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EXECUTIVE SUMMARY

In the global efforts to end hunger and increase food security, substantial investments would have to be enacted to boost agricultural productivity. In sub-Saharan Africa, where the majority of the population relies on subsistence agriculture, smallholder agricultural households have a major role to play in this collective effort. However, finding the right instruments to stimulate agricultural growth at the household level requires an accurate understanding of agrarian households' behaviour, in particular an understanding of how intrahousehold dynamics influence the propensity of agricultural households to embrace new technologies. In this regard, understanding the processes of decision making and the reasons underlying the patterns of resource mobilisation and collective action for food production is crucial. This thesis aimed to contribute to a better understanding of the workings of agrarian households in rural Burkina Faso, focusing on the institutional conditions under which collective action emerges within polygynous households. This research focus was chosen because polygynous households are widespread in African societies, but their specific features are relatively neglected in the agricultural development literature. Considering that such households have a rather large number of household members, collective action within such households appears important with regard to agricultural production and food security. There is a prevailing perception that polygynous households are conflict-ridden, which would pose a challenge to collective action, but empirical evidence is scarce. Moreover, the theory of collective action has, so far, mostly been applied at the community-level, but rarely at the intra-household level. To address this knowledge gap, case studies of two ethnic communities, the Fulani and the Mossi, were conducted. The research explored the rules and norms shaping the allocation of resources within polygynous agrarian households and examined the structural conditions under which cooperation between household members may or may not emerge.

After an introductory chapter, the second chapter of this thesis sets the scene by presenting a comprehensive literature review, which assesses the discourse surrounding agricultural households' behaviour. Examining the empirical evidence presented in the literature, the chapter examines the adequacy of existing economic conceptualisations of agricultural households and their generalisability to West-African settings. Drawing on insights from ethnographic studies in anthropology and feminist perspectives, the chapter highlights the shortcomings of conventional household models, including static representations of households, and the failure to consider gender and intergenerational relations of production, which affect the allocation of resources within agrarian households.

The third chapter, which is based on the application of ethnographic field research methods, analyses the challenges underlying cooperation in agricultural households. The chapter uncovers the contractual arrangements that shape the intrahousehold relations of production and define the allocation of productive resources to food production. Drawing on the natural resource management literature, the third chapter examines how the position of individual household members and their socially accepted roles and responsibilities shape their incentive structures and determine whether or not household resources are pooled for realizing economies of scale and achieving productivity gains. Chapter 4 examine a factor that is essential for collective action: trust. The chapter investigates the correlation of trust with a range of activities

in polygynous households, including labour pooling on individual agricultural plots and income pooling for food purchase. The chapter makes an innovative methodological contribution to the study of households, by applying an experimental trust game to co-wives in polygynous households.

The critical review of the economic literature in chapter 2 highlights the need to reconsider the ways in which agrarian households in sub-Saharan Africa are represented and modelled. The review identifies the need to redefine the units of agricultural production and to be cautious about the implications of conventional economic theories for agricultural development programmes. The review calls for a framework that encompasses the complexities and diversity of behaviour in agrarian households. Such a framework could integrate theories developed in different disciplines, including the feminist and anthropological literature. Chapter 3 reveals that the contractual arrangements embedded in the rules and norms that define socially-accepted behaviour, influence the patterns of intrahousehold resource mobilisation and the likelihood of cooperation among household members. Agricultural household members were found to pool, exchange or split resources based on their roles and positions within the household arena. Implicit monitoring and sanction systems were identified, which shape the incentive structures of agrarian household member and determine whether cooperation will occur. The final chapter revealed that trust can mediate cooperation between co-wives, depending on the nature of the activity at hand. It was also found that the role of trust differs across areas of intra-household cooperation. For activities that require labour pooling on individual household members' plots, no correlation was found between trust and co-wives' likelihood to cooperate. However, a strong correlation was identified between trust among co-wives and income pooling for food purchase, which underlines the importance of uncertainty and of existing norms on the outcomes of cooperation in agricultural households.

The thesis concludes that collective action in polygynous agrarian households does not occur in a vacuum. On the contrary, collective action is the outcome of several processes and mechanisms, which influence the allocation of resources and determine whether they are efficiently mobilised. Policymakers should be aware of these internal arrangements as they influence the potential effects of policy interventions on intra-household resource allocation. The success of agricultural policies on food productivity and food security depends on a better understanding of agricultural households.

ZUSAMMENFASSUNG

Bei den weltweiten Bemühungen, den Hunger zu beenden und die Ernährungssicherheit zu erhöhen, müssten erhebliche Investitionen getätigt werden, um die landwirtschaftliche Produktivität zu steigern. In Afrika südlich der Sahara, wo die Mehrheit der Bevölkerung auf Subsistenzlandwirtschaft angewiesen ist, kommt kleinbäuerlichen landwirtschaftlichen Haushalten bei diesen gemeinsamen Anstrengungen eine wichtige Rolle zu. Um die richtigen Instrumente zur Förderung des landwirtschaftlichen Wachstums auf Haushaltsebene zu finden, ist ein genaues Verständnis des Verhaltens landwirtschaftlicher Haushalte erforderlich, insbesondere für Dynamiken, welche die Bereitschaft neue Technologien anzunehmen beeinflusst. In dieser Hinsicht ist das Verständnis der Entscheidungsfindungsprozesse, die der Ressourcenmobilisierung und des kollektiven Handelns für die Nahrungsmittelproduktion zugrunde liegen, entscheidend. Ziel dieser Arbeit war es, zu einem besseren Verständnis der Funktionsweise von landwirtschaftlichen Haushalten im ländlichen Burkina Faso beizutragen, wobei der Schwerpunkt auf den institutionellen Bedingungen lag, unter denen kollektives Handeln in polygynen Haushalten entsteht. Dieser Forschungsschwerpunkt wurde gewählt, da polygyne Haushalte in afrikanischen Gesellschaften weit verbreitet sind, ihre spezifischen Merkmale in der Literatur zu landwirtschaftlicher Entwicklung aber relativ vernachlässigt werden. In Anbetracht der Tatsache, dass solche Haushalte eine relativ große Anzahl von Haushaltsmitgliedern haben, scheint kollektives Handeln innerhalb der Haushalte wichtig für die landwirtschaftliche Produktion und die Ernährungssicherheit. Nach vorherrschender Meinung sind polygyne Haushalte konfliktreich, was eine Herausforderung für kollektives Handeln darstellen würde. Empirische Belege dazu gibt es aber kaum. Außerdem wurde die Theorie des kollektiven Handelns bisher meist auf der Gemeinschaftsebene angewandt, selten auf der Ebene der Haushalte. Um diese Wissenslücke zu schließen, wurden Fallstudien von zwei ethnischen Gemeinschaften, den Fulani und den Mossi, durchgeführt. Diese Arbeit untersuchte die Regeln und Normen, die die Ressourcenverteilung innerhalb polygyner Agrarhaushalte prägen, sowie die strukturellen Bedingungen, unter denen Kooperation zwischen Haushaltsmitgliedern entstehen kann oder nicht.

Nach einem einleitenden Kapitel wird im zweiten Kapitel dieser Arbeit eine umfassende Literaturübersicht präsentiert, die den Diskurs über das Verhalten landwirtschaftlicher Haushalte analysiert. Das Kapitel untersucht die in der Literatur präsentierten empirischen Belege und prüft die Eignung bestehender ökonomischer Konzeptualisierungen landwirtschaftlicher Haushalte und deren Anwendbarkeit auf westafrikanische Verhältnisse. Unter Rückgriff auf Erkenntnisse ethnographischer Studien der Anthropologie und feministischen Perspektiven zeigt das Kapitel die Unzulänglichkeiten herkömmlicher Haushaltsmodelle auf, darunter statische Darstellungen von Haushalten und die Nichtberücksichtigung von Gender- und intergenerationalen Produktionsbeziehungen, die die Ressourcenverteilung innerhalb landwirtschaftlicher Haushalte beeinflussen.

Das dritte Kapitel basiert auf der Anwendung ethnographischer Feldforschungsmethoden und analysiert die Herausforderungen, die der Kooperation in landwirtschaftlichen Haushalten zugrunde liegen. Das Kapitel beleuchtet die vertraglichen Vereinbarungen, die die haushaltsinternen Produktionsbeziehungen prägen und die Verteilung der Ressourcen für die

Nahrungsmittelproduktion definieren. Unter Rückgriff auf Literatur zum Management natürlicher Ressourcen untersucht das dritte Kapitel, wie die Position der einzelnen Haushaltsmitglieder und ihre sozial akzeptierten Rollen und Verantwortlichkeiten ihre Anreizstrukturen formen, die Ressourcen des Haushalts zusammenzulegen, um Skaleneffekte zu realisieren und Produktivitätsgewinne zu erzielen.

Kapitel 4 untersucht einen Faktor, der für kollektives Handeln wesentlich ist: Vertrauen. Das Kapitel untersucht die Korrelation von Vertrauen mit einer Reihe von Aktivitäten in polygynen Haushalten, einschließlich der Arbeitsteilung auf einzelnen landwirtschaftlichen Parzellen und der Einkommensteilung für den Kauf von Lebensmitteln. Das Kapitel leistet einen innovativen methodischen Beitrag zur Untersuchung von Haushalten, indem es ein experimentelles Vertrauensspiel auf Frauen in polygynen Haushalten anwendet.

Die kritische Analyse der ökonomischen Literatur in Kapitel 2 unterstreicht die Notwendigkeit, die Art und Weise, wie landwirtschaftliche Haushalte in Afrika südlich der Sahara dargestellt und modelliert werden, zu überdenken. Die Analyse identifiziert die Notwendigkeit, die Einheiten der landwirtschaftlichen Produktion neu zu definieren und mit den Implikationen konventioneller ökonomischer Theorien für landwirtschaftliche Entwicklungsprogramme vorsichtig zu sein. Die Literaturanalyse legt die Notwendigkeit eines Frameworks offen, der die Komplexität und Vielfalt des Verhaltens in landwirtschaftlichen Haushalten umfasst. Ein solcher Framework könnte Theorien integrieren, die in verschiedenen Disziplinen entwickelt wurden, einschließlich der feministischen und anthropologischen Literatur.

Kapitel 3 zeigt, dass die vertraglichen Vereinbarungen, die in Regeln und Normen eingebettet sind, die das gesellschaftlich akzeptierte Verhalten definieren, die Muster der haushaltsinternen Ressourcenmobilisierung und die Wahrscheinlichkeit der Zusammenarbeit zwischen den Haushaltsmitgliedern beeinflussen. Es wurde festgestellt, dass die Mitglieder eines landwirtschaftlichen Haushalts je nach ihrer Rolle und Position innerhalb des Haushalts Ressourcen zusammenlegen, austauschen oder aufteilen. Es wurden implizite Kontroll- und Sanktionssysteme identifiziert, die die Anreizstrukturen der landwirtschaftlichen Haushaltsmitglieder prägen und bestimmen, ob es zu einer Kooperation kommt.

