevention programs that have effectively worked with community leaders to change local norms and attitudes about sexual practices. Similar strategies could be employed to drive change in alcohol use (Rosenthal et al., 2005). Health warnings concerning alcohol

consumption during pregnancy should be required on alcohol advertisements and on sachets/bottles. Using illustrations for non-literate populations would be most effective. Currently, towns within the Upper West region are home to large numbers of public service notices – most notably concerning malaria and HIV/AIDS transmission prevention. In Lawra town, which is the closest town to the communities studied, there are no signs with messages on the risks of drinking while pregnant. Large beer advertisements do not include text on avoiding drinking while pregnant, but rather encourage patrons to 'drink responsibly' with no further direction. No health labeling is included on sachets of hard liquor.

- ***Invest in long-term poverty reduction strategies:*** Many of the causes of disability are, either directly or indirectly, related to poverty and can only be averted through long-term, coordinated efforts to reduce poverty in the region. Such efforts must incorporate attention to adaptive capacity and the effects that the changing climate may have on agrarian communities, but must extend beyond climate-related programs and must include international, national, and local actors working in coalition.
- ***Promote and improve access to family planning***: Health authorities should encourage family planning so that women know when they are pregnant in order to avoid alcohol consumption while pregnant. Planned pregnancies would also improve the ability to space births so that children do not need to be weaned so quickly and be at risk of protein deficiencies.

In light of the far-reaching and complex nature of the problem, a multi-sectoral approach will be necessary to ensure an effective response to these pressing issues. This response must be driven forward not only by government (from the local to the national level), but also by traditional authorities, non-governmental agencies targeting adaptive capacity, development agencies, and researchers.

6.11 Conclusion

In summary, maladaptive strategies to manage stress and the prevalence of disabilities and chronic ill health may be a much stronger impediment to building communities with high adaptive capacity than previously considered. This chapter has demonstrated the pathways through which response spaces are limited as a result of the reliance on these maladaptive strategies. A greater focus on these stressors is needed in both programming and research. As we have seen in previous chapters, although communities in the region are already

responsive and resilient to specific environmental changes, adaptive capacity is not equal across and within households, and some households require building additional capacity through investment of resources to adapt and benefit. Exposure to risk factors that impede healthy cognitive and physical growth and working capabilities of the poor could increase social difference and inequality within the case study region for current and future generations of farming families. Ultimately, for subsistence-oriented farming communities that experience the fluctuations of climate, adaptive capacity begins at the antenatal stage of life and must be nurtured through each life phase. Building adaptive capacity must consist of not only improved farm production, but a more holistic consideration of food and livelihood security, which includes the absence of risk factors and maladaptive coping strategies that impede healthy living.

7 Conclusion

This thesis has investigated how adaptive capacity and response spaces differ based on points of social differentiation; the drivers that limit or exacerbate adaptive capacity and response spaces; and the implications of these responses for humanitarian, development, and government programmes that aim to support these populations. It has brought to light not only the unequal vulnerability to environmental change experienced by individuals based on specific points of social differentiation, but also their unequal response spaces and adaptation outcomes. It followed context-specific local drivers and looked deep into the familial and cultural political lives of households to better understand the interdependent nature of empowerment within the household, the distribution of scarce food, control over livelihoods and income, the management of poverty-induced stress, and the risk these drivers pose to public health. Out of this research, a multi-level vulnerability landscape surfaced, characterized by a food system on the margins and unequal adaptation within the case study population.

It found that farmers experience multiple disadvantages being located in the Upper West of Ghana as compared to southern regions, and are underserved by multiple governmental and NGO institutions. The farmers in turn experience heterogeneous vulnerability and access to response spaces at the community level, which are deeply entrenched in social norms that favour adult male bodies, male spaces, and male-typical productive roles. There are however, individuals and families that stand outside these trends and are able to adapt and benefit, which highlights the need for an intersectional approach when examining the household and sub-household context.

This concluding chapter will summarize key findings from the three empirical chapters. It will then discuss two themes of programmatic implications of the research in greater depth: (1) the use of women's empowerment and gender mainstreaming and (2) the use of safety nets and adaptive social protection. It will then outline the limitations of this study, overall, and detail important areas for future research. It will conclude with a closing section.

7.1 Summary of key findings

This thesis has used a unique conceptual framework which draws heavily on systems thinking to consider the overall food system of the case study area in Lawra District, Upper West Ghana, through multiple lenses – (1) adaptation and resilience theory, including an application of systemic reflection, (2) food systems, (3) social differentiation and intersectionality, (4) feminist research theory including positionality and systemic intervention, and (5) Sen's capabilities approach including the concept of multi-dimensional poverty and theory on inequality. These theories combined offer the discipline a theoretical framing that lends itself well to applied research to inform policy and programming. Through this framing we gain key insights into context-specific capacities and limitations from the regional level down to the sub-household level. This is a unit of analysis less commonly reached in the field of climate adaptation and food security, which has predominantly focused on production and food access at household, village, and regional levels.

This framing has guided the research in a grounded theory manner to follow specific local drivers in order to explore how these drivers produce socially differentiated impacts, which vary between and within households. We have seen in Chapter 4 that climate and weather related stressors must be considered in the context of broader socio-economic interdependent stressors, and that individuals and households are responding to

simultaneous stressors (both macro and micro). Crop failure, in particular, is typically the product of challenging seasonal conditions (low rain, rain gaps, late start to the season, etc.) as well as idiosyncratic events like the death of family members, accidents, and unanticipated labour constraints. As such, there is chronic vulnerability to crop failure in an exclusively rain-fed subsistence-oriented agricultural system and challenging socio-economic conditions with high levels of risk and no formal social safety nets.

We have also seen in Chapter 4 that there are social leveling effects that reduce all households' access to adaptation options, including limited off-farm work opportunities, no electricity at either village in the case study area, limited river access, poor market access, limited irrigation, and so forth. However, the data has shown that response spaces are further limited for specific individuals and households. Although the differences between different households and individuals, in terms of their access to adaptation and social deprivations, are innumerable, we have seen that approaching the data through the lens of social differentiation and intersectionality provides some clarity to the differing adaptability and productivity found in the case study area. One clear insight gained from the data and these lenses, for example, is that women in unequal marriages have particularly strong limitations on the actions they can take to protect their livelihoods.

Chapter 5 documented high levels of food scarcity and malnutrition in multiple forms. It demonstrated that improving production alone is not the answer to improving food and nutritional security in a changing climate. Under-nutrition in the case study ultimately stems from socially-differentiated poverty, low levels of knowledge on the nutritional needs of children and the prioritization of 'productive bodies' when food is scarce. The pattern of unequal distribution of food between men and women and between adults and children has

been made clear, exemplifying the social norms that favour adult men, which are both pervasive and powerful in the case study area. The food access patterns highlighted in chapter five are part of a larger trend of incremental disadvantages to children and women as well as a broader political and socio-economic pattern that disadvantages the Upper West and other northern regions of Ghana. Both the gendered and geographical patterns of disadvantage outlined in chapter five, in turn, provide further insight into the differing adaptability and access to response spaces.

In Chapter 5 we have seen that households in the case study region are buying large portions of their daily food, which is important for understanding their dietary and distribution choices. At times, farmers in the case study area realise they have made a poor decision when they reflect upon experiences, such as initially selling too much of their harvest and then having to buy it back at higher prices. These choices may be impeded by the high cognitive load produced by hunger and poverty, and are a crucial piece in understanding responses spaces. Cognitive load may be a further limitation to taking effective adaptive decisions, which is mediated by a number of factors including hunger, exhaustion, stress, and cognitive development in the early years of life (Mani et al. 2013). The difficulty of these choices may also be impacted by high inter-annual variability of seasonal rainfall and the resulting inter-annual variability of food production – both of which are likely to become more variable as a result of climatic change (Mcsweeney et al. 2010).

Smoothing out access and consumption of food throughout the calendar year is an urgent necessity in the case study area to avoid nutritional deficiencies, stunting and wasting, which can all have life-long negative heath impacts, which in turn limit one's response space. It was demonstrated in Chapter 5 that women and men are prevented from

providing optimal diets for themselves and their children throughout the year because of many different aspects of their poverty and climatic vulnerability, which are unique to each family. These are a mix of micro and macro differentiations, such as gender or employment status (macro) and empowerment within a marriage or access to a strong dependency network (micro). It is at the intersection of a household's micro and macro points of social differentiation where the most comprehensive understanding of the social determinants of their health and nutritional status can be found. Smoothing out this variability in access will involve addressing seasonal food scarcity, often referred to as the 'lean season' in the case study area, as well as preferential household distribution of food that disadvantages women and children.

Detriments to healthy growth and the development of future generations of farming families were documented in both chapter five and six in the form of nutritional deficits and in-utero exposure to alcohol. Exposure to risk factors that impede healthy growth and development is a type of poverty trap, whereby families get caught in a negative intergenerational cycle of poor developmental outcomes and limitations to the response space. This could in turn heighten the social difference and inequality documented within the case study region for future generations. Both chapters highlighted that, for subsistence-oriented farming communities, building a resilient community involves reducing public health risk factors through each life phase, beginning at the antenatal stage of life. To this end, a more holistic consideration of food and livelihood security would include the absence of public health risk factors and maladaptive coping strategies for stress, poverty, and environmental change that impede healthy living. Furthermore, the pattern identified in Chapter 6, whereby the older generation is perceived as healthier than the current adult

generation, is striking given the tremendous growth in Ghana in recent decades. Given this pattern, the message of unequal growth, which is characteristic of middle income countries (Hoy & Samman, 2015), is well illustrated in the case study region.

7.2 Programmatic implications

Climate adaptation programmes have become pervasive in the development and humanitarian sectors. Climate adaptation programs in their most common form in practice are interventions to build the adaptive capacity and resilience of specific populations at one or more levels (Horn-Phathanothai & Tanner 2014). The risk of creating inequalities or exacerbating existing inequalities is present in all humanitarian and development oriented programming, and climate adaptation programing is no different. In fact, climate adaptation programing may be more prone to producing unexpected inequitable outcomes because of uncertainty inherent in predicting the future and the increased frequency of shocks and mini-shocks that disproportionately affect marginalized people.

For sub-Saharan African countries, the globally shared but differentiated responsibilities for mitigating climate change have been partially facilitated through national adaptation plans of action and a suite of climate adaptation and mitigation programs implemented through donor agencies. Many of these efforts, however, have replicated the shortcomings of other poverty-alleviation and food security programs. For example, Climate Smart Agriculture (CCA) programs have adopted intervention models used within development programming with little demonstrable impact, like farmer field schools (Waddington & White 2014). This low-impact poverty reduction model is quickly becoming a ‘best practice’ in the current climate adaptation programmatic landscape. Climate adaptation programmes in the case

study area and elsewhere also frequently include village loans and savings schemes targeted towards women, who in turn will begin women-typical income generating activities which are low yield or have high market saturation, as was discussed in Chapter 4.

Climate change adaptation programmes also rely on many of the same front line institutions as development programmes, such as agricultural extension workers – the fleet of which was gutted throughout sub-Saharan Africa during decades of World Bank-led structural adjustment programmes (Sarris & Shams 1991). Extension services in Ghana remain weak with long-standing hiring freezes, staff truancy, limitations to staff transport, and unfilled positions, which has limited the implementation of climate adaptation policy on the ground (Sova et al. 2014). Climate change adaptation programmes, like development programmes, may also homogenize the differentiated needs of impoverished persons in these contexts. One example of this is the large-scale climate resilience building program in Tabier Village, discussed in Chapter 4, which selected household beneficiaries based on meeting attendance rates rather than on any distinction between the varying needs between households. Further, the research found that individual officials involved in the implementation of supports held views that do not recognize the equality of marginalized sub groups of the population – in particular, women and girls.

With these programmatic implications in mind, two themes will be addressed in more detail in the following sub-sections: 7.2.1 women's empowerment and mainstreaming, and 7.2.2 social safety nets and adaptive social protection.

7.2.1 Women's empowerment and mainstreaming within programmes

This thesis explored multiple ways in which people experience marginalization. Gender emerged as a prominent marker of social differentiation both in the case study area overall and within households. Gender was one of the greatest limitations to response spaces. Men felt limited in their ability to undertake traditional female roles or publically consult with their wives, but it was women who reported the greatest limitations to their response spaces, particularly in terms of decision-making ability, access to farmer extension services, and access to off-farm income generating opportunities. Chapters 5 and 6 demonstrated the multi-dimensional nature of women's empowerment within the household, exemplified by individual women having mastery of their own affairs in some aspects of life and not in others – such as being able to join savings groups or make productive decisions, but being unable to choose family size or enforce child feeding practices that differ from the preferences of husbands or mothers-in-law.

Chapter 2 covered the prominence of the concepts 'gender mainstreaming' and 'women's empowerment' within climate change adaption programming. Multiple NGOs, community-based organisations, government entities, and credit unions in the case study area claim to increase women's empowerment through enterprise. Further, enterprise and off-farm income generating activities among farming families have been advocated as a viable strategy to supplement farm-based incomes and reduce vulnerability to variable rainfall. However, these empowerment initiatives rarely attempt to make structural change concerning the kinds of economic activities that women could be trained in, nor do they generally consider market saturation for typical women's enterprises. Findings discussed in Chapter 4 showed that women who engage in small enterprises may attain important social benefits that empower them to feel good about themselves and their role within the larger

community. They may also obtain economic benefits that empower them to handle unanticipated expenses and other mini shocks, but the earnings remain too small for women to buffer themselves from the stressors they routinely face.

This thesis has argued that feminist research is needed to understand the root causes of the disproportionate vulnerability women experience, in order to design policies and programs that can meaningfully reduce that vulnerability. Philanthropic organisations with a mandate to 'do no harm' (Collaborative for Development Actions 2004), which includes the majority of development and humanitarian agencies, have a mandate to consider the unintended, gendered consequences of their operations. As such, these institutions have a mandate to critically assess women's unequal vulnerability and unequal access to response actions to secure their livelihoods in a changing climate. This involves understanding the heterogeneous nature of women's vulnerability and limitations, which becomes apparent when using an intersectional approach.

The women's narratives presented in Chapter 4 demonstrated heterogeneity of the empowerment of women within households. For example, Woman One described her marriage as 'we are two hands clapping' and emphasized how her husband regularly consults with her on decisions affecting the family. In contrast Woman Two secretly used birth control, in hopes of limiting her risk of contracting sexually transmitted infections and HIV/AIDS, which provided an example of how in some families, child-bearing aged women are stripped of all agency. In Woman One's narrative, she emphasized her ability to leave the home and live with sisters who have a business in another city. Her example highlights that women's empowerment may be most directly related to a way out of a particular family dynamic, raising the question as to whether empowerment interventions should

focus on women's ability to migrate from their families, temporarily or permanently, as needed. This is contrary to current mainstreamed empowerment or 'gender' policies and programmes, which feminist scholars have argued focus too heavily on assisting women within the narrow confines of women-typical roles and responsibilities – namely facilitating ways women can be better wives and mothers (Cornwall & Edwards 2014).

7.2.2 Social safety nets and adaptive social protection

A major trend in the data is underlying social vulnerability and the multitude of ways individuals and households are at risk of losses and the use of negative coping strategies. Chapter 4 outlined the conditions of crop failure, which were in each instance a combination of challenging personal circumstances and unfavourable seasonal conditions. Chapter 5 demonstrated the seasonal nature of hunger, with seasonal productivity being linked to the length and extremity of the lean season leading up to the next harvest. A difficult lean season is associated with multiple negative coping strategies that disproportionately affect women and children and in some instances have life-long detrimental impacts on growth and development of young children. Chapter 6 looked in-depth into the management of climate and poverty-induced stress, which is heavily related to the lean season, and outlined another set of dangerous negative coping strategies – namely the use of alcohol to mitigate stress and feelings of hunger. The findings point to the fact that there is underlying vulnerability that production-oriented programming alone, such as climate smart agriculture, is not well placed to address.

One viable way to deal with so many differing risk factors and possible adaptive or coping actions may be through a formalized social safety net. At present there are a number of social protection programs in place in Ghana, including national health insurance, which the

case study area relies on heavily, although non-pregnant adults are required to pay an annual premium, and school feeding programmes, which are present in some schools in Lawra District but is not operational at the primary school that the children of the case study area attend. The most prominent social cash transfer program in Ghana is the Livelihood Empowerment Against Poverty (LEAP) programme, although it has very limited coverage.

LEAP is a social cash transfer programme that targets the extreme poor who meet certain eligibility requirements. It targets (1) persons above 65 years without any form of support, (2) severely disabled people without productive capacity, (3) orphaned and vulnerable children, and (4) extremely poor or vulnerable houses who also have pregnant women or mothers with infants (Government of Ghana 2017a). Although Lawra District is home to some of the poorest villages in Ghana, and has one of the highest rates of households coverage within the LEAP programme (4488 households are currently registered from Lawra District) (Government of Ghana 2017b), the programme only reaches approximately 4% of the population in Lawra District. The eligibility requirements are such that only households who experience chronic destitution are eligible, which precluded all but 4 households in the case study area, at the time of data collection. As such, this social safety net's coverage is too small to reduce the types of vulnerability discussed in this thesis.

The concept of adaptive or shock-sensitive social protection is becoming increasingly popular in the humanitarian and development sectors. Major donors including the UK's Department for International Development (DfID) have made substantial investments in the development and trialling of the approach. Adaptive social protection incorporates both climate change adaptation and disaster risk reduction into social protection programmes, acknowledging the link between environmental changes, shocks, and disasters with the

social protection needs of affected populations (Vincent & Cull 2012). It acknowledges that social protection is intrinsically shock sensitive in that access to cash helps people buffer themselves from both covariate and idiosyncratic shocks. However, the explicit addition of disaster risk reduction and climate change adaptation considerations makes social protection programmes more resilient to the vulnerabilities vulnerable populations face. Famous examples from Africa of adaptive social protection are Ethiopia's Productive Social Safety Net Programme and Kenya's Hunger Safety Net Programme, which are able to scale up quickly based on a disaster (typically drought) to distribute cash through public works programmes and cash transfers.

For the case study area, the analysis of underlying social vulnerability and food insecurity indicates that a seasonal safety net of this variety, that is able to scale up vertically (increasing the amount of support) and horizontally (increasing the number of beneficiaries entitled to support), may be a viable strategy to address the needs of the case study population and northern Ghana more broadly. Such a programme, if designed in a gender-sensitive way, could also positively impact women in particular – both by reducing the disproportionate rationing of food they experience during times of scarcity and by providing a basic cash flow that may allow them the freedom to step out of disempowering domestic situations. This would be consistent with the literature from the industrial country context on the link between basic income and freedom and security (Parjis 2004; Pateman 2004).

7.3 Limitations

The findings are limited to a specific region of northern Ghana and are therefore not generalizable in all ways to the broader Ghanaian context, as regional differences exist. Village level comparisons in particular are not generalizable as only two villages were

studied. As such, the greatest strength of the data is in its richness and multiple sources and the resulting comparisons that can be made at individual and household levels. This thesis presented data that has a wide breadth, attempting to cover many aspects of the lived experience of residents of the case study region. However, in doing so not all areas of the food system could be covered in depth in the course of this doctoral research period. Boundaries needed to be drawn about what elements of the system were in and out of the analysis. Further, the case study area is largely ethnically homogenous and so ethnicity was not explored as a point of social differentiation, although it is likely a relevant point in other areas of Ghana, especially in cities, where ethnic diversity plays a strong role in the landscape of marginalized people.

I was unable to precisely quantify the exact extent of several of the challenges to building adaptive capacity and food security outlined in this thesis. Concerning nutrition and alcohol consumption, several imitations have already been covered within the empirical chapters. These are (1) oedema of the abdomen potentially biasing child growth records, (2) having only weights for age anthropometric data, (3) dog meat and wild vegetables not being included within the food consumption module of the WEAI survey, (4) the survey not capturing who eats what within the household, (5) the alcohol content within *pito* is variable and largely unknown, which makes it difficult to assess the risks to a foetus, and (6) the precise consumption rates of alcohol in the case study area remain unknown. Further, likely incomplete answers to sensitive questions on certain local drivers, including child rearing, family planning, household dynamics between spouses and with in-laws, the consumption of alcohol, women's decision making on productive activities, and gendered food rationing, also limited the findings. The findings may be subject to social desirability bias, as individuals

may be disinclined to disclose information that may be viewed negatively by the researchers. There is also always a risk with ethnographic work of this nature that individuals have modified their behaviour while under observation, although every effort was made to reduce observer effects.

The initial design of the research was to cover intangible points of social differentiation – namely worldviews – in addition to the more tangible points of social differentiation, including gender, age, education levels, and so forth. It is acknowledged within the fields of strategic planning, decision theory and systems thinking that making the worldviews that inform any planning and decision making process explicit is essential. The risks of not doing so are both moral and practical: that the worldviews of a particular elite dominate at the expense of affected stakeholders and that ill-informed or biased notions pervert planning processes or block adaptive capacity. Furthermore, since the merits of any plan are assessed in accordance with a particular worldview, they will determine the buy-in of affected citizens to interventions aimed at building resilience or adaptive capacity, and therefore the effectiveness and sustainability of that intervention. However, there is a deficit of practical participatory methods for uncovering worldviews relevant to adaptation and resilience planning. In part this is because worldviews are not simple to capture.