Das abschließende Kapitel zeigte, dass Vertrauen die Kooperation zwischen Frauen vermitteln kann, abhängig von der Art der jeweiligen Aktivität. Es wurde auch festgestellt, dass die Rolle des Vertrauens in den verschiedenen Bereichen der haushaltsinternen Kooperation unterschiedlich ist. Bei Aktivitäten, die eine Arbeitsteilung auf den Parzellen der einzelnen Haushaltsmitglieder erfordern, wurde keine Korrelation zwischen Vertrauen und der Wahrscheinlichkeit der Zusammenarbeit von Frauen gefunden. Es wurde jedoch eine starke Korrelation zwischen dem Vertrauen unter den Frauen und der Zusammenlegung von Einkommen für den Kauf von Lebensmitteln festgestellt, was die Bedeutung von Unsicherheit und bestehenden Normen für die Ergebnisse der Kooperation in landwirtschaftlichen Haushalten unterstreicht.

Die Arbeit kommt zu dem Schluss, dass kollektives Handeln in polygonen Agrarhaushalten nicht im Vakuum stattfindet. Vielmehr ist kollektives Handeln das Ergebnis mehrerer Prozesse und Mechanismen, die die Verteilung von Ressourcen beeinflussen und bestimmen, ob diese

effizient mobilisiert werden. Politische Entscheidungsträger sollten sich dieser internen Arrangements bewusst sein, da sie die möglichen Auswirkungen politischer Interventionen auf die Ressourcenverteilung innerhalb der Haushalte beeinflussen. Der Erfolg agrarpolitischer Maßnahmen hinsichtlich Nahrungsmittelproduktivität und Ernährungssicherheit hängt von einem besseren Verständnis der landwirtschaftlichen Haushalte ab.

LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|-------------|--------------------------------------------|
| CA | Collective Action |
| CPR | Common Pool Resource |
| FGD | Focus Group Discussion |
| GDP | Gross Domestic Product |
| HDI | Human Development Index |
| HH | Household |
| IAD | Institutional Analysis and Development |
| ILRI | International Livestock Research Institute |
| NRM | Natural Resource Management |
| SSA | Sub-Saharan Africa |

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1. INTRODUCTION

With population growth and increasing demand for food, global efforts to end hunger and enhance food security will require substantial investments in agricultural development. Smallholder farmers, who constitute more than 70 % of the world's producers (Lowder et al., 2016), can be part of the solution (IFAD, 2017). Provided the right policies are identified and adequate implementation strategies are put forward, smallholder farmers offer strong leverage for enhancing global food security. Nonetheless, the success of agricultural interventions is contingent upon an accurate understanding of farmers' responses to different stimuli. At the farm household level, for instance, accurate conceptualisations of the units of production, the relations of production, and the underlying mechanisms which shape the allocation of resources is a prerequisite for sound policy implementation. This is particularly relevant in the sub-Saharan African context, where agrarian households exhibit complex dynamics, with unclear boundaries, and strong socio-cultural relations of production and consumption (Goody, 1989; Guyer, 1984; Guyer & Peters, 1987; Meillassoux, 1973). Indeed, the patterns of resource allocation and division of labour, follow socially-established laws (Apusigah, 2008; Evans et al., 2015; Kazianga & Wahhaj, 2013; Kea, 2013), with implications for agrarian household members propensity to pool resources, and agricultural productivity (Akresh et al., 2016; Kazianga & Wahhaj, 2017; Udry, 1996).

This thesis explores the institutional conditions, which shape the allocation of resources in agrarian households in Burkina Faso. It aims to uncover the relations of production binding individual household members, including their rights, obligations and entitlements, and how these, in turn, influence how labour, time, agricultural inputs and output are allocated and appropriated in agrarian households. It is important from a practical perspective to understand these dynamics to identify potential leverage points for strengthening food and agricultural policy. The following introduction lays the foundation of this thesis. In section 1.1, a brief overview of the research problem is presented, then section 1.2 elaborates on the rationale for conducting this research. In the subsequent section, 1.3 the conceptual framework underlying the thesis is provided. Section 1.4 makes a brief overview of the study context, followed by the methodology that guided the empirical study in section 1.5. The final section provides a roadmap of the thesis structure, with emphasis on the different chapters constituting the document.

1.1. Problem statement

Low agricultural productivity in sub-Saharan Africa remains a major challenge in achieving the Millennium Development Goals (MGDs), mainly its component 2, which aims to stem hunger and ensure food security for all. Indeed, the substantial yield gaps characterising agricultural output in this part of the world (Henderson et al., 2016; van Ittersum et al., 2016), pose serious concerns to policymakers and development organisations, considering that a large proportion of the population derive their subsistence from agricultural production and mostly depend on their own production for consumption and food security. The output from own production rarely covers annual food needs, putting millions under the risk of famines during lean seasons, and requiring immediate interventions from external interventions to improve this situation.

The consequences of this low productivity are multidimensional. At the household level, low productivity outcomes can jeopardise the food and nutritional security of the household. This situation in turn, affects the potential of the household to reproduce itself. Given the positive relationship between calorie intake and farm productivity (John Strauss, 1986), farmers who achieve low output levels are likely to be less productive in the following season, leading to a vicious circle, and a food insecurity trap. On the other hand, low productivity implies low income and poverty (Dzanku et al., 2015), thus less opportunity to purchase food, exacerbating food insecurity (Okello et al., 2017). Furthermore, the situation of food insecurity at the household level translates into gender and intergenerational differential food security at the individual level (Hadley et al., 2008; Kuku et al., 2011). The adverse consequence of poor nutrition and food security raises questions on the underlying factors shaping these productivity gaps.

Low productivity and yield discrepancies have been attributed to various factors. Climate and agronomic conditions, including poor water and nutrient management, have been identified in the literature as constraints to agricultural productivity (Davis et al., 2017; Mueller et al., 2012). Others have highlighted the socio-economic conditions (Banerjee et al., 2014; Liu et al., 2016) and poor market and credit structures (Ofori et al., 2010). For a few decades, however, the evidence is pointing to the misallocation of resources within farm households as additional drivers of poor farm overall performance (Guirkingner et al., 2015; Kazianga & Wahhaj, 2017; Udry, 1996). The inefficient fertiliser and labour allocation in many agrarian settings in sub-Saharan Africa supports this argument. For instance, differential labour and fertiliser intensities were observed across plots within agricultural households, contributing to lower productivity

outcomes (Guirkinger et al., 2015; Kazianga & Wahhaj, 2017; Udry, 1996). The failure of these households to embrace potential economies of scale and coordination gains, raises fundamental questions on the underlying reasons shaping the allocation of resources within agrarian households. Why are some plots more intensively cultivated than others within the same agricultural households? Why don't household members reallocate resources to achieve coordination gains and scale economies? These questions need rigorous answers to advance knowledge on agrarian households' behaviour and to tailor interventions for household crop productivity and food security.

1.2. Rationale of the thesis

Smallholder farmers are the major actors in agricultural and food production in sub-Saharan Africa (SSA). A significant proportion of the food produced (about 80%), in the region emanates from small-scale farmers (IFAD, 2017) whose practices are rudimentary and whose access to technology and inputs is severely constrained (Moyo, 2016). Hence, smallholder farmers have a critical role to play in global efforts towards reducing hunger and enhancing food security. In the wake of climate change and population growth, ensuring sustainable food security would thus require substantial investments in agricultural development practices, through sound implementation and targeting of agrarian households. Yet, successful intensification of agricultural production in SSA, not only depends on a favourable external environment, such as access to improved technologies, or better access to markets. The dynamics of agrarian households are equally important, if not crucial, to the outcomes of policy interventions (Doss & Quisumbing, 2020).

Many agricultural programs in sub-Saharan Africa are based on a strong premise that agrarian households behave as unity. In other words, agrarian households will reallocate their resources to their best possible uses, regardless of the person targeted in the intervention. This conceptualisation of household behaviour has informed male-centric interventions, with men receiving most extension services and information (Fisher et al., 2019; Ragasa et al., 2013). The assumption that household heads can freely mobilise other members labour to account for the induced increase in labour demand, or those other members are willing to relinquish more time to the head's activities, often motivate the direction taken by agricultural programs in SSA. Yet, there is strong evidence that women are often reluctant to reallocate their labour to their husbands' private enterprises (Carney, 1988; Carney & Watts, 1990). The case of failed rice development programs in The Gambia, with reduced rice productivity, illustrate the complexity

of targeting household heads without a clear understanding of the intrahousehold relations of production (Carney, 1988; Chavas et al., 2005). Female centric programs are not void of such unintended outcomes. Das et al. (2013) found that empowering rural women by reallocating livestock assets from men to women yielded mixed effects: women gained increased control on transferred assets, but men got greater control over all other assets in the household. Similar interventions that redistributed resources from men to women resulted in a decrease in calorie intake by household members (Aromolaran, 2004). These unexpected outcomes highlight the complexity of intrahousehold relationships and call for a better understanding of the intrahousehold micro-processes.

The pertinence of this thesis, hence, lies in its attempt to uncover the complex interplay between the institutional arrangements which shape relations of production and the allocation of resources in agrarian households. The thesis is based on the assumption that the propensity of farm households to embrace productivity-enhancing opportunities is contingent upon the underlying institutional arrangements which govern the division of labour. In other words, the prospect of smallholders to raise their productivity and incomes is tightly woven into their ability to overcome the potential conflicts of interest embodied in the rights and obligations assigned to each household member. Therefore, understanding the household constructs and the relations of production that shape the patterns of resource distribution is crucial for predicting project outcomes and strengthening food policy. From a practical perspective, greater knowledge of the conditions under which household members cooperate is important both from a productivity and equity standpoint. Failure to grasp the nature of the relationships binding household members in agrarian settings may be counterproductive when the interventions adversely alter the rules of exchange. Some household members may withdraw their labour from the activity unless a renegotiation of rights and obligations is reached (Carney, 1988; Schroeder, 1996). Increased concerns for the equity consequences of policy interventions also justifies the need to examine the micro-processes in agrarian households. The repercussions of policy interventions on the welfare of individual household members call for a cautious implementation of programs, considering they may exacerbate the vulnerable position of some household members by reinforcing the unequal relations of production and the uneven distribution of costs and benefits across individuals.

1.2.1. Knowledge gaps

Over the past decades, increased interest in the dynamics of households has motivated a tremendous amount of theoretical and empirical work. Scholars were particularly concerned about the efficiency outcomes of intrahousehold interactions (Akresh et al., 2016; Guirkingner et al., 2015; Hidrobo et al., 2020), whether income and consumption smoothing occurred within households (Hotchkiss et al., 2005; Kazianga & Udry, 2009), or the extent to which household members pooled and shared risks (Mazzocco, 2004; Ortigueira & Siassi, 2013). Studies on the allocation of resources in agrarian households have followed similar patterns, examining the efficiency of inputs allocation across plots managed by different household members (Kazianga & Wahhaj, 2017; Udry, 1996) and the processes underlying productivity outcomes (Akresh et al., 2016; Kazianga & Wahhaj, 2013). These studies have contributed a great deal to our understanding of agrarian households' behaviour but the underlying structural conditions that shape the observed outcomes have not yet been explicitly analysed (Doss & Meinzen-Dick, 2015). Besides, few studies have explored the dynamics within more complex settings, such as polygynous households. Indeed, polygynous households are widespread in African societies, but their specific features are relatively neglected in the agricultural development literature. Considering that such households have a rather large number of household members, collective action within such households appears important with regard to agricultural production and food security. There is a prevailing perception that polygynous households are conflict-ridden, which would pose a challenge to collective action, but empirical evidence is scarce.