For this doctoral study I designed a simple practical methodology for surfacing worldviews relevant to adaptation and resilience planning and decision-making. This involved a suite of participatory methods that were tailored to this end including a repertory grid, which was specially designed to surface latent perspectives, narrative techniques, interviews, and direct participant observation. The theory behind the choice and application of those particular techniques draws on personal construct theory, adaptation and resilience theory,

and cognition, as was outlined in Chapter 2. This was attempted within the research project but the results were difficult to analyze and the rigor of the methodology developed was not high enough to be included in this thesis. In particular, it became clear that the participants struggled to place the cards on the repertory grid in an intentional way. They would give verbal cues to their thoughts on particular actions outlined on the cards, which were captured through video recordings and analyzed qualitatively as an interview. However, the placement of the cards, and the relation of the cards to one another did not appear clear to the participants. The exercise also took a lot of time to first explain and then complete. As such, participants became disinterested and tried to finish the task as quickly as possible during the later grids, drawing into question the rigor of the exercise even further over the course of each repertory grid an individual was asked to complete.

Lastly, I was not able to do evaluations of the interventions available to the case study area. This was beyond the scope of the doctoral research as it would have been time consuming, not easily aligned to the timeframe of a doctoral research project, and I would have needed extensive permissions from the implementing organisations of the studied intervention. In lieu of evaluating local available interventions I relied on evaluations literature of common climate adaptation programmatic models, such as farmer field schools and the on-farm techniques categorized as CSA. However, understanding more fully the impact of the supports available to the case study population would have been helpful to the analysis, especially pertaining to the targeting of interventions (including any biases in the targeting), the theories of change used within interventions, and the extent to which these interventions were achieving their stated goals, especially as it pertains to building adaptive capacity.

7.4 Areas of future research

There are a number of areas for future research made clear in this thesis. The household has been viewed as a 'black box' within development discourse with little clarity on the culturally specific dynamics playing out within it. While understandings have improved, there is still much unknown about how food distribution happens within the household, among other behaviours. This study has added some novel qualitative and quantitative data to the discussion, but in many ways it creates more questions than answers. Chapter 5 demonstrated the clear need for more research into nutrition interventions suitable to needs of the case study area which is affected by seasonality as well as social norms around feeding.

Further, more research is needed into the annual variability of food production and its links with undernutrition. One of the key steps to making the most common agricultural interventions nutrition sensitive may be to identify if adults and children are chronically undernourished in both 'good' and 'bad' years of crop and livestock production. Rigorous research to answer this question may inform, for example, if there is a need to smooth out the variability of seasonal production and provide supports during difficult years, or if the set of staple foods being consumed needs to be improved through fortification or supplemented with alternative foods in all years.

It was demonstrated in Chapter 6 that maladaptive strategies to manage stress and the prevalence of disabilities and chronic ill health may be a much stronger impediment to building communities with high adaptive capacity than previously considered. A greater focus on these maladaptive strategies is needed within the study of climate change

adaptation. In particular there is a dearth of evidence on the consumption of alcohol at high levels and during pregnancy in Africa outside of studies done in townships in South Africa. Literature in the field of climate adaptation fails to consider the causes and consequences of alcohol consumption, with few studies specifically focusing on alcohol consumption and broader community resilience (Hodgson, 2008; Lundgren & Adams, 2014; Eaton et al., 2014). While this study provided substantial evidence of a high prevalence of alcohol consumption during pregnancy and developmental disabilities in Ghana, additional research is needed to understand how prevalent these issues are in Ghana.

Although I was unable to capture worldviews as an intangible point of social differentiation, it remains a worthy pursuit. Given the opportunity I would like to refine the methodology and undertake an additional study on worldviews using an adapted version of the repertory grid technique to operationalize personal construct theory. The results of the thesis provide further rationale for continuing to research worldviews. Over the course of the fieldwork, I encountered individuals with highly variable worldviews that appeared to impact the extent to which they were interested in joining farming groups, trying new technologies including CSA practices, making longer-term investments and so forth. More work is needed to test these relationships empirically.

7.5 Conclusion

This thesis has argued that in order to support the most vulnerable, we need to both understand their differing vulnerability as well the ways in which their response spaces and adaptive capacity have been differently shaped. The results have conveyed the complexity of community-level vulnerability and the ways that deprivations are experienced unequally

between the case study area and more prosperous southern regions of Ghana, between and within families in the case study area, and in the case of child stunting and FASDs, between generations. The ability to 'adapt and benefit' through a suite of climate change adaptation interventions that build adaptive capacity is touted by many humanitarian and development institutions as integral to food security today. However, this thesis has demonstrated that adapting and benefiting is a far reach for the smallholder farming families of the case study area. The families I was embedded with more commonly manage multiple interdependent stressors through a mix of adaptive actions and negative coping strategies – the relative benefit of which varies between and within households.

The three results chapters have made the case that environmental change has wildly differing impacts on adaptive capacity based on points of micro and macro social differentiation. For example, we have seen that being a woman (a macro point of social differentiation) produces disadvantages but the equality within their marriages (a micro point of social differentiation) and the resultant power they hold within their households varies between families. This, in turn, has a demonstrable effect on how individual women are able to protect their livelihoods. As such an intersectional, context-specific approach is required to achieve food security in these contexts. In the absence of an intersectional approach, policies and programmes risk targeting the wrong individuals and households, and misunderstanding the needs of the affected population.

Many of the results presented in this thesis have both practical and moral significance. In the theory laid out in Chapter 2 on systemic reflection on empowerment and the social theories surrounding equality, this thesis was grounded in the supposition that higher inequality is undesirable and that societies with greater equality have higher utility

(Wilkinson & Pickett 2009). It is from this basis that we apply Sen's Capabilities Approach to interpret and guide metrics on poverty, development and adaptation, and apply feminist research theories to examine the extent to which vulnerabilities and adaptation options are producing outcomes that increase inequality. Understanding the differing vulnerability of subsistence-oriented smallholder farming populations, like those who inhabit the case study area, as well as the ways their response spaces and adaptive capacity have been differently shaped, will be important for the program design and targeting strategies of interventions to achieve the 2015 Sustainable Development Goals pledge to 'leave no one behind'. This thesis has aimed to contribute to this enormous task.

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nicef.org/programme/breastfeeding/innocenti.htm\nhttp://innocenti15.net/declaration.pdf.pdf\nhttp://whqlibdoc.who.int/publications/2010/9789241599757_eng.pdf.

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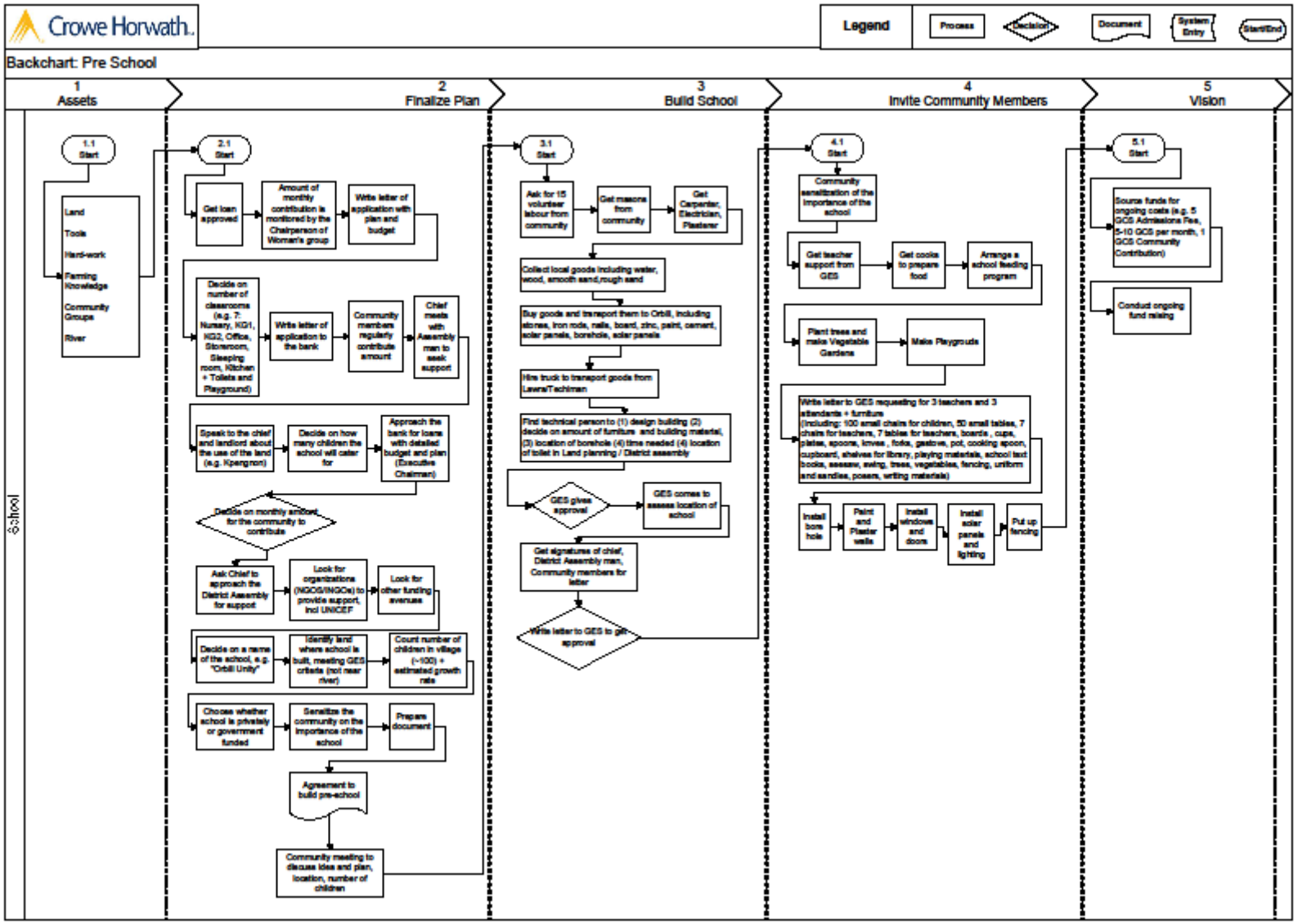
Appendix 1: Seed funding plan


Crowe Horwath.
Legend
Process
Decision
Document
System Entry
Start/End
Backchart: Pre School
1 Assets
2 Finalize Plan
3 Build School
4 Invite Community Members
5 Vision
School
1.1 Start
Land
Tools
Hard-work
Farming Knowledge
Community Groups
River
2.1 Start
Get loan approved
Amount of monthly contribution is monitored by the Chairperson of Woman's group
Write letter of application with plan and budget
Decide on number of classrooms (e.g. 7: Nursery, KG1, KG2, Office, Storeroom, Sleeping room, Kitchen + Toilets and Playground)
Write letter of application to the bank
Community members regularly contribute amount
Chief meets with Assembly man to seek support
Speak to the chief and landlord about the use of the land (e.g. Kpengnon)
Decide on how many children the school will cater for
Approach the bank for loans with detailed budget and plan (Executive Chairman)
Decide on monthly amount for the community to contribute
Ask Chief to approach the District Assembly for suppot
Look for organizations (NGOS/INGOs) to provide support, incl UNICEF
Look for other funding avenues
Decide on a name of the school, e.g. "Orbill Unity"
Identify land where school is built, meeting GES criteria (not near river)
Count number of children in village (>100) + estimated growth rate
Choose whether school is privately or government funded
Sensitize the community on the importance of the school
Prepare document
Agreement to build pre-school
Community meeting to discuss idea and plan, location, number of children
3.1 Start
Ask for 15 volunteer labour from community
Get masons from community
Get Carpenter, Electrician, Plasterer
Collect local goods including water, wood, smooth sand,rough sand
Buy goods and transport them to Orbill, including stones, iron rods, nails, board, zinc, paint, cement, solar panels, borehole, solar panels
Hire truck to transport goods from Lawra/Tachiman
Find technical person to (1) design building (2) decide on amount of furniture and building material, (3) location of borehole (4) time needed (4) location of toilet in Land planning / District assembly
GES gives approval
GES comes to assess location of school
Get signatures of chief, District Assembly man, Community members for letter
Write letter to GES to get approval
4.1 Start
Community sensitization of the importance of the school
Get teacher support from GES
Get cooks to prepare food
Arrange a school feeding program
Plant trees and make Vegetable Gardens
Make Playgrouds
Write letter to GES requesting for 3 teachers and 3 attendants + furniture (including: 100 small chairs for children, 50 small tables, 7 chairs for teachers, 7 tables for teachers, boards , cups, plates, spoons, knives , forks, gastove, pot, cooking spoon, cupboard, shelves for library, playing materials, school text books, seesaw, swing, trees, vegetables, fencing, uniform and sandles, posers, writing materials)
Install bore hole
Paint and Plaster walls
Install windows and doors
Install solar panels and lighting
Put up fencing
5.1 Start
Source funds for ongoing costs (e.g. 5 GCS Admissions Fee, 5-10 GCS per month, 1 GCS Community Contribution)
Conduct ongoing fund raising

Appendix 2: SIA Household Questionnaire

Household Questionnaire modules for the SIA Empowerment in Agriculture for Adaptive Capacity Index

Example Questionnaire for Ghana Climate Change Agriculture and Food Security (CCAFS)

NOTE: This instrument has been modified for the purposes of the SIA research project in Nepal. It is a modified version the original household questionnaire modules included in the Women's Empowerment in Agriculture pilot survey for the Uganda case study, developed by the International Food Policy Research Institute (IFPRI). This information can be used in conjunction with the Individual level questionnaire to construct and validate the index. Modules highlighted in green are required; modules or questions highlighted in blue are used for validation. Note that this instrument must be adapted for country context including translations into local languages when appropriate.

MODULE A. HOUSEHOLD IDENTIFICATION (REQUIRED)

Household Identification	Code		Code
A01. Household Identification:.....		**A06**.Main religion of household (enter code) 1 = Muslim 2 = Christian 3 = Animist/traditional 4 = Other (specify)….....	☐
A02. Village name: ..... **A03.** Date of interview		**A10**. Main language of the household (enter code): 1 = Dagaari 2 = Twi 3 = English 4 = other (specify)	☐
A04. Type of household: 1 = Male and female adult 2 = Female adult only (eg. widow, husband living abroad, divorced) 3 = Male adult only (eg.widower, divorced) NO adult women in HH 4 = Other gender identity:(specify)_____	☐	**A11** Main ethnic group of the household (enter code) 1 = Dagao 2 = Twi 3 = Ga 4 = Volta area	☐
A05. Name of primary respondent: **Surname, First Name: .....**		**A20.** Final outcome of interview (enter code) **1 =** Completed 2 = incomplete 3 = Absent 4 = Refused 5 = Could not locate	☐
A06. Name/code of enumerator:		**xx**. Signature of supervisor:	

Informed Consent for SIA Empowerment in Agriculture for Adaptive Capacity Index (REQUIRED)

Informed Consent: *Before beginning the interview, it is necessary to introduce the household to the survey and obtain their consent to participate. Make it clear to them that their participation in the survey is voluntary. Please read the following statement in the language of interview:*

Thank you for the opportunity to speak with you. We are a research team from the University of Oxford working in collaboration with Ministry of Food and Agriculture (MOFA). We are conducting a survey to learn about agriculture, food security and wellbeing of households in this area. You have been selected to participate in an interview which includes questions on topics such as your family background, dwelling characteristics, asset ownership and income earning activities. The survey includes both a section to be asked about the household generally, in addition to sections which will be asked to a primary adult male and female in your household if applicable. These questions in total will take approximately 1.5 hours to complete and your participation is entirely voluntary. If you agree to participate, you can choose to stop at any time or to skip any questions you do not want to answer. Your answers will be completely confidential; we will not share information that identifies you with anyone. After entering the questionnaire into a data base, we will destroy all information such as your name which will link these responses to you.

We will also interview other households in your community and in other parts of Lawra District, Ghana. After we collect all the information we will use the data to make a study about how various programs can be most helpful to the people in this area. Do you have any questions about the study or what I have said? If in the future you have any questions regarding study and the interview, or concerns or complaints we welcome you to contact Meghan Bailey, by calling 0205963825. We will leave one copy of this form for you so that you will have record of this contact information and about the study.

Please ask the participants (male and female) if they consent to the participation in the study (check one box):

Participant 1:	YES	NO	Participant 2:	YES	NO

I _____, the enumerator responsible for the interview taking place on _____, 2012 certify that I have read the above statement to the participant and they have consented to the interview. I pledge to conduct this interview as indicated on instructions and inform my supervisor of any problems encountered during the interview process.

If the household does not give consent to all of the data collection, stop the interview and inform your team leader. Team leaders will discuss the reason for this refusal and decide whether a partial data collection is possible for this household.

Informed Consent for SIA Empowerment in Agriculture for Adaptive Capacity Index

DUPLICATE: *Enumerator: Tear out this page, and leave it with the household.*

Informed Consent: *Before beginning the interview, it is necessary to introduce the household to the survey and obtain their consent to participate. Make it clear to them that their participation in the survey is voluntary. Please read the following statement in the language of interview:*

Thank you for the opportunity to speak with you. We are a research team from the University of Oxford working in collaboration with Ministry of Food and Agriculture (MOFA). We are conducting a survey to learn about agriculture, food security and wellbeing of households in this area. You have been selected to participate in an interview which includes questions on topics such as your family background, dwelling characteristics, asset ownership and income earning activities. The survey includes both a section to be asked about the household generally, in addition to sections which will be asked to a primary adult male and female in your household if applicable. These questions in total will take approximately 1.5 hours to complete and your participation is entirely voluntary. If you agree to participate, you can choose to stop at any time or to skip any questions you do not want to answer. Your answers will be completely confidential; we will not share information that identifies you with anyone. After entering the questionnaire into a data base, we will destroy all information such as your name which will link these responses to you.

We will also interview other households in your community and in other parts of Lawra District, Ghana. After we collect all the information we will use the data to make a study about how various programs can be most helpful to the people in this area. Do you have any questions about the study or what I have said? If in the future you have any questions regarding study and the interview, or concerns or complaints we welcome you to contact Meghan Bailey, by calling 0205963825. We will leave one copy of this form for you so that you will have record of this contact information and about the study.

Please ask the participants (male and female) if they consent to the participation in the study (check one box):

Participant 1:	YES	NO	Participant 2:	YES	NO

I _____, the enumerator responsible for the interview taking place on _____, 2012 certify that I have read the above statement to the participant and they have consented to the interview. I pledge to conduct this interview as indicated on instructions and inform my supervisor of any problems encountered during the interview process.

If the household does not give consent to all of the data collection, stop the interview and inform your team leader. Team leaders will discuss the reason for this refusal and decide whether a partial data collection is possible for this household.

DEFINITION OF HOUSEHOLD AND RESPONDENTS (REQUIRED)

A **household** is a group of people who live together and cook food in the same kitchen with shared food costs. In our survey, a household member is someone who has lived in the household at least 6 months, and at least half of the week in each week in those months. Even those persons who are not blood relations (such as servants, lodgers, or agricultural labourers) are members of the household if they have stayed in the household at least 3 months of the past 6 months and take food prepared in the same kitchen. If someone stays in the same household but does not bear any costs for food or does not take food prepared in the same kitchen, they are not considered household members. For example, if two brothers stay in the same house with their families but they do not share food costs and they cook separately, then they are considered two separate households. Generally, if one person stays more than 3 months out of the last 6 months outside the household, they are not considered household members. We do not include them even if other household members consider them as household members.

Exceptions to these rules should be made for:
Consider as household member:

- A newborn child less than 3 months old.
- Someone who has joined the household through marriage less than 3 months ago.
- Servants, lodgers, and agricultural labourers currently in the household and will be staying in the household for a longer period but arrived less than 3 months ago.
- An individual who has returned from working outside the community less than 3 months ago who intends to stay within the household for a long period of time.

Do not consider as household member:

- A person who died very recently though stayed more than 3 months in last 6 months.
- Someone who has left the household through marriage less than 3 months ago.
- Servants, lodgers, and agricultural labourers who stayed more than 3 months in last 6 months but left permanently.
- An individual who stayed within the house for more than 3 months in the last 6 months but has now left to work outside the community (their income will be considered remittances).

This definition of the household is very important. The criteria could be different from other studies you may be familiar with, but you should keep in mind that you should not include those people who do not meet these criteria. Please discuss any questions with your supervisor.

The **primary and secondary respondents** are those which are self identified as the primary members responsible for the decision making, both social and economic, within the household. They are usually husband and wife, however can also be another member as long as there is one male and one female aged 18 and over. It may also be the case that there is only a primary respondent if that person is a female and there is no adult male present in the household.