Furthermore, current literature has essentially focused on the material component of intrahousehold interactions, including exchange and allocation of tangible resources among household members (Guirkingner et al., 2015; Kazianga & Wahhaj, 2017; Udry, 1996). The analysis of household relations often overlooks the non-material drivers of these exchanges. A few scholars did hypothesise the role of less tangible factors such as altruism and reciprocity in shaping intrahousehold cooperation (Akresh et al., 2016; Barr et al., 2019). However, few empirical studies have paid close attention to the importance of trust as a component of social capital in supporting collective action in agricultural households. Turning the theoretical conceptions into an empirical enquiry could offer avenues for understanding the critical role social capital plays in the allocation of resources within households.

1.2.2. Objectives and research questions

The overall objective of this thesis is to examine the institutional context within which cooperation arises and is sustained in agrarian households. Accordingly, the following specific objectives are pursued:

- 1) To examine the accuracy and reliability of existing representations of agricultural households and their consequences on agricultural policy
- 2) To determine the conditions that enable resource pooling within agrarian households
- 3) To assess the role of social capital in mediating cooperation in productive and reproductive activities.

To guide the inquiry into agrarian households' organisation, a set of research questions were formulated to address each of the objectives. The overarching research question is: Why do members of agricultural households' pool resources and engage in joint ventures? The specific questions are as follows:

The research questions for addressing the objective of examining the accuracy and reliability of existing representations of agricultural households and their consequences on agricultural policy are:

- a) To what extent do existing household models reflect the patterns of resource allocation in agrarian households?
- b) How can existing household models be improved to inform sound agricultural policy interventions?

For realising the objective to determine the conditions that enable resource pooling within agrarian households, the following questions were defined:

- a) What are the constraints to resource and income pooling in agrarian households?
- b) How do relations of production shape the prospects of intrahousehold cooperation?
- c) How do institutional arrangements create a conducive environment for resource pooling in agrarian households?

The objective to assess the role of social capital in mediating cooperation in productive and reproductive activities was guided by the following research questions:

- a) To what extent is social capital important in interpersonal relationships in agrarian households?

b) Under which conditions is social capital important to the emergence of cooperation in agrarian households?

c) How useful are experimental methods in assessing behaviour in agrarian households?

Towards this end, the thesis advances a conception of agrarian households as collective institutional units (Doss & Meinzen-Dick, 2015; Lecoutere & Jassogne, 2019), to explore the intrahousehold relations of production, the nature of collective problems encountered in the course of food production, and how household members address problems requiring collective action.

1.3. Conceptual framework

1.3.1. The commons problem in agricultural households

To ensure food and nutritional security for their members, agricultural households must mobilise and allocate scarce resources to produce food in sufficient quantity and quality. In their pursuit of sustainable livelihoods, however, agricultural households face collective action dilemmas, characteristic of Common Pool Resource (CPR) settings (Ostrom, 1990). Like any corporate institution, multi-member households must overcome two simultaneous problems, which pose serious constraints to optimal resource allocation. Provision problems are linked to *the resource system* (Ostrom, 1990) and arise from a lack of cooperation between actors to provide the necessary stock to sustain the resource. In the agricultural household context, cooperation could take on many forms, ranging from joint labour allocation for crop production, income pooling for the purchase of inputs including seeds and fertilisers, and the coordination of activities for livestock keeping. Evidence, however, highlights an undersupply of food (Akresh et al., 2016; Udry, 1996) resulting from intrahousehold inefficient resource allocation (Akresh et al., 2016; Guirkingner et al., 2015; Kazianga & Wahhaj, 2017). Appropriation problems, on the other hand, relate to *“the flow of resource units produced by the system”* (Ostrom, 1990 p:30). Stakeholders incentive to cooperate depends on the distributional consequences of joint effort, and whether it follows principles of fairness and equity (Lecoutere & Jassogne, 2019; Ostrom, 1990; Poteete & Ostrom, 2004a). In many peasant households of Sub-Saharan Africa, evidence suggests unequal nutrient intake and food consumption (Coates et al., 2018; Villa et al., 2011). The potential conflict between provision and appropriation incentives, may give rise to social dilemmas, which threaten the success of collective action within agrarian households.

In both natural resource management and agrarian households, dilemmas arise from the difficulty in aligning individual interests with collective pursuits, as private and social marginal

benefits diverge (Ostrom, 1990). The challenge to exclude members from the joint resource, renders benefits non-excludable, while the costs of provision are borne by the individual. In most agricultural households in Sub-Saharan Africa, each household member is a potential appropriator of the collective output from common fields (Guirkingner et al., 2015; Kazianga & Wahhaj, 2017; Kevane & Gray, 1999). The joint entitlement to the proceeds from collective efforts, combined with the fear of being exploited by other members, may exacerbate opportunistic behaviour and impair the optimal allocation of household resources. Besides, the coexistence of individual and collective plots (Kazianga & Wahhaj, 2017; Udry, 1996), and the private appropriation of proceeds from individual plots, enhances coordination problems through strong incentives to allocate more resources and efforts to one's private endeavours (Guirkingner et al., 2015).

The next section of the thesis draws insights from the natural resource management literature to examine potential drivers and inhibitors of cooperation in agrarian households.

1.3.2. Collective action in agricultural households: determinants and constraints

Following Olson's (1965) workhorse study on collective action, a tremendous amount of empirical studies was conducted in various field settings. Natural resource management (NRM), in particular, has received substantial attention over the past decades (Anderies et al., 2013; Ostrom, 2010; Rivera et al., 2017). Increased concerns over the preservation of natural resources and the sustainable harvesting of renewable resources, has sparked considerable interest in the factors that are likely to positively affect collective action. The current thesis draws on NRM theoretical developments on collective action, to assess intrahousehold cooperation in agrarian societies. The extrapolation of NRM conditions to agrarian household settings is prompted by the range of characteristics both corporate institutions share (Doss & Meinzen-Dick, 2015). Just as NRM, households comprise several members who share common pool resources, and whose livelihoods depend on sustainable resource use and collective action. In light of this background, we introduce the thesis' conceptual framework (Figure 1), which largely builds on the three broad categories identified in the natural resource management literature: these include the community characteristics, the attributes of the common pool resource, and the institutional arrangements that shape decision making.

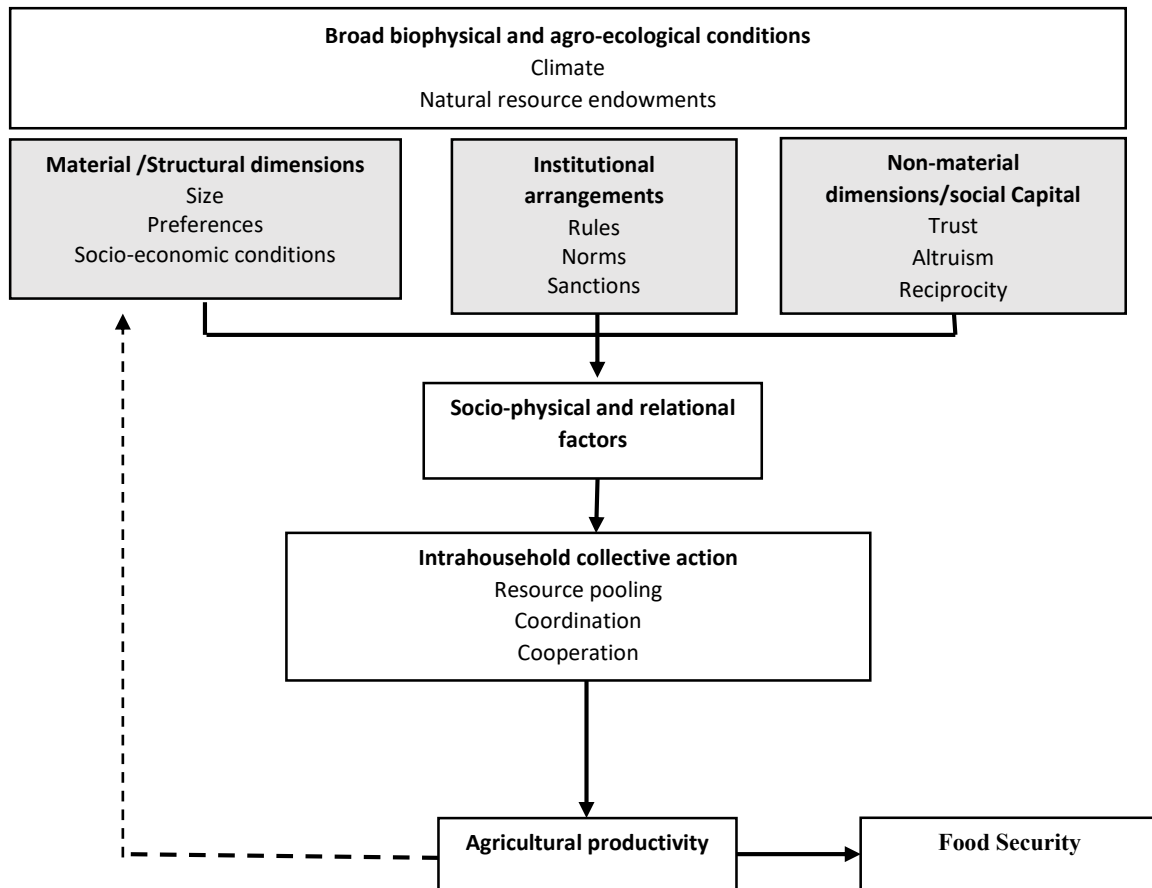


Figure 1: Conceptual Framework depicting the interlinkages between household structural conditions, institutional arrangements and cooperation. Adapted from Ostrom (1994)

1.3.2.1. Structural characteristics and collective action

1.3.2.1.1. Socio-economic attributes and intrahousehold cooperation

The natural resource management literature clearly cites community attributes as potential drivers or inhibitors of collective action in CPRs (Poteete & Ostrom, 2004a; Pradhan & Patra, 2013; Takayama et al., 2018; Useche, 2013). The composition of the CPR group, in terms of socio-economic, demographic or cultural diversity (Dash & Behera, 2015; Mukherjee et al., 2017; Negi et al., 2018), influences the costs and benefits facing actors but also their preferences, altering their incentives towards cooperation (Gavrilets, 2015; Poteete & Ostrom, 2004a). There is, however, heated debate about the direction of the relationship between group heterogeneity and collective action (Varughese & Ostrom, 2001), or whether it influences the likelihood of cooperation in social dilemmas (Adhikari & Lovett, 2006; Gautam, 2007). Like many CPRs settings, agricultural households in sub-Saharan Africa are complex and diverse, often spanning several generations (Akresh et al., 2016; Guirkingner et al., 2015; Guyer & Peters, 1987; Kazianga & Wahhaj, 2017). Household members differ along a diversity of dimensions,

including their age, their gender and status within the household (Becker, 1996; Guyer & Peters, 1987; Tsikata & Dede-Esi, 2009). They are also entitled to different endowments and access to productive resources (Becker, 1996; Kazianga & Wahhaj, 2013; van den Bold et al., 2015) and exhibit diverging preferences (Doss, 2001a, 2001b).