MODULE B. HOUSEHOLD LISTING AND DEMOGRAPHICS (REQUIRED). ***Enumerator: Ask these questions about all household members.*** *The respondent should be the one most knowledgeable about the age, completed education, and other characteristics of household members.*
Respondent ID:

First, we would like to ask you about each member of your household. Please list the names of everyone considered to be a member of this household, starting with the primary respondent.

ID CODE	Name of household member? [start with primary respondent, continue with the secondary respondent, and other members in descending order of age]	What is [NAME's] gender? 1 = Male 2 = Female 3 =Other gender identity. Eg. 3rd gender. Specify _____	What is [NAME's] relationship to the primary respondent? **CODE 1**	What is [NAME's] age? (in complete years) If unknown, ask year and season of birth and do math	What is [NAME's] marital status? **CODE 2**	Can [NAME] read and write? **CODE 3**	Is [NAME] currently attending school? 1 = Yes 2 = No	What is the highest grade of education completed by [NAME]? **CODE 4**	Does [name] have valid health insurance? 1 = Yes 2 = No
	B01	**B02**	**B03**	**B04**	**B05**	**B06**	**B07**	**B08**	
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

Code 1 (B03) Relationship to primary respondent		**Code 2: (B05) Civil Status**	**Code 3 (B06): Literacy**	**Code 4: (B08) Education level**	
Primary respondent……1	Brother/sister……7	Single/never married (**includes children**)……1	Cannot read or write……1	Less than nursery, (or no school)……0	**Adult literacy** only (no formal education)…7
Husband/wife/partner……2	Nephew/niece……8	Divorced……2	Can sign (write) only……2	Some primary school……1	Religious education only (no formal education)……8
Son/daughter……3	Uncle/aunt ……9	Separated……3	Can read only……3	Completed primary……2	
Son/daughter-in-law……4	Cousin ……10	Widowed……4	Can read and write ……4	Completed junior secondary……3	Don't know/no response……98
Grandchild……5	Other relative ……11	Married ……5		Completed senior secondary……4	
Mother/Father……6	Maid ……12	Cohabiting (unwed)……6		Polytechnic ……5	
				University ……6	

MODULE C. DWELLING CHARACTERISTICS; *Respondent ID:*

C01. ENUMERATOR: OBSERVE (DO NOT ASK) Roof top material (outer covering): **(Code 1)**		**C10.** Is the drinking water from the same source? 1=Yes (>> C13) 2=No 9=Don't Know (>> C14)	
C02. ENUMERATOR: OBSERVE (DO NOT ASK) Floor material: **(Code 2)**			
C03. ENUMERATOR: OBSERVE (DO NOT ASK) State of the dwelling: **(Code 3)**			
C04. IF THE HOUSEHOLD SHARES THE SPACE WITH OTHER HOUSEHOLDS: How many other households live in this same house or apartment? **(Enter 0 if not shared)**		**C11.** What is the household source of electricity? **(Code 7a)**	
C05. Ownership: this dwelling is [READ RESPONSES]: **(Code 4)**		**C 12:** What is the main source of lighting?	
C06. How many rooms are there in this dwelling? (Do not consider bathrooms, hallways, garage, cellar for example)		**C13.** What is the main source of cooking fuel for this household? **(Code 9)**	
C07. How many rooms are used exclusively for sleeping?			
C08. What is the main type of toilets your household uses? **(Code 5)**			
C09. What is the main source of water for general use of the household? **(Code 6)**			

Code 1: (C01) Type of roof	Code 2: (C02) Type of floor	Code 3: (C03) State of dwelling	Code 4: (C05) Ownership	Code 5: (C08) Type of toilet
Tile ……1 Wood……2 Corrugated metal……3 Plastic sheeting……4 Thatched/vegetable matter/sticks…5 Mud/cow dung……6 Concrete……7 Other, specify……8	Earth/mud……1 Concrete/flag stone/cement……2 Tile/bricks……3 Wood……4 Carpeted ……5 Other, specify……6	In excellent repair, no sign of wear ……1 In good shape, some minor wear-and-tear or damage……2 In moderate condition, some damage and moderate wear-and-tear……3 In poor shape, much damage……4 In very bad shape……5	Rented……1 Owned……2 Borrowed (no payment)……3 Other, specify……4	Flush, shared……1 Flush, private……2 Pit latrine, shared……3 Pit latrine, private……4 Community toilet……5 Pan / bucket……6 No toilet……7 Other, specify……8

Code 6: (C09) Water source	Code 7a: (C11) Electricity	Code 8: (C12) Lighting source	Code 9: (C13) Cooking fuel
Piped into dwelling ……1 Piped into plot/yard……2 Public tap ……3 Tubewell/borehole, private……4 Tubewell/borehole, public……5 Protected dug well……6 Protected spring……7 Rain water collection ……8 Unprotected dug well/springs ……9 River/ponds/streams ……10 Tankers-truck/vendor ……11 Other, specify ……12	Direct to household, ……1 Rented from neighbor ……2 Charging stations (e.g mobile phone), public ……3 No access to electricity……5	Electricity via national grid……1 Solar panel……2 Biogas……3 Private generator……4 Public or shared generator……5 Lanterns/candles/paraffin……6 Fire lit sticks, or grass ……7 Other, specify……8	Electricity ……1 Biogas……2 Gas stove (LPG)……3 Kerosene……4 Charcoal……5 Firewood……6 Animal dung……7 Agricultural crop residue……8

MODULE D. LAND AND AGRICULTURE

Enumerator: Ask this section to the member with most knowledge about household land and agriculture. Respondent ID:

READ: Now I am going to ask you a series of questions about the land your household lives on, uses for productive purposes-- that is leases or sharecrops, owns or rents out. I would like you to consider not only the land your household uses now, but also the land your household may have used during the last growing season. Please start with the largest piece of land and move to the smallest piece of land in terms of area. By piece of land, I mean one continuous piece, which is used predominantly for the same purpose and managed by the same person or group of people. Include the homestead and home garden production.

Land No.	[Enumerator: If the interviewee has multiple pieces of land, as these questions for each of the pieces of land. If they have just one piece of land, ask them the questions just once.] What is the land name?	What is the area of [LAND]? a. Area	b. Unit	What is the ownership status of the [LAND]? **Code 2↓**	Who owns [LAND]? **Code 3↓**	What is the tenancy status of [LAND]? **Code 3↓**	If you made any improvements on [LAND] (such as irrigation, building structures, etc) in the last 12 months, who made the decision to make the improvement? **Code 3↓**	If you were to buy a similar plot as [LAND] today, how much would you pay (counting all improvements)?	What was the main use of [LAND] during the last growing season? If 1 (>> continue) If 2 – 7 (>> next piece of land) **Code 5↓**
ID	**Land Name**	**D01a**	**D01b**	**D02**	**D03**	**D04**	**D05**	**D06**	**D07**
1								GhC	
2								GhC	
3								GhC	

CODE 1: UNIT	CODE 2: Land Ownership Status	CODE 3: Land Ownership and Decision Making	CODE 4: Tenancy Status	CODE 5: Use status
Hectares ..... 1 Meters squared 2	Government/state land ..... 1 Private, with papers ..... 2 Private, without papers……..3 Leasehold ……4 Freehold.....5 Share cropping***…..6 Other (specify)..... 7 Don't know……9 ***If share-cropping, write the ratio of harvest received as follows: famers/ land owner (eg. 50/50 or 60/40) _____/_____	Male head of household .....1 Woman head of household .....2 Household jointly……..……..3 Other relatives .....4 Chief .....5 Government or other institution……..6 Not applicable/decision not made 98	Owner operated..... 1 Habitant operated (landless) ……..2 Rented in (cash) ..... 3 Rented out (cash) ……..4 Sharecropped in . ..... 5 Sharecropped out..... ……6 Lending out (no payment)..……...7 Lending in (no payment)……..8 Other (specify)……9	Agriculture/crop production..... 1 Grazing for livestock ..... 2 Homestead/ house plot..... 3 Bush..... 4 Commerical/non-agricultural enterprise..... 5 Fallow ..... 6 Other (specify) 7

MODULE D. LAND AND AGRICULTURE CONTINUED – Main GROWING SEASON. *Enumerator: Copy plots from previous page in same order.*

ID	What are (will be) the three major crops grown on [LAND] during the main growing season? *[List up to three with primary crop first]* **Code 5**			Who during the main growing season generally makes the decisions about which crops to plant on [LAND]? *[List up to three starting with primary decision maker]* **Code 6**			Who physically works on [LAND] during the main growing season? *[List up to three starting with primary worker]* **Code 6**			Who during the main growing season generally makes the decisions about what inputs to use on [LAND]? *[List up to 3 starting with primary decision maker]* **Code 6↓**			If any produce will be sold from crops planted on [LAND] in the main growing season, who will be responsible for taking the crop to market and negotiating the sale? [*List up to three starting with primary decision maker]* **Code 6**			If any revenue is generated from crops planted on [LAND] in the main growing season, who will decide how to spend the revenues? [*List up to three starting with primary decision maker]* **Code 6**			For how many months of the year was this crop eaten before you needed to begin rationing? *[List 1-12 months; write 13 if part of the harvest was left over still when the new harvest began]*
	D09a	**D09b**	**D09c**	**D10a**	**D10b**	**D10c**	**D11a**	**D11b**	**D11c**	**D12a**	**D12b**	**D12c**	**D13a**	**D13b**	**D13c**	**D14a**	**D14b**	**D14c**	**D15**
1																			months
2																			months
3																			months

CODE 5 (D09) : CROPS

Rice……..1	Sourghum 13	Pumpkin 25	Soybean ……..37
Wheat ……..2	Beans ……14	Squash……26	Sunflower ……38
Maize……..3	Tomato ……15	Bottlegord (lauka)……..27	Coffee.....39
Millet ……..4	Onion ……16	Chili ……..28	Sugar cane ……40
Lentil ……..5	Garlic ……..17	Casava. 29	Cocoa.... ……41
Gram……..6	Ginger ……..18	Lettuce.....30	Pepper . ……42
Potato……..7	Cow Peas 19	Carrot 31	Tobacco ……43
Mango.....8	Garden egg.....20	Yam 32	Pineapple ……..44
Banana 9	Cauliflower 21	Other greens 33	Coconut ……..45
Orange 10	Cucumber……..22	Other herbs ……34	Other tree crop/woodland….46
Lime/lemon 11	Okra 23	Tiger nuts 35	Other, specify……47
PawPaw 12	Cabbage ……..24	groundnut.....36	

CODE 6: Decision making

Male head of household 1
Female head of household 2
Adult child (male) 3
Adult child (female) 4
Household jointly……..……..5
Other relatives 6
Chief 7
Government or other institution……..8
Not applicable/decision not made ..... .98