Within agricultural households in sub-Saharan Africa, production relations are characterised by socially-differentiated capacities to mobilise resources, translating into intrahousehold inequality (Apusigah, 2008; Duncan, 2010; Evans et al., 2015; Shibata et al., 2020). Land often remains under male household members' control, and women' access is restricted to usufruct rights which they acquire upon marriage (Theriault et al., 2017; van den Bold et al., 2015). Likewise, labour mobilisation capacities operate along gender and generational lines with differential labour claims and rights (Apusigah, 2008; Duncan, 2010). Beyond the labour and land constraints facing households' members, access to inputs and markets constitute an important source of technological heterogeneity within agricultural households (Anang et al., 2015; Theis et al., 2018; Udry, 1996). The heterogeneity in resource endowments and obligations, all constitute potential challenges or opportunities for resource pooling for food production in agricultural households. The outcomes will, however, be contingent on the interdependencies and preferences of household members, and the extent to which it alters their incentive structures for cooperation.

1.3.2.1.2. Preferences, interdependencies and cooperation

The natural resource management highlights heterogeneity in preferences and interests as potential sources of collective action dilemmas (Kölle, 2015; Pradhan & Patra, 2013). Kölle (2015), for instance, shows that different valuations of the public good negatively influence cooperation. In agrarian households, heterogeneous preferences are expressed in the different values rendered to specific crop traits or the patterns of expenditures (Duflo & Udry, 2004; Reynolds et al., 2020; Smith & Chavas, 1997). Evidence suggests that women exhibit a greater preference for crops that ensure food and nutritional security for household members, men's preferences on the other hand are geared towards cash crops (Reynolds et al., 2020). These asymmetric patterns often reflect the fundamental asymmetries in resource access and control which, in turn, can affect production and consumption preferences and household members' incentives to cooperate, with repercussions on the distribution of costs, such as labour allocation and the benefits from crop production (Carney, 1988; Carney & Watts, 1990; Smith & Chavas, 1997).

Despite the diversity of preferences and interests in social dilemmas, interdependencies and complementarities tend to generate patterns of collective behaviour in NRMs (Anderies et al., 2013; Araral, 2009; Lockwood et al., 2010; Schlager, 2016). These outcomes are illustrated in irrigation systems, where head-enders and tail-enders tend to cooperate due to the mutual interdependencies on the activities undertaken on the other side of the watershed (Anderies et al., 2013). By analogy, mutual interdependencies affect the effectiveness of collective behaviour within agrarian systems, by altering the incentive structures of household members (Doss & Meinzen-Dick, 2015). Relations of production in agrarian systems in sub-Saharan Africa create complementarities and mutual interdependencies, which influence the patterns of resource allocation, and cooperation within the household (David, 2015; Lodin, 2012; Tsikata, 2016). In many agrarian societies, both men and women depend on their spouses support, either in the form of labour to the collective fields, or through usufruct rights to private plots (Carney, 1988; Kazianga & Wahhaj, 2013; Kevane & Gray, 1999). Such interdependencies may alter household members' incentive structures towards cooperation. In some agrarian systems in sub-Saharan Africa, men must provide the grains, or main staple, for household consumption, while it is women's responsibility to bring the sauce that accompany the main staple (Rousseau et al., 2019; Tsikata & Dede-Esi, 2009). The division of responsibilities, and the inherent impact it has on household nutritional outcomes, creates complementarities that can influence the prospects for cooperation (van den Bold et al., 2015).

1.3.2.2. Resource attributes and collective action

Successful collective action not only depend on the users' characteristics, but is also linked to the attributes of the resource itself, as experience in the NRM reveals (Anderies et al., 2013; Araral, 2009; Ostrom, 2003a). The resource physical boundaries and size, its flow and scarcity, all play a significant role in shaping incentives for cooperation. In an irrigation system management in the Philippines, Araral (2009) found a curvilinear relationship between water scarcity and collective action. The actors in the watershed were more likely to free-ride under water-abundant and water-scarce conditions. In the agrarian context, the attributes of the resource can be viewed from the broader context (Doss & Meinzen-Dick, 2015). On the provision side, the quality and fertility of the land will determine the extent to which collective action will secure food for household members. Efforts to boost productivity by improving soil fertility might entail the purchase of fertilisers or the application of manure to cropping fields. By analogy to the natural resource management, scarcity or abundance (in both absolute and qualitative terms) might either present opportunities or challenges to intrahousehold

cooperation, by altering the set of incentives that household members face in a given situation. Akresh (2005), for instance, posits that under adverse environmental constraints, household members' incentives are geared towards optimal resource allocation. In comparing two geographical regions in Burkina Faso, he found that households which experienced negative rainfall shocks, allocated more labour to women's plots.

From the consumption side, the complexity of the resource attributes is exacerbated by the cultural meaning embodied in each of the resource units. Under agricultural and livelihood diversification, households not only produce food for consumption but slowly integrate cash crops in the farming system. The attributes of these crop types must be clearly distinguished, as they embody different socio-cultural and religious meanings (Korieh, 2007; Obidiegwu & Akpabio, 2017; Padmanabhan, 2007), with implications for intrahousehold division of labour and collective action (Guyer, 1980, 1984; Linares, 1985). As described in the anthropological debates, staple crops embody specific cultural functions which influence gender relations of production. Using the example of yam production in Nigeria, Obidiegwu & Akpabio (2017) illustrate how *“The process for cultivating yam crop is characterized by strict and traditional gender division of labor where men and women are distinctly assigned traditional roles.”* (p.6). The same intuition is implied in the work of Duflo & Udry (2004) where the patterns of household expenditures reflect the source of income. Income from yam, the appreciated crop, is allocated to joint goods purchases, while income from cash crops are spent on more private goods. The attributes of joint goods, the frequency of harvesting or consumption, all have implications for the propensity of household members to cooperate. In the case of livestock, for instance, intrahousehold arrangements for the provision and appropriation of birds and bird products, such as eggs, may be different from the arrangements required to manage either small ruminants or cattle.

1.3.2.3. Institutional arrangements and intrahousehold collective action

Voluntary cooperation for the provision of a common pool resource is contingent upon the set of rules and norms governing the organization and allocation of resources (Ostrom, 1990). The institutional arrangements, or rules-of-the-game, provide the framework for shaping socially-accepted behaviour in commons dilemmas (Ostrom, 1990; Persson & Prowse, 2017). Ostrom (1990) describes them as the prescriptions or prohibitions that shape the incentives structures of individuals and guide their decision making. Several empirical studies in NRM illustrate the importance of crafted rules and norms in facilitating processes of resource provision and

maintenance (Gautam & Shivakoti, 2005; Janssen et al., 2011; Ostrom, 1987; Skurray, 2015). Extrapolating insights from the NRM literature to the agrarian household perspective, cooperation will take its meaning within the predefined social norms and relations of production, which outline resource allocation and the division of labour (Arora & Rada, 2020; Guyer & Peters, 1987; Kazianga & Wahhaj, 2013; Lambrecht, 2016). Gender relations of production, in particular, are embodied in the conjugal contracts that prescribe the rights and obligations of spouses towards the provision and appropriation of the joint products (Carter & Katz, 1997; Guyer, 1981; Siskind, 1978). Labour allocation decisions are thus the outcome of a combination of rules and norms which affect the incentive structures of individual household members (Staveren & Odebo, 2007). Consumption patterns are also subject to rules and social norms, which define the nature and quantity of food that each member is entitled to and the intrahousehold arrangements with respect to eating organisation. The norms and sanctions following these all have implications for the labour division of labour and intrahousehold gender and intergenerational relations of production and consumption (Sapir, 1970).

1.3.2.3.1. Social capital, trust and collective action

The success of community resource management is the outcome of both tangible and less tangible resources. Among the non-physical factors influencing cooperation, social capital occupies a central role in explaining community collective action in social dilemmas (Ostrom, 1994; Ostrom & Ahn, 2001; Pretty & Smith, 2004; Pretty & Ward, 2001). The NRM literature is rich of evidence that highlights the importance of social capital in shaping the outcomes of community resource governance (Adger, 2003; de Vries et al., 2019; Hotte et al., 2019). According to Putnam (1994), “*social capital refers to features of social organization, such as networks, norms, and trust, that facilitate coordination and cooperation for mutual benefit*” (p:6). Within the context of natural resource management, the relationship between trust, as a component of social capital, and collective action has been widely explored. Several of the empirical studies highlight the role of trust in shaping resource conservation and high levels of social capital are reflected in better organisation and better some of the components of social capital have received considerable attention. Under prohibitive costs of monitoring household members behaviour in agrarian settings (Kazianga & Wahhaj, 2013), social capital can enhance rule compliance by reducing the transaction costs associated with information seeking (Ostrom, 2003b; Pretty, 2003).

1.4. Study context

1.4.1. Agriculture and food security in Burkina Faso

Located in West Africa, Burkina Faso is a Sahelian landlocked country, among the poorest in the world (UNDP, 2019). With a Human Development Index (HDI) of 0.452, the country is ranked 182 of the 189 countries included in the evaluation (UNDP, 2020). According to World Bank (2020) figures about 36.7% of the population lives with less than 1.90 USD per day, the majority of whom live in rural areas. The poor economic indicators of the country are a reflection of several structural and institutional factors, including a lack of adequate infrastructures and the underperformance of the country's major sub-sectors, including agriculture.

Agriculture forms the backbone of Burkina Faso's economy. The sector employs more than 80% of the active population (OECD, 2018) and contributes up to 30% to the Gross Domestic Product (GDP) (Aragie et al., 2018). Over a ten-year period, agricultural output has increased by nearly 33% from 3,314,000 tons in 2009 to 4,420,000 tons in 2018 (MAAH-Burkina Faso, 2020). Unfortunately, this significant growth has not compensated for the food needs of growing population (MAAH-Burkina Faso, 2020). Conscious of the role that agriculture plays for the national economy, the government has made significant investments in developing the sector (Haider et al., 2018; Zidouemba & Gérard, 2015) but it still suffers from low productivity and important yield gaps (Dabat et al., 2012; Herrera & Ilboudo, 2012; Ouédraogo, 2012).

The factors underlying the poor performance of the agricultural sector are diverse and multiple, ranging from the adverse climatic conditions, to poor market and credit infrastructures, and to the low adoption of improved technologies (Kohio et al., 2018; Koussoubé & Nauges, 2017). With such constraints to agricultural development, the country remains in a vulnerable position, with regards to ensuring its population food security, especially smallholder farmers whose livelihoods are reliant on subsistence farming.