MODULE D. LAND AND AGRICULTURE CONTINUED – Current GROWING SEASON. *Enumerator: Copy plots from previous page in same order.*

ID	Do you currently produce crops during the dry season? 1 = yes 2 = no >> if no, go to next page	What are the three major crops grown on during the dry season growing season? *[List up to three with primary crop first]* **Code 5**			Who during the dry season generally made the decisions about which crops to plant on [LAND]? *[List up to three starting with primary decision maker]* **Code 6**			Who physically works on [LAND] during the dry growing season? *[List up to three starting with primary worker]* **Code 6**			Who during the dry growing season generally makes the decisions about what inputs to use on [LAND]? *[List up to three starting with primary decision maker]* **Code 6**			If any produce was sold from crops planted on [LAND] in the dry growing season, who was responsible for taking the crop to market and negotiating the sale? *[List up to three starting with primary decision maker]* **Code 6**			If any revenue was generated from crops planted on [LAND] in the dry growing season, who decided how to spend the revenues? *[List up to three starting with primary decision maker]* **Code 6**			How many units of dry season crops do you produce during the harvest season per week? *[List number of units]*
		D16a	**D16b**	**D16c**	**D17a**	**D17b**	**D17c**	**D18a**	**D18b**	**D18c**	**D19a**	**D19b**	**D19c**	**D20a**	**D20b**	**D20c**	**D21a**	**D21b**	**D21c**	**D22**
1																				
2																				
3																				

CODE 5 : CROPS

Rice……..1	Sourghum 13	Pumpkin 25	Soybean ……37
Wheat ……..2	Beans ……14	Squash……26	Sunflower ……38
Maize……..3	Tomato ……15	Bottlegord (lauka)……..27	Coffee.....39
Millet ……..4	Onion ……16	Chili ……28	Sugar cane ……40
Lentil ……..5	Garlic ……17	Casava. 29	Cocoa.... ……41
Gram……..6	Ginger ……18	Lettuce.....30	Pepper.. ……42
Potato……..7	Cow Peas 19	Carrot 31	Tobacco ……43
Mango.....8	Garden egg.....20	Yam 32	Pineapple ……44
Banana 9	Cauliflower 21	Other greens 33	Coconut ……45
Orange 10	Cucumber……22	Other herbs ……34	Other tree crop/woodland….46
Lime/lemon 11	Okra 23	Tiger nuts 35	Other, specify……47
PawPaw 12	Cabbage ……..24	groundnut.....36	

CODE 6: Decision making

Male head of household 1
Female head of household 2
Adult child (male) 3
Adult child (female) 4
Household jointly……..……..5
Other relatives 6
Chief 7
Government or other institution……..8
Not applicable/decision not made ..... .98

MODULE E. BUSINESS AND ENTREPRENEURSHIP, *Enumerator: Ask this section to the member with most knowledge about household business activity.*

Respondent ID:

E01. Has anyone in your household owned or operated any non-farm economic activity or business in the last 12 months? 1 = Yes, 2 = No (>> next section)

	What type of income generating activity is/was this? **Code 1**	Who in the household made the decision to start the business? *[List up to three starting with primary decision maker]* **Code 2**			Who in the household would you consider the owners of the business? *[List up to three starting with primary decision maker]]* **Code 2**			Who in the household had control over any money from the business? *[List up to three starting with primary decision maker]* **Code 2**			Who in the household is/was the principal manager/administrator of the business (responsible for day to day operations)? *[List up to three starting with primary worker]* **Code 2**		
	E01	**E02a**	**E02b**	**E02c**	**E03a**	**E03b**	**E03c**	**E07a**	**E07b**	**E07c**	**E08a**	**E08b**	**E08c**
1													
2													
3													

CODE 1: Sub-categories of ISIC Economic Activity Codes

Hunting for sale……..1
Selling of charcoal or firewood……..2
Selling in common and weekly markets 3
Selling of mineral resources e.g stones …..4
Manufacturing of goods..... …...5
Construction ……6
Fishing ……7
Electricity, gas and water supply.....8
Wholesale trade ……9
Retail trade (including shopkeeping)……..10
Repair of motor vehicles, motorcycles……11
Repair of personal and household goods..12
Hotels and restaurants ..... …..13
Transport……14
Storage ……..15
Communications……16
Financial intermediation e.g accounting 17
Real estate and renting property..... …….18
Government administration 19
Military ..... …….20
Education e.g. schoolworker ..... …….21
Health and social work ..... …….22
Other community, social and personal service activities ..... ……23
Rental services e.g. furniture, speakers…..24
Activities of private households as INGO/NGO services ……..25

CODE 2: Decision making

List up to three :

Male head of household 1
Female head of household 2
Adult child (male) 3
Adult child (female) 4
Household jointly……..……..5
Other relatives 6
Chief 7
Government or other institution……...8
Not applicable/decision not made ..... .98

MODULE F: CONSUMPTION AND CONSUMPTION HABITS *Enumerator: Ask this section to the female head/spouse or member who has the most knowledge on food preparation.*
Respondent ID:

Question		Code	Response	Item	**Food frequency:** *READ:* Now I would like to ask you about foods that the members of your household consumed at home. Could you please tell me how many days in the past week your household has eaten the following food items, prepared and/or consumed at home and what the source of the food was?	**F07.** Number of days eaten in previous 7 days: If 0 >> Next item **CODE 1**	**F08**. What was the main source of this food in the last 7 days? **CODE 2**
F01	z In the past year was there ever no food to eat of any kind in your house because of lack of resources to get food?	1 = Yes 2 = No (if No >>F03)					
F02	How often did this happen?	When this happened, how often did it happen? 1 = Rarely (1-5 times in a month) 2 = Sometimes (5-15 times in a month) 3 = Often (> 15 times in a month) How many months of the year is this shortage typical? Specify (1-12)_____		1	TZ, Banku, fufu or kenke		
				2	Rice		
				3	Potatoes, casava and other roots/tubers		
				4	Cereals (maize, millet)		
				5	Vegetables		
				6	Fruits (orange, banana, mango, pawpaw)		
F03	In the past year did you or any household member go to sleep at night hungry because there was not enough food?	1 = Yes 2 = No (if No >>F05)		7	Beans, lentils, peas		
				8	Eggs		
F04	How often did this happen?	When this happened, how often did it happen? 1 = Rarely (1-5 times in a month) 2 = Sometimes (5-15 times in a month) 3 = Often (> 15 times in a month) How many months of the year is this shortage typical? Specify (1-12)_____		9	Plantain		
				10	Meat (goat, beef, lamb, pork)		
				11	Poultry (chicken, duck, guinea fowl, turkey)		
				12	Fish (fresh and dry) or snails		
				13	Oil//fats (butter, veg oil)		
				14	Sugar, Honey		
F05	In the past year did you or any household member go a whole day and night without eating anything at all because there was not enough food?	1 = Yes 2 = No (if No >>F07)		15	Sensen		
				16	Bread		
				17	Nuts and seeds (ground nut, mustard, sunflower)		
				18	Pito		
				19	Tobacco		
F06		When this happened, how often did it		20	Soya beans or soya (dawadawa)		

	How often did this happen?	happen? 1 = Rarely (1-5 times in a month) 2 = Sometimes (5-15 times in a month) 3 = Often (> 15 times in a month) How many months of the year is this shortage typical? Specify (1-12)_____		**CODE 1: (F07) Food Frequency** Not eaten……..0 1 day……..1 2 days……..2 3 days……..3 4 days……..4 5 days……..5 6 days ……..6 7 days ……..7	**Code 2: (F08) Source of Food** Own production……..1 Received as payment….6 Hunting/gathering/fishing....2 Food assistance……..7 Bought using cash……3 Gifts (friends/relatives)..8 Bought on credit……4 Begging…..9 Borrowed (friends/relatives). 5

MODULE G. CHARACTERISTICS OF DIFFERENTIATION; Enumerator you may need to remind the respondent(s) of the confidential nature of all responses and that they can choose not to respond to any question they choose. If more than one person in the household has a disability, please adapt questions **I03 – I09** and include each individual separately.
Respondent ID:

G01. Do any of your children experience difficulty learning in school?
1 = Yes
2 = No _____

G02. Could any of your children be described as slightly slow, for example, needing to have instructions repeated or difficulty remembering what they have been told?
1 = Yes
2 = No _____

G03. Are any of your children less developed physically or mentally than other children their age?
1 = Yes
2 = No _____

OBSERVE, DO NOT READ ALOUD
G07. *Enumerator, if you observe someone within the household who visually appears to have a disability or impairment, but the information is not offered, please make a note of this here*:
ID from survey roster , if known
Conditions from **CODE 4** based on anecdotal observation of individual(s) within household who visually appears to have a disability.

G08. Is the individual involved in either farm or off-farm productive activities? (the includes household work and odd jobs) Y=1, N=2. If Y, please specify:_____ If N >> I10

G04. Do any members of the household have a physical or mental disability or impairment? This includes reduced mobility e.g. difficulty walking
1=Yes, 2=No _____
If yes, list the **ID code(s)** in next box. If No >>> **I11**

ID(s) from roster:

G09. Is the individual solely responsible or the primary personal responsible for any of these activities?
Y=1, N=2. If Y, please specify _____. If N>>I10

Enumerator, were these activities included in modules D and E? If not, please add them or explain why it is not possible to fit them within the categories on a separate sheet of paper.

G05. What best describes the origin of the physical or mental disability or impairment?
(Code 3)

Read: Think about the decisions that were made concerning the activity just described.
G10 Who makes decisions about how this activity should be done? Code
G11 Whose idea was it to start this activity?
G12 Who decides what should be done with the income of this activity, if any?

G06. What best describes the conditions of the individual with a physical or mental disability or impairment? List up to 3 codes.
(Code 4**)**

Codes for G10-G12
Person with the disability 1
Person with a disability's parent 2
Person with a disability and parent, jointly 3
Other household member 4
Person outside the household .....5.