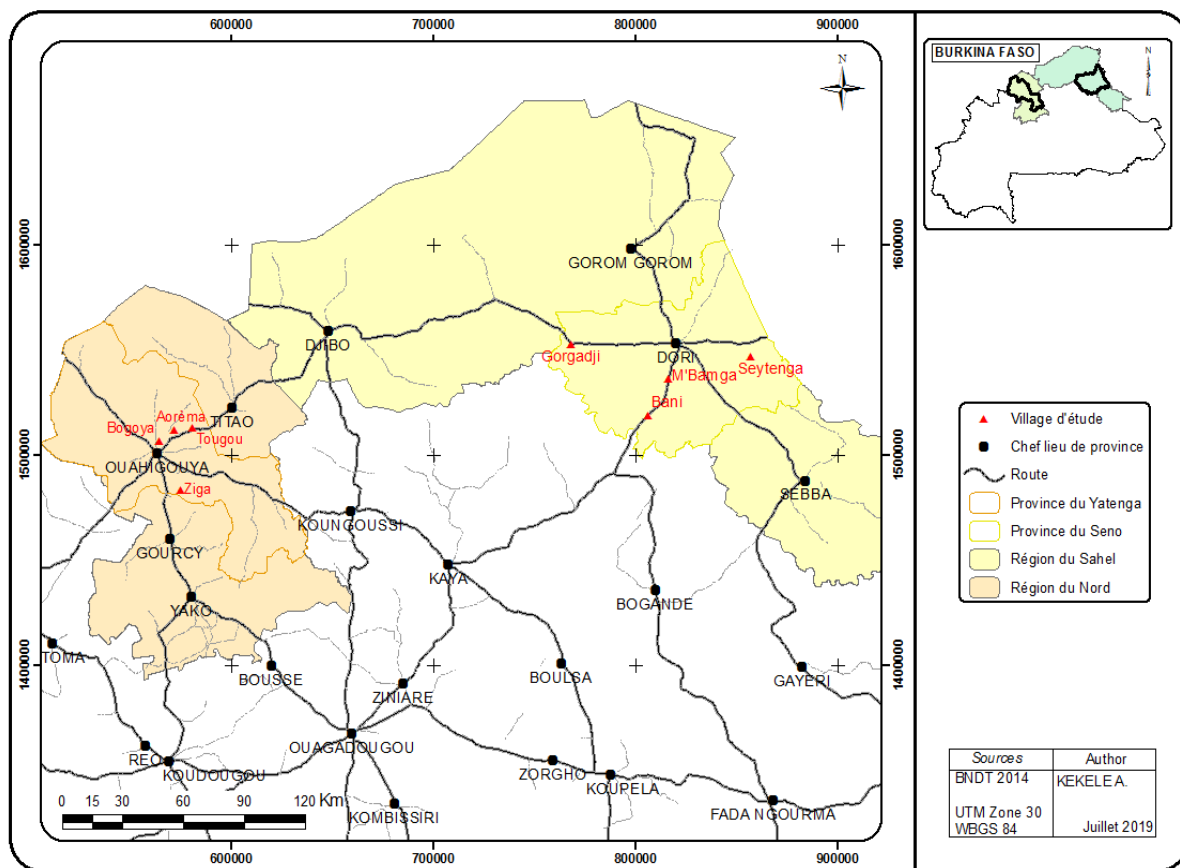
Food security remains a major challenge for policymakers and international development agents in Burkina Faso. The latest assessment of the state of food security in the country revealed that 1.2 million people are in a critical state of food insecurity, representing 5.9% of the total population (RCPA, 2019). A map of the current situation shows that the Northern and the Sahel region are the most affected areas and that more than a third of the food insecure are from these parts of the country (RCPA, 2019).

Conscious of the role that smallholder farmers can play in boosting agricultural productivity and food security, policymakers in Burkina Faso have initiated several actions, geared towards the creation of sound institutional conditions for the development of agriculture, including the promotion of technologies through subsidies. But these efforts seem insufficient to ensuring adoption, farmers relying mostly on rudimentary tools. Fertilisers subsidisation programs (Coulibaly & Savadogo, 2020; Haider et al., 2018), for instance, did not yield the expected outcomes, to boost adoption and application on crop fields. Several factors were put forward to explain these low adoption rates, ranging from the price of inputs, the lack of information, or the perceived productivity effects of these technologies. Nevertheless, the intrahousehold dynamics, in terms of power relations, gender relations of production and intergenerational contracts, are still not integrated in the major paradigms to explaining the deviation from what seem to be the most profitable option for smallholder farmers. Hence, the current research topic aimed to fill this knowledge gap left in the literature. In the next section, an ethnographic presentation of the study site and communities are presented.

1.4.2. Ethnography of study areas

The Sahel zone of Burkina Faso (Figure 22) was selected for this thesis, as part of a global ILRI¹-led project on sustainable intensification in livestock farming systems. The area is one of the three climatic zones in Burkina Faso. It is characterised by arid climate conditions with an average annual rainfall ranging from 400 mm to 600 mm (Kiema et al., 2012; Thiombiano & Kampmann, 2010). The rainy season in the Sahel zone is unimodal, ranging from June to September (Kiema et al., 2012), though climate variability in the past decade has influenced the distribution and duration of rain showers in the region. These global patterns in the climate are accompanied by a downward trend in soil fertility, resulting primarily from wind and hydrologic erosion, with implications for the land use patterns and agricultural systems (Ganaba, 2005; Kissou et al., 2018).

¹ International Livestock Research Institute



there are distinct variations in the dominant ethnic group and farming systems represented in each location. The Seno province, for instance, where M'Bamga is located, is mostly occupied by the Fulani, while the Mossi constitute the majority ethnic group in Tougou, Yatenga province. The Mossi and the Fulani practice agriculture and livestock husbandry, though to varying degrees (D'Aquino, 2000; Kintz, 1982; Majekodunmi et al., 2017). The Fulani rely mostly on livestock rearing as their main source of livelihoods and practice agriculture as a sub-activity. The opposite is true for the Mossi, who derive their livelihoods principally from crop production (D'Aquino, 2000). The heterogeneity in the patterns of farming, combined with the socio-cultural organisation results in intrahousehold division of labour and gender relations of production, which differ from one location to the other. The next section briefly describes the two ethnic groups, their social structures, with emphasis on their agricultural practices and intrahousehold labour organisation.

1.4.2.1. Social organisation and farming systems among the Mossi

The Mossi are the majority ethnic group in Burkina Faso, representing about 48% of the population (Thiombiano & Kampmann, 2010). Though they are spread across different regions of the country, they occupy the central plateau and the Northern part.

The Mossi society is fundamentally organised in lineages (*Buudu*) around a lineage head (*Buudkasma*), who sees to the transmission of social values and resources among members of the kin. Each lineage, is composed of several sub-units, believed to share a common ancestor who binds the members together (Attané, 2008). Lineage heads play a central role in forming alliances with neighbouring communities, often through marriage arrangements, as wife exchanges and transfers, based on reciprocity principles (Attané, 2008). Exogamy is the main feature of Mossi unions (Attané, 2008; Laurent, 2013; Pageard, 1966), that is members must marry outside their kin, a strategy sometimes employed to maintain good relationships and strengthen alliances with neighbouring communities (Rohatynskyj, 1988).

The Mossi society is patriarchal with a patrilineal descent system. Men hold authority on all resources and make important decisions for the socio-economic organisation of their sub-units (Kohler, 1971; Skinner, 1961; West, 2010). Social organisation revolves around principles of seniority, which translates into strong hierarchical gender and intergenerational relationships (Attané, 2008; Fiske, 1990). The *zaka* constitute the basic domestic unit among the Mossi (Rohatynskyj, 1988; Van der Schaaf, 2008). It is made up of a head with his dependents, including not only his wife (ves) and children but in many cases, adult brothers and/ or elder

parents, who all form a productive unit, and work collectively under the leadership of the head (Tallet, 1989).

Agriculture forms the major economic activity of the Mossi. Farming is characterised by a mixed crop-livestock system, with emphasis on the former. The social organisation of production and consumption articulates around individual and collective fields, shaping the division of labour and the relations of production. Collective fields (*Puugkinga*), which occupy the largest share of cultivated area, are dedicated to staple food production, and often represent the most fertile land available for cultivation (Tallet, 1989). Individual plots (*beolgo*), on the other hand, represent, on average, 11 to 17% of the total area cultivated (Ancey, 1974). They are often of lower fertility than collective fields and are mostly dedicated to the production of cash crops and vegetables. The allocation of household resources, including labour, to each of these field type follows distinct arrangements in the Mossi households. Collective fields usually receive greater investments in terms of inorganic fertilisers or manure, and are more intensively cultivated, labour-wise than individual plots.

More than its direct value in sustaining farmers livelihoods, agriculture embodies the cultural and social meanings, which contributes to the reproduction of the Mossi society (Kohler, 1971), forming the core area where gender and intergenerational relations are expressed. Labour requirements for agricultural production are based on an exchange system, whereas women get access to private plots in exchange for their labour on collective fields (Kazianga & Wahhaj, 2013; Kevane & Gray, 1999; Tallet, 1989). Young adults may also contribute their labour for a small plot of land, where to produce their private crops and appropriate the output from it. Thus, all household members labour is mobilised on collective fields (sometimes referred to as *zaksobpuuga* or “the head’s field”), where wives’ and children’s labour are intensively extracted for food production (Kazianga & Wahhaj, 2017; Udry, 1996). The participation of household members in each stage of production, from land preparation to harvesting, is required and the household head decides how to allocate labour across different collective plots, and when to start the production process.

The output from collective fields is stored in collective granaries, in the centre of the compound and is managed and controlled by the household head who distributes manages the use and consumption by rating the amount of food that is allocated daily. Women rarely access these granaries and only control the output they obtained from their private fields (Kevane & Gray, 1999). These arrangements equally apply to other household members, such as brothers and

sons of the household head, who also can control their output from private fields but have little say on how the joint output should be managed.

1.4.2.2. Social organisation and farming systems among the Fulani

The Fulani are a large semi-nomadic group, spread across many countries in sub-Saharan Africa (Boutrais, 1994). The geographical dispersion of the Fulani across regions and agro-ecological contexts (Lingane, 2001), influences the heterogeneity between different Fulani groups, including their social organisation (Dupire, 1970). In Burkina Faso, the Fulani represent 8.2% of the total population, and mostly occupy the Northern part of the country (Bazémo, 2008). They are characterised by a patrilineal descent system and a hierarchy of rank (Langlois, 1983; Lingane, 2001). Unlike the Mossi, however, the Fulani practice endogamy (Langlois, 1983; Laurent, 2013). Cousin marriage accounts for about 64% of unions (Hampshire & Smith, 2007; Laurent, 2013). The political organisation is less centralised than that of the Mossi, with a multiplicity of chiefs spatially dispersed across various locations (Lingane, 2001). Household heads, as a result, enjoy some level of political autonomy

Traditionally, the Fulani are a pastoralist society, whose social organisation revolved around livestock keeping, engaging in economic exchanges with neighbouring ethnic groups to meet their needs in grains. In the Yatenga province of Burkina Faso, for instance, Lingane (2001) notes that the Fulani engaged in contractual arrangements with the indigenous Mossi farmers, by leaving their livestock on the latter's farms in exchange for gains for their subsistence. Following the 1970s and 1980s droughts, however, and the decimation of livestock by the trypanosomes disease, the socio-economic organisation of the Fulani was profoundly altered, affecting their farming systems (Colliot & Nguyen, 1993). Crop production was gradually integrated into the farming systems, as a strategy for coping with the uncertainty surrounding livestock husbandry. In the Sahel zone of Burkina Faso, Fulani practice extensive livestock farming, combining it with rain-fed agriculture (Hampshire, 2006).

The major unit of domestic organization of the Fulani is the *wuro* or *baade* (depending on the Fulani branch considered) and reflects the basic unit of co-residence, production and consumption (K. Hampshire, 2006). Hampshire (2006) reports that the head of the domestic unit (*babaade*) is in charge of the social organisation of its members, including his wife (*ves*) and children but also in some cases his brothers, uncles and father. The *babaade* sees to the allocation of household resources to livestock and agricultural production and members of the *wuro* often cooperate on a range of agricultural tasks. The integration of agriculture into

livestock husbandry, was accompanied by greater male participation into crop production (Colliot & Nguyen, 1993), given that Fulani women do not farm (Delgado, 1979; Ellsasser, 1993). All tasks from land preparation, though weeding and harvesting are performed by male household members. Milking and milk sale, on the other hand, are the exclusive domain of women (Delgado, 1979; Querre, 2003), who also contribute to household reproductive activities.

1.5. Methodology

This section elaborates on the research tools applied to address the thesis' objectives. The research design and sample selection will be briefly discussed and the instruments for data collection will be presented. The second part will further discuss the choices of data collection methods and the strategies employed to ensure data validity and reliability.

1.5.1. Case study design

The empirical study of collective action poses numerous challenges, given its dynamic nature and the multiplicity of features it can take (Meinzen-Dick et al., 2004; Poteete & Ostrom, 2004b). The literature highlights several methodological approaches for operationalising collective action, and deciding on the most appropriate tools is contingent upon the study's purpose and the exact nature of collective action to investigate (Meinzen-Dick et al., 2004). Operationalising collective action in the household presents additional challenges, given the intimacy of intrahousehold relationships and given that many interactions take place behind closed doors (C. R. Doss & Quisumbing, 2020). Nonetheless, the literature identifies several useful tools (Meinzen-Dick et al., 2004), that can circumvent the difficulties inherent to the study of intrahousehold cooperation. The choice of instruments for the current thesis, combining quantitative and qualitative methods, was informed by each of the study's overall purpose and objectives.

The thesis uses a case study design to investigate intrahousehold resource allocation in agrarian households. This research design was preferred over a range of approaches because it allows a thorough analysis of complex phenomena (Yin, 2013). It was particularly suited for the first objective of the thesis, which is to assess the institutional context within which cooperation emerges in agrarian households. Given the lack of a clear understanding of the institutions governing intrahousehold resource allocation, and the complexity of household interactions, embedded in gender and intergenerational relations of production, the case study design offered a rigorous and flexible approach for collecting relevant data (Meinzen-Dick et al., 2004).

Two cases from different ethnic groups, the Mossi and the Fulani, were purposefully selected from an existing database obtained from a baseline survey conducted by the International Livestock Research Institute (ILRI). The ILRI data were collected in the 2016 cropping season in the Sahel Region of Burkina Faso. Information was gathered on household socio-economic and demographic characteristics, cropping and livestock practices, livelihood strategies and the gender and generational labour organisation for crop and livestock activities. Given the large sample size, the choice of the case household posed a challenge, therefore a set of criteria was identified to reduce the scope of the search: households were considered for inclusion if they were engaged in both crop and livestock activity if they were a polygynous household with at most two wives. Of the households meeting the criteria, five were randomly selected and field trips were organised to further scrutiny their suitability for the study. After informal discussions with both household heads and some household members, and short visits to their farms, a final case was randomly identified for inclusion in the research. The fieldwork for the thesis was implemented in several stages between August 2018 and January 2019.

1.5.2. Data collection

1.5.2.1. Qualitative methods

To address the first objective of the thesis, which is to assess the institutional context within which cooperation takes place in agrarian households, qualitative data collection methods were applied. Several instruments were used for data triangulation purposes. The thesis borrowed data collection techniques from ethnography, including participant observation, key informant and focus group discussions, allowing a more open-ended discussion of the topic at hand (Gittelsohn & Mookherji, 1997). Innovative qualitative tools were also employed, such as net-mapping (Schiffer, 2008), a powerful tool to elucidate interpersonal relations and resource exchange within a given setting. This approach was particularly useful to uncover the power dynamics within agrarian households and provided a relaxed environment to visualise and comment intrahousehold resource allocation and the nature of the relationship that links each of the household members. All the information was audio-recorded with prior informed consent from participants, and photos and field notes were taken.

Participant observation: Participatory observation was well justified to assess, from an insider's perspective (J. Li, 2008; Spradley, 1980), the interactions between household members and the allocation of resources to different uses and tasks. By being actively involved, in both productive and reproductive activities, this approach laid the foundations to directly observe and document both physical settings and labour arrangements, but also the distribution

of output across household members. Some may argue that the presence of the researcher altered the behaviour of the participants (J. Li, 2008). However, we believe that the potential bias caused by the presence of the researcher was circumvented by the nature of our investigation. While household members were briefed on the objective of the research, they had little knowledge about which behaviour or attitude was expected. Besides, the labour requirements for activities in this cropping season, would have prevented any change in behaviour to suit the researcher's expectations. Note that the integrity and privacy of the households selected, were preserved over the course of this participatory observation. This approach also provided a platform to engage in informal conversations with household members.

Net-mapping: To elucidate the power dynamics within the agrarian household, the net-mapping tool developed by Schiffer (2008) was implemented. The tool was useful in determining the flow of resources between household members, the rules and norms underlying the patterns of resource allocation, and the challenges that faced household members in their pursuit of joint activities. All household members, including husbands, wives and children participated in the exercise. The activity consisted of a series of questions and exercises to complete with the participants. The activity started with a general question on the sources of livelihoods. The objective was to identify the sources of food and income, to list the number of plots, their sizes, the types of crops grown. Information was also obtained on the size of livestock, the species and whom they belonged to. Once the physical and financial sources of income were identified, the next step consisted of determining the inputs to each productive activity. The discussion revolved around the labour participation of household members, the contribution of each person to the purchase of inputs, including fertilisers and seeds, and details were obtained on the reasons underlying the patterns of resource allocation. Participants were encouraged to reflect on all the inputs that contributed to the collective output. In the case of fertilisers for instance, household members were asked to tell the origin, whether they purchased it, who contributed money to the purchase and where the money originated from. The same procedure was applied for inputs such as seeds, animal feed and whether labour was hired for some of the activities.

The subsequent phase of the mapping exercise consisted of understanding the relative power relationship between members of the household, to uncover the sources of power and the bargaining position of each household member. The discussion revolved around decision making on the allocation of resources, allocation of output from collective fields and relative

status and power in the decision-making process. To facilitate understanding, household members were asked to represent their perceptions of power by building influence towers. Once a consensus was reached on the size of each of the main actors' towers in the household sphere, additional information was obtained on the meaning of the configuration and the implications for resource allocation.

In-depth interviews: This approach was used to gain further insights on the individual perceptions on current patterns of resource allocation. It also offered an opportunity to discuss the roles of each of the main actors in the household production, their preferences in terms of livelihood activities and the challenges they faced in the pursuit of their interests. Interviews were semi-structured and revolved around the following broad themes: 1.) The organisation of household labour 2.) The nature of exchanges among household members 3.) The allocation of collective and individual output and income and the underlying rules guiding this distribution 4.) The areas of potential cooperation and the related challenges and 5.) The relative position and power of household members. This set of questions served as a guide to understanding the nature of the collective dilemmas and to elicit the incentives that shaped collective action. To prevent participants from exhibiting social norms rather than the actual behaviour, we avoided direct questions. Rather than asking "Does your co-wife help you in your activities, we asked, "Who takes part in activity A or activity B". We complemented these interviews with accounts from identified community elders on norms of intra-household behaviour and how they evolved.

Focus group discussions: Carefully designed focus groups (FGDs) were implemented to recoup information and assess the norms that governed socially-sanctioned behaviour in the communities. Four types of groups were formed, each comprising eight to ten participants selected from polygynous households. The first consisted of first wives, and the second group gathered second wives. A third group was composed of both first and second wives, and the last group consisted of polygynous men married to mostly two wives. To prevent any form of intimidation during the discussions, the mixed group was arranged such that no pair of co-wives from the same household were present. A combined set of eight FGDs were conducted in each of the selected communities. Topics covered were the intrahousehold labour and income allocation, the share of resources among different household members, the conflicts arising from competition between co-wives, and the reasons underlying cooperation despite strong incentives to behave opportunistically. Participants were encouraged to express their opinions about the topics discussed and additional information was obtained about the potential

opportunities for further cooperation in polygynous households, especially with respect to child nutrition and welfare.

The data analysis was performed after retrieving relevant information from field notes and audio-recorded interviews. The analysis followed an inductive process, with detailed content analysis. Based on desk review, field observations and notes, broad themes were identified. To simplify the analysis, two categories of cooperation were considered for analysis: bilateral interactions between co-wives and multilateral cooperation, involving all household members. This distinction was justified to account for the gender division of labour and for the sake of isolating the organisational linkage between co-wife cooperation outcomes and overall household outcomes (Ostrom, 2005). Reproductive activities, in particular, were analysed within the realm of co-wife relations.

1.5.2.2. Experimental game research

As part of the inquiry into the workings of agrarian households, the thesis relied on experimental methods. Widely implemented in the NRM literature, experimental games represent a methodological innovation into the study of collective action (Cárdenas & Ostrom, 2004; Ostrom, 2000, 2002, 2006). In recent years, lab-in-the-fields experiments were used to gain further insights into household behaviour (Barr et al., 2019; Doss & Quisumbing, 2020; Kebede et al., 2014; Lecoutere & Jassogne, 2019; Verschoor et al., 2019). The approach has proved particularly useful for assessing the impact of one specific factor on cooperation, while controlling for other covariates. To address the thesis' second objective, "to examine the impact of social capital on intrahousehold cooperation", a trust game was implemented in the Yatenga province in Burkina Faso. Given the multidimensionality of social capital, and the variety of concepts it embodies, this thesis stresses on the role of trust, a component of social capital, in shaping cooperation between co-wives in polygynous households. The game was supplemented with a survey to examine the relationship between field results and actual cooperation in the household. To account for potential gender effects of gender on subjects' responses, female enumerators were designated to administer survey questionnaires.