CODE 3: (G05) ORIGIN OF DISABILITY OR IMPAIRMENT
Experienced since birth……..1
Result of an injury/trauma..……2
Result of an illness……..3
Developed during childhood……..4
Developed during adulthood……..5
Developed during old age ……6
Rather not say……..7
Other (specify) _____...8
Don't know……..98

CODE 4: (G06) CONDITIONS OF DISABILITY OR IMPAIRMENT.
Impaired mobility of upper limb(s)….1
Impaired mobility of lower limb(s)…..2
Impaired manual dexterity (ability to use hands)……3
Major injury to or ailment related to the spinal cord or brain ……4
Developmental delay, minor.....5
Developmental delay, major ……..6
Impaired Hearing……..7
Impaired vision ……..8
Impaired speech……..9
Learning disability ……..10
Cognitive/intellectual disability, minor……..11
Cognitive/intellectual disability, major……..12
Psychological disorder ……..13
Rather not say/don't know ……..98

MODULE H EXTENDED NETWORKS;

Respondent ID: ☐☐

H01. Do any of your extended family members live outside of the community for work?Y=1, N=2(N>>END)	**H02**. If Yes, is this person consulted for major decisions of the household? Yes=1 No=2	**H03**. If Yes is this person the primary decision maker on any major decisions of the household? Y=1, N=2	**H04**. Does this person send cash or goods to support the household? If so, please estimate the portion of annual household income this provides. Y, portion of HH income _____. N=2.

END OF HOUSEHOLD QUESTIONNAIRE

Enumerator, please thank the respondent(s) graciously for their time and insights.

Now, you must complete the individual level questionnaire for the heads of the household. If a married couple heads the household, administer the individual questionnaire to each of them separately. The other should not be present during the interview of their partner/husband/wife because it may influence their responses. If there is only one head of household (eg. The respondents partner has died or is living outside the community, you only need to complete the survey for the one individual head of household who is remaining. In most cases, there will be two heads of household (the main woman and main man) who need to be interviewed so that we may compare their results. It is ok if their answers are different for the same questions. When answers are different it is not that they are wrong, but rather that they each have a different perspective which they may or may not be aware of. Your job is to record their perspectives and not to intervene or make suggestions otherwise.

Appendix 3: SIA Individual Questionnaire

INDIVIDUAL QUESTIONNAIRE (Modules K-R)
SIA EMPOWERMENT IN AGRICULTURE FOR ADAPTIVE CAPACITY INDEX – *Ghana*

NOTE: This survey is a modification of the **Women's Empowerment in Agriculture Index**. Sections K1, K2, K3 and K8 (formerly J6) have been updated for the Nepal context; sections K4 and K5 have been significantly altered and K6 and K7 are additional to the original survey. The information in Module K1 (formerly J1) can be captured in different ways; however there must be a way to a) identify the proper individual within the household to be asked the survey, b) link this individual from the module to the household roster, c) code the outcome of the interview, especially if the individual is not available, to distinguish this from missing data, d) record who else in the household was present during the interview. For the Nepal study, the individual questionnaire (module K) will be administered to a subset of the individuals surveyed in the household survey (modules A-J). This instrument must be adapted for country context including translations into local languages when appropriate.

Enumerator: This questionnaire should be administered separately to the primary and secondary respondents identified in the household roster (Section C) of the household level questionnaire. You should complete this coversheet for each individual identified in the "selection section" even if the individual is not available to be interviewed for reporting purposes.

Please double check to ensure:

- *You have completed the roster section of the household questionnaire to identify the correct primary and/or secondary respondent(s);*
- *You have noted the household ID and individual ID correctly for the person you are about to interview;*
- *You have gained informed consent for the individual in the household questionnaire;*
- *You have sought to interview the individual in private or where other members of the household cannot overhear or contribute answers.*
- *Do not attempt to make responses between the primary and secondary respondent the same—it is ok for them to be different.*

MODULE K. INDIVIDUAL IDENTIFICATION

	Code
K1.01. Household Identification:.....	☐☐☐☐☐☐
K1.02. Name of respondent currently being interviewed (ID Code from roster in Section C Household Roster): **Surname, First name: .....**	☐☐
K1.03. Sex of respondent**:** Male ……..…..1 Female……..……2 Other (specify preferred identification) …3	☐
K1.04. Type of head of the family: 1 = Male and female adult 2 = Female adult only (eg. widow, husband living abroad) 3 = Male adult only (eg.widower) NO adult women in HH 4 = Other gender identity:(specify)_____	☐

	Code
K1.05. Outcome of interview **CODE K5**	☐
K1.06. Ability to be interviewed alone: **CODE K6**	☐

K5
Completed 1
Incomplete 2
Absent 3
Refused 4
Could not locate 5

K6
Alone ..... …1
With adult females present ..... …2
With adult males present ..... …3
With adults mixed sex present…… ..... …4
With children only present..... …5

MODULE L: CLIMATE SENSITIVITY AND CONSIOUSNESS

QNo.	Question	Response	Response options/Instructions
L.01	The following is about your top concerns/ worries about the future. Take a moment to think about the concerns that you <u>personally</u> are most worried will negatively impact you and/or your family in the future. Please tell us the top 5 that you are most worried about. There are no right or wrong answers. You may decide to make this decision based on the amount of time you spend thinking about the issue, the likelihood that it will happen, or the gravity of the situation if it were to happen. If any of these criteria were helpful in ranking the issues, please indicate here. A …… The amount of time you spend thinking about the issues B …… The likelihood that it will happen C …… The gravity of the situation if it were to happen D……. Other criteria, please specify _____ _____	*Most worried about* 1_____ 2_____ 3_____ 4_____ 5_____ *Least worried about* Way decision was made (choose: A,B,C or D) 1_____ 2_____ 3_____ 4_____ 5_____	Enumerator, if the interviewee struggles to list 5 top concerns you may read the following list to give them ideas, stressing that these are not necessarily the right answers if they have give others previously. A. Political unrest/strikes B. Problems attaining health insurance C. Storms D. Shortage of land E. Shortage of credit F. Crop failure G. Loss of traditional culture H. Pests and disease of crops I. Pests and disease of livestock J. Problems related to children not attaining education K. Problems related to sanitation L. Problems related to health M. Insufficient power/electricity N. Drying of tubewells or boreholes O. Problems of soil quality P. Increased wind Q. Increase or decreased temperature R. Increased or decreased rain S. Late rains or early rains T. Theft U. Treatment of marginalized people, including widows and the disabled V. Deforestation W. Insufficient food X. Problem of unsafe drinking water Y. Early marriage Z. Leave the community to work in the south

MODULE L: CLIMATE SENSITIVITY AND CONSIOUSNESS continued…

ENUMERATOR: Now I am going to list the top 10 (or less) concerns you flagged in the previous sheet, below. Think about how you feel the issues will affect you in the future (eg. 5-10 years from now) and respond to the following statements. You might have a different perspective on each concern and there is no right or wrong answer. Please tell me from your perspective to the best of your ability, what the likelihood is that these statements are true to say:		[CONCERN] could impede my, or my family's, ability to maintain economic self-sufficiency in the future. [READ OPTIONS]	[CONCERN] could cause family or community disputes in the future. [READ OPTIONS]	[CONCERN] could make our homestead unlivable in the future. READ OPTIONS]	Government or NGO institutions are best placed to take actions to avoid [CONCERN] in future. [READ OPTIONS]	I am or my family is the best placed to take actions to avoid [CONCERN] in future. [READ OPTIONS]	The actions that are being taken now to address [CONCERN] will make us worse off in the long term. [READ OPTIONS]	The actions that are being taken now to address [CONCERN] will make us worse off in the short term but better off in the long term. [READ OPTIONS]
	Top Concerns (from L.01)	**L.02**	**L03**	**L.04**	**L.05**	**L.06**	**L.07**	**L.08**
1	(most worried)							
2								
3								
4								
5	(least worried)							
		L.02 – L.08: Perspective on future impact of issues of concern Not at all likely/ Never true .....1 Unlikely/ Rarely true.....2 Somewhat likely / Often true.....3 Very likely/ Always true.....4 I'm not sure/I don't know .....5 Does not affect/impact.....98						

MODULE M: INFORMATION DISSEMINATION AND KNOWLEDGE SHARING

ENUMERATOR: I am going to ask you some questions about sources of information. For the following list, please specify your most important sources of information. You may have different sources for different aspects of your life and there is no right or wrong answers. Your answers should be a reflection of your experience accessing information as an individual and not reflective of the entire community or household, unless the answer would be the same. It is possible that you will not have an answer for many of the categories listed here if you have not learned new information on this topic that you can remember. This is ok. *[If individual does not engage in that particular activity, enter 98 and proceed to next activity.]*		The source that I rely on most for information regarding [ASPECT] is: [LISTEN TO RESPONSE, THEN FIT INTO THE CATEGORY]
		M.01
A	Agricultural production	
B	Getting inputs for agricultural production	
C	The types of crops to grow for agricultural production	
D	Market price of crops	
E	Livestock raising	
F	Nonfarm business activity	
G	Health and Nutrition	
H	Sanitation and hygiene	
I	Climate and weather	
J	Politics and Security	
K	Environmental Management/Conservation	
L	NGO/INGO projects	

M.01-M.04: Sources of Information

News program on TV/Radio 1
Government extension worker 2
NGO/INGO training 3
Government training 4
Newspaper or notice 5
School teacher 6
Local politician 7
Nurse, Doctor, or clinician 7
Traditional healer 8
Private firms, (wholesalers, Retailers).....9
Word of mouth by household members 10
Word of mouth by male neighbor,.....11
Word of mouth by female neighbor.....12
Assembly man.....13
Word of mouth male community leader 14
Word of mouth by female community leader 15
Chief.....16
Religious leader 17
Traditional signs (weather or spiritual) 18
Myself (an idea) 19
Household does not engage in activity 98

MODULE M: INFORMATION DISSEMINATION AND KNOWLEDGE SHARING CONTINUED

ENUMERATOR: This set of questions is very important. I am going to give you some possible perspectives on learning and sharing information on the aspects of household life I just mentioned. You might have a different perspective on learning and sharing for different aspects of your life and there is no right or wrong answer. Please tell me how true it would be to say: *[If household does not engage in that particular activity, enter 98 and proceed to next activity.]*		Most of what I know about [ASPECT] I learned from our traditional practices. [READ OPTIONS]	My knowledge of [ASPECT] is changing all the time. I am always learning new information that affects my actions. [READ OPTIONS]	Regarding new information on [ASPECT] I am often among the first people in my community to use it to try something new. READ OPTIONS]	Regarding new information on [ASPECT], I often wait to see if it is useful or not by observing others using it to try something new. [READ OPTIONS]	Regarding new knowledge on [ASPECT] I am often encouraged by my neighbors to try new things. [READ OPTIONS]
		M.03	**M.04**	**M.05**	**M.06**	**M.07**
A	Agricultural production					
B	Taking crops to the market (or not)					
C	Livestock raising					
D	Nonfarm business activity					
E	Health and Nutrition					
F	Sanitation and hygiene					
G	Climate and weather					
H	Politics and Security					
I	Environmental Management/Conservation					

M.03 - M.09: Perspective on Information Dissemination and Knowledge Sharing

Never true 1
Not very true 2
Somewhat true.....3
Always true 4
Household does not engage in activity / Decision not made.....98

MODULE N: ROLE IN HOUSEHOLD DECISION-MAKING AROUND PRODUCTION AND INCOME GENERATION

Household identification (in data file, each sub-module (K2-K6) must be linked with HH and respondent ID) | | | | | | |

Respondent ID Code | |

Activity		Did you (singular) participate in [ACTIVITY] in the past 12 months (that is during the last [one/two] cropping seasons)? Yes..... 1 No ..... 2 >> next activity	How much input did you have in making decisions about [ACTIVITY]?	How much input did you have in decisions on the use of income generated from [ACTIVITY]?
Activity Code	Activity Description	**N.01**	**N.02**	**N.03**
A	Food crop farming: crops that are grown primarily for household food consumption			
B	Cash crop farming: crops that are grown primary for sale in the market			
C	Livestock raising			
D	Non-farm economic activities: Small business, self-employment, buy-and-sell			
E	Wage and salary employment: in-kind or monetary work both agriculture and other wage work			
F	Fishing or fishpond culture			
			N.02/N.03: Input into decision making No input ..... 1 Input into very few decisions ..... 2 Input into some decisions ..... 3 Input into most decisions ..... 4 Input into all decisions ..... 5 No decision made 6	

MODULE O: ACCESS TO PRODUCTIVE CAPITAL (ASSETS)

.

Productive Capital		Does anyone in your household currently have any [ITEM]? Yes ... 1 No ..... 2 >> next item	How many of [ITEM] does your household currently have?	Who would you say owns most of the [ITEM]?
Productive Capital		**O.01a**	**O.01b**	**O.02**
A	Farm equipment (non-mechanized)			
B	Farm equipment (mechanized)			
C	Means of transportation (bicycle, motorcycle, car)			
D	Cell phone			

O.02-O.06: Decision-making and control over productive capital

Self 1
Spouse 2
Self and spouse jointly.....3
Other household member ……4
Chief or assembly man..……5
Household jointly……...7
Someone (or group of people) outside the household…… ……..8

MODULE O continued: ACCESS TO CREDIT

Lending sources		Has anyone in your household taken any loans or borrowed cash/in-kind from [SOURCE] in the past 12 months? **Code O.97**	Who made the decision to borrow from [SOURCE]?	Who makes the decision about what to do with the money/ item borrow from [SOURCE]?	If more credit had been available from this source, would you have used it? Yes ....1 >> Next source No……..2	Why would you not have borrowed more from [SOURCE]? Select code then >> Next source
Lending source names		**O.07**	**O.08**	**O.09**	**O.10A**	**O.10B**
A	Non-governmental organization (NGO)					
B	Informal lender					
C	Formal lender (bank/financial institution)					
D	Friends or relatives					
E	Group based micro-finance or lending and savings group, **single sex members** (e.g a women's savings group)					
F	Group based micro-finance or lending and savings group, **mixed sex members**					
O.07 Taken loans Yes, cash ..... 1 Yes, in-kind ..... 2 Yes, cash and in-kind ..... 3 No ..... 4 >> O.11A Don't know……5 >> O.11A		**O.08/O.09: Decision-making and control over credit** Self……1 Partner/Spouse……..2 Self and partner/spouse jointly…….3 Other household member(s)…….4 Self and other household member(s)……5 Partner/Spouse and other household member(s)…..6	Chief ……..7 Someone (or group of people) outside the Household …… 8		**O.10B/O.11B: Borrowing** Have enough money……1 Afraid of losing collateral……..2 Do not have enough collateral/did not qualify for the loan……3 Afraid cannot pay back the money……4 Interest rate/other costs too high……5 Not allowed to borrow/family dispute in borrowing decision……6 Place of lender is too far……7 Other, specify…… ……8	

MODULE P: INDIVIDUAL LEADERSHIP AND INFLUENCE IN THE COMMUNITY

QNo.	Question	Response	Response codes
P.01	Do you feel comfortable speaking up in public to help decide on infrastructure (like small wells, roads, water supplies) to be built in your community?		No, not at all comfortable.....1 Yes, but with a great deal of difficulty.....2 Yes, but with a little difficulty.....3 Yes, fairly comfortable.....4 Yes, very comfortable.....5
P.02	Do you feel comfortable speaking up in public to ensure proper payment of wages for public works or other similar programs?		
P.03	Do you feel comfortable speaking up in public to protest the misbehavior of authorities or elected officials?		
P.04	Do you have a leadership role in any community organization?		Yes= 1 No=2
P.05	Do you feel your opinion is considered during decisions about which infrastructure is built in your community?		Never ..... 1 Rarely..... .....2 Often.....3 Always 4
P.06	Do your neighbors ever approach you for advice on matters arising within the community?		
P.07	Do community leaders ever approach you for your advice on matters arising within the community?		

QNo.	Question	Response	
P.08. Do you vote in elections? **(Code 1a)** **P.09.**If 4, (Never) why do you not vote in elections? **(Code 1b)** *Enumerator: do NOT ask the respondent directly who they voted for in any election.*		☐ ☐	**CODE 1a: (P.08) VOTING FREQUENCY** Most elections .....1 Some elections.....2 Rarely .....3 Never .....4 Rather not say .....5 **CODE 1b: (P09) REASON FOR NOT VOTING** Not interested .....6 No "papers" .....7 Other: specify_____...8
P.10 How much effect do the activities of Government have on your day-to-day life?		☐	On day-to-day life....[finish sentence with responses] Government improves conditions .....1 Government sometimes improves conditions, sometimes does not.....2 Government makes no difference.....3 We would be better off without government.....4 Other _____(specify) .....5 Don't know.....6

MODULE P continued: GROUP MEMBERSHIP AND INFLUENCE IN THE GROUP

Group membership		Are you an active member of [GROUP] in your community? Yes ..... 1 No ..... 2 >> next group	How often do you attend activities of this group? [response code P.14]	How much input do you have in making decisions in this [GROUP]? [response code p.15]	Why are you not a member of this [GROUP]? [response code p16]
	Group Categories	**P.13**	**P.14**	**P.15**	**P.16**
A	Agricultural / livestock/ fisheries producer's group (including marketing groups)				
B	Water users' group				
C	Credit or microfinance group				
D	Mutual help or insurance group (including burial societies)				
E	Trade and business association				
F	Civic groups (improving community) or charitable group (helping others)				
G	Local government (e.g female community health volunteers)				
H	Religious group				
I	Mothers Group				
J	Women's group (only if it does not fit into one of the other categories)				
K	Other (specify)				

P.14 Frequency of group involvement	**P.15: Input into decisions**	**P.16: Why not member of group**	
I attend activities weekly, or more frequently …. 1	No input 1	NO GROUP……..1	Group meeting location not convenient...6
I attend activities 1-3 times per month …… 2	Input into very few decisions 2	Not interested……2	Family dispute/unable to join..... ..7
I attend activities every few months ……..3	Input into some decisions 3	No time .....…3	Not allowed because of gender..... ..8
I attend activities once per year ……4	Input into most decisions 4	Unable to raise entrance fees..... …4	Not allowed because of other reason.….9
We currently do not have activities ……5	Input into all decisions……..5	Unable to raise reoccurring fees……5	Other, specify……10

MODULE Q: ADAPTATION DECISION MAKING

ENUMERATOR: Ask Q.01 for all categories of activities before asking Q.02. Do not ask Q.02 if Q.01 response is 1 and respondent is male OR Q.01 response is 2 and respondent is female. *If household does not engage in that particular activity, enter 98 and proceed to next activity.*		If decisions are made regarding the following aspects of household life, who is it that would normally make the decision?	Enumerator: If the respondent did not list themself as the response for Q.01 answer the following. If they did, leave this question blank and go to the next page. To what extent do you feel you could make your own personal decisions regarding these aspects of household life if you want(ed) to?
		Q.01	**Q.02**
A	Whether to try a new seed variety or crop for agricultural production?		
B	Whether to change the pesticides or fertilizers used on crops?		
C	Whether to change farm practices? (eg. Plants in ridge or pits, or do intercropping)		
D	What to do with remittances?		
E	Whether to join a group activity such as group farming or group savings?		
F	Whether the household, or members of the household, should leave the community for seasonal work?		
G	Whether or not to reduce portions of food served to the family because of seasonal shortage?		
H	Whether to use a small piece of land to try a new crop which may or may not be successful?		
I	Whether to do other work in replacement of time spent on the farm?		
Q.01: Who makes decision Main male or husband……1 Main female or wife……2 Partners/spouses jointly……3 Household jointly ……4 Chief and head of household ……5 Someone else in the household……6 Household does not engage in activity/Decision not made……98			**Q.02: Extent of participation in decision making** Not at all ……1 Small extent……2 Medium extent……3 To a high extent……4

MODULE Q continued: MOTIVATION FOR ADAPTATION DECISION MAKING

ENUMERATOR: This set of questions is very important. I am going to give you some reasons why you act as you do in the aspects of household life I just mentioned. You might have several reasons for doing what you do and there is no right or wrong answer. Please tell me how true it would be to say: *[If household does not engage in that particular activity, enter 98 and proceed to next activity.]*		My actions when [ASPECT] are determined by the situation. I don't really have an option. [READ OPTIONS]	My actions when [ASPECT] are partly because I will get in trouble with someone if I act differently. [READ OPTIONS]	Regarding [ASPECT] I do what I do so others don't think poorly of me. [READ OPTIONS]	Regarding [ASPECT] I do what I do because I personally think it is the right thing to do. . [READ OPTIONS]	Regarding [ASPECT], there are other possible actions which might be better, but I do what I do because I know what the outcome of my actions will be. [READ OPTIONS]	Regarding [ASPECT], there are other possible actions which might be better, but I do what I do because I do not have access to those options (because of cost, or otherwise) [READ OPTIONS]
		Q.03	**Q.04**	**Q.05**	**Q.06**	**Q.07**	**Q.08**
A	Trying planting in ridges or sunken beds						
B	Joining a group activity such as group farming or group saving						
C	Changing portion sizes of food served to the family because of seasonal shortages						
D	Using birth control / family planning						
E	Attending training for skills development						
		Q.03 - Q.08: Motivation for Activity Never true .....1 Not very true .....2 Somewhat true.....3 Always true .....4 Household does not engage in activity Decision not made.....98					

END OF INDIVIDUAL QUESTIONNAIRE

Enumerator please thank the respondent graciously for their time and insights, then move on to the next individual who needs to be surveyed (alone) within the household. If all surveys are complete, please remind them that they can contact the research team at any time through the number provided on the consent sheet, ask them if they have any additional questions, then excuse yourself.