The experimental design applied in this research was inspired by Berg et al., (1995) trust game. The game is of the family of voluntary public good games, and measures trust in a dyadic interpersonal relationship. It is structured in the form of an investment where two counterparts have the opportunity to gain interest on investment, provided they cooperate. The behaviour of participants reflects the trust they put in their counterparts. A sample of 184 pairs of co-wives

from eight villages in the Yatenga province in Burkina Faso were invited to take part in the experiment. Participants were randomly selected from a list of polygynous households, and socio-economic and demographic variables were collected on each co-wife to support further analysis. Upon arrival at the field lab, participants were separated into two groups, one playing the role of the trustor and the other the role of trustee. Subjects were invited by pairs to a private room where instructions were explained to them. Visual aids were used as supporting documents to facilitate understanding. Trustors were then endowed with an amount of 500 CFA, representing about 1 dollar, at the time of the experiment, and asked to decide privately how much they would want to transfer to their co-wife. Any amount transferred was multiplied by 3 and given to the counterpart waiting in a different room. According to Berg et al., (1995), if the trustor transfers a positive amount to their counterpart, they would have expressed trust towards their counterpart, given that the dominant strategy would be to keep the full endowment.

In the first stage of the data analysis, a regression analysis was performed to identify the socio-economic and demographic factors which influenced the amount transferred (a proxy for trust) and to determine whether trusting behaviour is contingent upon the rank of the co-wife in the marriage order. Then Probit regressions were conducted, with the amount transferred as a covariate to determine whether there was any correlation between trust and cooperation on selected intrahousehold activities. Marginal effects were obtained performed with the amount sent as a covariate in the factors that influenced the amount sent in the investment game, were identified, using regression analysis. The objective was to determine whether income pooling for food purchase and labour pooling on individual plots was contingent upon the trust co-wives exhibited towards one another.

1.6. Study structure

The thesis is organised in three main chapters, each addressing a specific component of the. Following this introductory chapter, Chapter 2 reviews the existing literature on conventional household theories, evaluating the accuracy of these models and the implications for agricultural policy in sub-Saharan Africa. Chapter 3 presents a case study of intrahousehold cooperation among the Mossi and the Fulani, highlighting the similarities and contrasts between both ethnic groups in terms of institutional arrangements and resource allocation. In Chapter 4, an experimental game assessing the relationship between trust and cooperation in polygynous households is presented. Chapter 5 provides a general discussion of the overall study, the implications for the theoretical and practical arenas, and the relevance of the conceptual

framework for the study of agrarian households. Attention is given to the limitations of the study and potential areas for future investigation. A conclusion with recommendations for policymakers is provided in the end.

2. HOUSEHOLD THEORIES: A REVIEW AND CRITIQUE WITH IMPLICATIONS FOR AGRICULTURAL PROGRAMS IN WEST AFRICA

Abstract

Many agricultural programs in Sub-Saharan Africa rely on theoretical conceptualisations of the peasant households for policy implementation. After decades of investments in agricultural development, these models have shown their limits, given the weight of evidence of failed policy interventions. The inadequacy of existing household theories to inform sound policy action in Sub-Saharan Africa can be attributed to the strong assumptions underlying these models, and to the juxtaposition of western representations of the household to more complex environments. The objective of this chapter is to review the assumptions postulated by existing household theories and to assess their accuracy for farm household behaviour in West Africa. The chapter relies on both theoretical and empirical data to support our analysis and draw insights from the feminist and anthropological literature to propose new approaches to peasant household modelling. The results from the review underscore the limitations of existing theories to explain peasant household behaviour and call for a reconciliation between economics and other social sciences for better conceptualisations of households in rural Africa.

2.1. Introduction

Smallholder farm productivity and food security are tightly woven into the intrahousehold dynamics of resource mobilisation and allocation (Andrews et al., 2015; Lecoutere & Jassogne, 2019; Mukasa et al., 2015). The nature and structure of the farm households determine the patterns of exchange and cooperation between household members, influencing opportunities to capture economies of scale and enhance household productivity (Akresh et al., 2016; Guirking, et al., 2015; Kazianga & Wahhaj, 2017). Hence, the efficacy of policies targeted towards households and individuals within agrarian settings depends on a clear understanding of the intrahousehold decision making, production and distribution processes. To achieve the most cost-effective policy programs, accurate and reliable ex-ante conceptualisations of household behaviour are fundamental.

Over the past decades, owing partly to a weight of evidence of failed policy interventions, economists have theorised and modelled household behaviour, posing a set of assumptions about the intrahousehold allocation of resources (Becker, 1981; Bourguignon et al., 2009;

Browning & Chiappori, 1998; Lundberg & Pollak, 1993; Samuelson, 1956; McElroy & Horney, 1981). Within this *homo oeconomicus* framework, farm households are analogous to rational economic agents, whose sole objective is to maximise household utility and profit (Strauss et al., 2011; Taylor & Adelman, 2003), and whose behaviour can be altered exogenously. Empirical research in developing countries has since shattered several of the western assumptions on the household economy (Akresh et al., 2016; Guirkinger et al., 2015; Kazianga & Wahhaj, 2017; Udry, 1996) and has sparked criticisms about the adequacy of these models to accurately explain farm household behaviour and successfully inform agricultural policies and programs.

Critics of conventional theories of the agricultural household contend that they are misleading, and of no policy relevance, because they make abstraction of some of the complex dynamics that characterise many peasant settings (Akram-Lodhi, 1997; Koopman, 1991). Most theories are formulated based on the common nuclear structure of western households, rendering them inadequate to accurately conceptualise household behaviour in more complex environments. In sub-Saharan Africa, for instance, rural households are characterised by extended family structures (Guirkinger et al., 2015; Kazianga & Wahhaj, 2017; Neves & du Toit, 2013; Smale et al., 2019) and often composed of several micro-families and multiple generations (Abdul-Korah, 2011; Fafchamps, 2001; Netting et al., 1989). The complexity of peasant households is increased when several members are spatially dispersed (Becker, 1996; Hart, 1997; Roberts, 1991; Goody, 1958) or when production and consumption units do not coincide (Goody, 1958; Netting et al., 1989). In polygynous households, for instance, co-wives may form separate consumption groups with their uterine children while sharing the same group for food production (Newman, Larkin, Friedlander, & Goff, 2012).

Conventional theories were also challenged for obscuring the internal gender dynamics of households' relationships (Agarwal, 1997; Evans, 1991; Koopman, 1991) and making misleading analogies between household and firm behaviour (Akram-Lodhi, 1997; Mattila-wiro, 1999). Restricting household behaviour to the mere pursuit of self-interest and maximisation of individual utility from a material perspective obscures the qualitative and non-material dimension of household relationships, including love and care. Besides, households are sites of both conflict and cooperation (Sen, 1987), shaped by salient differences in gender, age, or status. In avoiding these aspects of household life and organisation economic literature

has left some gaps in our understanding of the rural household, and has proved ill-suited for development efforts that aim to promote agricultural rural development in Sub-Saharan Africa.

This chapter critically reviews the assumptions postulated by existing household theories on intrahousehold farm behaviour. In so doing, we do not aim to replicate the excellent reviews that already exist (Alderman et al., 1995; Haroon, 1997; Mattila-wiro, 1999; Singh et al., Squire, & Strauss, 1986; Strauss et al., 2000). We are rather concerned about the economic theories as they apply to agricultural household behaviour in Sub-Saharan West Africa. We also aim to widen and deepen the understanding of household theories by drawing on insights from feminist and anthropological literature. One of the strengths of feminism is it presents a portal into multiple social sciences (feminist geography, feminist economics; feminist ecology ...) used in agricultural contexts. Anthropology, on the other hand provides a useful lens to the understanding of domestic units, exploring aspects such as relations of exchange, norms and values and how they shape social organisation in agricultural households. We believe that these two disciplines can shed light on some of the household aspects that are overlooked within the economic framework and may provide concepts that can support better and more accurate representations of peasant households in Sub-Saharan Africa. The following questions are asked to guide the review process: a) how accurate are existing economic theories in their representations of the peasant household in West Africa? b) how can anthropology and feminist literature inform more accurate representations of agricultural households? The remaining of the chapter is organised as follows: in section 2, the methodology employed for the review is introduced, section 3 provides the results from the review, with emphasis on the contributions of feminist and anthropological literature. The next section discusses the implications of these perspectives for economic household theories. The final section concludes.

2.2. Methodology

The literature review was carried out using the search engine Google scholar, as it offers a rich array of scholarly papers in social sciences. Given that the study involved the review of several disciplines, we employed different search strategies, i.e., keywords, to account for the different “language” or concepts used across the economic, feminist and anthropological literature, and to consider the variety of sources and time frames in the development of each of these disciplines.

The search of the economic literature was limited to peer-reviewed papers in English and the time frame was set from 1981 (to mark the turning point in the analysis of intrahousehold

behaviour following Gary Becker's (1981) seminal work). Both theoretical and empirical literature was considered and the search terms are displayed in Table 1. Papers were included based on their relevance to this review. Attention was given to articles that addressed intrahousehold resource allocation and appropriation in agricultural households. Studies that focused exclusively on health issues with no linkage to agriculture or nutrition-related outcomes, and studies that investigated intrahousehold fertility choices were excluded from the analysis. Furthermore, few empirical and theoretical studies investigated the allocation of resources for livestock production, thus the analysis mainly focused on those studies which looked at how resources were distributed in crop production. After a thorough assessment and screening of the literature, a total of 49 papers were retained for detailed scrutiny.

The search for the feminist and anthropological literature was conducted separately. No time frame was set to limit the search process, and all types of documents were considered for analysis, including books, reports or working papers, and peer-reviewed articles. Only documents published in English were screened. While the search followed the same structure as in Table 1, most of the terms were substituted for terms familiar to the other disciplines. Concepts like “gender relations of production” “peasant modes of production” “household division of labour” or direct terms like “feminist representations of the household”, “anthropological representation of the household”, were used to expand the search spectrum. The search on the anthropological and feminist literature yielded a total of 127 articles. After screening for abstract and content 56 documents were retained for further analysis.

Table 1: Literature search procedure

| | Economic literature search | Feminist literature search | Anthropology literature search |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Central search terms | 'Agricultural' OR 'Peasant' OR 'Farm' AND 'Household' OR 'Family' AND 'Model' OR 'Theory' | 'Agricultural' OR 'Peasant' OR 'Farm' AND 'Household' OR 'Family' AND 'Model' OR 'Theory' | 'Agricultural' OR 'Peasant' OR 'Farm' AND 'Household' OR 'Domestic' AND 'Model' OR 'Theory' |
| Target search terms | 1. 'Resource' OR 'Income' 2. 'Insurance' OR 'Risk' 3. 'Labour' OR 'Time' OR 'Land' | 1. 'Gender' OR 'sex' 2. 'Power' OR ' | 1. 'Domestic' OR 'Unit' 2. 'Group' 3. 'Gender' OR 'Intergenerational' |
| Domains of application terms | 1. 'Allocation' OR 'distribution' 2. 'Efficiency' OR 'Productivity' 3. 'Pooling' OR 'Smoothing' 4. 'Production' OR 'consumption' | 1. 'Relations of production' 2. 'Division of labour' | 1. 'Relations of production' 2. 'Division of labour' 3. Modes of production' |
| Geographical limitation | 'West Africa' (countries were specified in some cases to narrow down the search) | 'West Africa' (countries were specified in some cases to narrow down the search) | 'West Africa' (countries were specified in some cases to narrow down the search) |

2.3. Results

2.3.1. Economic models of the household

In the following section, we will spare the reader a detailed elaboration on each of the economic theories, several excellent reviews having already achieved this endeavour (Alderman et al., 1995; Haroon, 1997; Mattila-wiro, 1999; Singh et al., Squire, & Strauss, 1986; Strauss et al., 2000). We merely provide an overview of the main assumptions postulated by each theory, to lay the foundation for discussion in subsequent sections.

Three main strands of scholarship dominate the household discourse in economic literature. They have been classified in the literature as the unitary model, the collective model, and the non-cooperative model. To varying degrees, all these models are concerned about resource pooling within the household, bargaining processes, outside options, voice and exit, and whether the outcomes of these interactions yield efficient outcomes (Carter & Katz, 1997). The unitary model was formalised by Becker (1981), and as its name suggests, presumes that households behaviour can be modelled into a single utility function. In other words, household members have joint preferences, or there is an altruistic household member who aggregates all

preferences and ensures that resources are distributed efficiently. Applied to agricultural households, the model postulates that household resources, such as labour or land are pooled. This representation has since been debunked by several critics (Bourguignon et al., 1993; Browning & Chiappori, 1998) for failing to account for diverse preferences within the household and for providing no methodological basis for the aggregation of these preferences. It fails to account for the use of violence by one member to impose their preferences and to the subordinate position of some of the household members (Bergstrom, 1989; Haroon, 1997; Mattila-wiro, 1999).

The collective model of the household grew out of the attempt to relax some of the strong assumptions postulated in the unitary model. Pioneered by Chiappori (1988) and later extended (Bourguignon et al., 1993; Browning & Chiappori, 1998), the collective model relaxes the assumption of a single utility function and accounts for the individuality of household members. The model acknowledges that conflicting interests may be observed in the household but like the unitary model, it concludes that outcomes of these interactions are efficient. The model assumes that household members engage in a bargaining process, and rely on outside options or threat points to achieve cooperative outcomes (Apps & Rees, 2007; Manser & Brown, 1980; McElroy & Horney, 1981). In other words, household members will cooperate, provided the utility they derive from staying in the household, exceeds the utility they would obtain by exiting it. The model implies that exogenous measures, such as divorce conditions or income opportunities for some members outside the household influences cooperative outcomes.

The non-cooperative model rejects the optimal allocation of resources and argues that husbands and wives remain in their “separate spheres”, as dictated by social norms. It is based on the postulate that individual household members do not enter any enforceable contract (Lundberg & Pollak, 1994). As opposed to the collective model, where divorce is the only option in the absence of cooperation, Lundberg & Pollak (1993) contend that the threat point is non-cooperation within the household. Husbands and wives will remain in the union but will act in a sub-optimal pattern.

The above-mentioned models all make postulates about household behaviour, including how resources are allocated and whether households these allocations are Pareto optimal. To what extent do these conceptualisations reflect the reality of farming households in Sub-Saharan Africa? The next section builds on empirical data from West Africa to assess the generalisability of these household economic models.

2.3.2. Household theories and peasant behaviour in sub-Saharan Africa

Empirical tests provide a useful tool for assessing the reliability of economic models in predicting household behaviour. Several scholars have tested whether these models can accommodate more complex environments of farming households in Sub-Saharan Africa. The findings from these analyses are mixed, posing questions about the assumptions made by conventional economic theories. Subsequent sections will elaborate on findings of these models as applied to the West-African context.

2.3.2.1. Intrahousehold preferences, income pooling and patterns of expenditure

The Beckerian model of common preferences implies that expenditure patterns in the household remain unchanged, regardless of the identity of the person who controls the resources. The evidence from West Africa seems to be dispersed and inconsistent, depending on the outcomes under consideration. The majority of the empirical data reject the joint preference hypothesis, and reveal striking differences between the patterns of expenditures between men and women (Doss, 2006; Duflo & Udry, 2004; Hoddinott & Haddad, 1995). In Ghana, Doss (2006) demonstrates that the share of assets held by women positively affected the share of the household budget spent on education and nutrition, with a significant decrease on the share of male consumed goods. In neighbouring Cote D'Ivoire, expenditure patterns, as observed by Duflo & Udry (2004) suggest that men and women hold separate "accounts" and that income from various sources is used to purchase different types of consumption items. Interestingly, this pattern of results was not observed in all cases. Aromolaran (2004) examined whether the women share of income affected calorie intake. Using data from South-Western Nigeria, he finds no impact of increases in the share of income controlled by women and the calorie intake of household members.

The allocative preferences of household members are further illustrated in the shifts in consumption patterns as a result of exogenous shocks such as rainfall. If the income pooling hypothesis is satisfied, we would not expect any change in the consumption of specific goods, as a result of changes in the income of a specific household member. Yet, the empirical data from Duflo & Udry (2004) reveals that a windfall to women's accounts increases the consumption of all types of food, but a similar shock to men's accounts has no effect on household food consumption. This imperfect risk-sharing among household members tends to support the perspective that men and women mostly act as autonomous sub-economies and that income pooling is an exception rather than the rule.

2.3.2.2. Efficiency in production and consumption

The unitary and collective cooperative models of the household assume that intrahousehold resource allocation yields efficient outcomes. If the efficiency condition is satisfied, we would expect the marginal productivities to equalise across plots managed by different members of the household. The predictions were tested under different circumstances and with different household structures and the results show some variations. The workhorse study by Christopher Udry (1996), and subsequent empirical research conducted in Sub-Saharan Africa (Akresh et al., 2016; Guirkingner et al., 2015; Kazianga & Wahhaj, 2017), provide strong evidence against the efficiency criterion posed by neoclassical economics. In Burkina Faso, controlling for plot characteristics and household-year-crop fixed effects, Udry (1996) observes that plots managed by men receive more fertilisers and labour than plots controlled by their female counterparts.

Similar observations were made in both nuclear and extended households (Guirkingner et al., 2015; Kazianga & Wahhaj, 2017). While nuclear households seem closer to efficient outcomes, none of these household structures achieved the best allocation of resources. Research from polygynous agrarian societies also fails to accommodate the efficiency criterion of conventional household theories. Data from Burkina Faso shows that the allocation of resources is inefficient across monogamous and polygynous households, but the latter exhibit better outcomes than the former (Akresh et al., 2016).

Interestingly, Smale et al., (2019) found no evidence of inefficient allocation of resources within households in Mali. Using data on fertiliser application across men's and women's plots, no productivity differentials were observed. In the same line of empirical findings, Goldstein & Udry (2008) argue that productivity differentials result from the following choices of households members. Because women have no secure rights over land resources, they tend to limit their investments in soil fertility, including the time of fallow, which leads to lower yields as compared to men's plots.

Given the inconsistency in the evidence provided by empirical data, it seems clear at this point that more accurate understanding of the workings of African agricultural households would require better conceptualisations. We believe that insights from both the anthropological and feminist literature can contribute to this endeavour. In the next section, we explore concepts from two fields of study - anthropology and feminist social sciences - which could enrich our understanding of the peasant household in Africa, and which could ultimately provide entry points for designing more robust economic theories.

2.3.3. Anthropological perspectives on the household

2.3.3.1. The politico-jural domain and household relations of production

Households modes of production and consumption cannot be understood outside the politico-jural domain within which they are embedded (Goody, 1958; Quan, 2007; Roberts, 1991). The set of traditional rules and regulations form the constitutional framework that defines the operation of the household and defines the constraints and opportunities available to each household member (Goody, 1958; Guyer & Peters, 1987; Siskind, 1978). By customary law, every individual recruited in the household has rights and duties and is accountable to society. These legal entitlements will determine the legitimacy s/he has in accessing resources and whether s/he is required to form joint or individual ventures in the domestic domain.

Accepted notions of division of labour are subsumed in the social norms of each society (Lambrecht, 2016; Meillassoux, 1972). The relations of production are based on kinship definitions of the rights to the appropriation of the objects of production (Siskind, 1978; Skinner, 1961). These relationships take their meaning in the classification of household members into generational and gender categories that determine who enters into relations of production and the kind of principles that underlie the nature of this exchange (Agarwal, 1997; Becker, 1996; Siskind, 1978). Father-son relationships, for instance, do not follow the same principles of labour arrangements and resource appropriation as husband-wife relationships (Becker, 1996; Guyer, 1981a; Roberts, 1991; Skinner, 1961). These relationships are channelled through the systems of inheritance of productive resources, land in particular, and the present and future cross-generational and gender rights and obligations.

2.3.3.2. Rules of property transmission and intrahousehold cooperation

The politico-jural field determines the land inheritance rights, shaping the type of relationships that emerge within the household (Abdul-Korah, 2011; Goody, 1958; Goody & Buckley, 1973). The propensity of household members to cooperate or to engage in private ventures will depend on the patterns with which resources are transmitted from one generation to the other. In comparing the LoDagaa and the Twilinsi in Gold coast (former Ghana), Goody (1958) shows how rights of property inheritance between matrilineal and patrilineal systems influence the propensity of household members to form joint farm activities or to fission at an earlier or later stage of the household development. He demonstrates that the matrilineal system of wealth transmission discourages intergenerational cooperation. Among the LoDagaa, this system accelerates the early fission of households into smaller units of production and leads to reduced cooperation between fathers and sons. Given that land and accumulated wealth is passed on to

the nephew on the uterine family side, fathers encourage their adult sons of marrying age, to settle on their production units, as a security against any appropriation of joint surplus in the event of death. The pattern of consumption and resource allocation also stems from this social organisation. In such a system, men retribute large amounts of grain (kept in separate granaries) to their wives, marking a clear distinction with the central granary (eventually inherited by the uterine nephew). The separation of the joint and collective wealth is thus an insurance against the rules that the matrilineal system imposes with respect to future rights over resources.

Equally, the allocation of resources between men and women is determined by the rules of succession and inheritance (Abdul-Korah, 2011; Goody & Buckley, 1973). Where land is inherited matrilineally, the division of labour for agricultural production is skewed towards a greater contribution of women labour. Goody & Buckley (1973) argue that the labour work hours of female farmers in this system are four times greater than that of their male counterparts, while in the patrilineal system, it accounts to about a double of men labour.

The importance of inheritance for the division of labour was, however, not found to be consistent in all communities. In studying communities around the cocoa belt in West Africa, Guyer (1980b) found no direct relationship between women participation in coca production and the per stirpes inheritance, which refers to the transfer of land rights to a woman that has contributed to the establishment of a crop field, that existed in the area. She hypothesises that it is the introduction of cocoa, into the community that brought about this form of inheritance, by changing the “devolution of land” (p:16).

2.3.3.3. Rules of separation, taboos, and household cooperation

Cultural taboos may, in some instances, prevent any form of joint activity among household members (Linares, 1985; Sapir, 1970; Skinner, 1961). For example, the *kujaama* system among the Diola-Fogny of Senegal is characterised by a separation of cooking and eating units, based on gender and generation (Sapir, 1970). While production is collectively performed, cross-generational eating arrangements are strongly condemned and sanctioned by the gods. Rule-breakers may suffer serious illnesses, and the curse can be lifted, only when some rituals are performed on the shrine. This rule comes into play after a son marries and forms a separate unit with his new wife. This changes the relationship between the son and the father, and the former is in no way obliged to share any proceeds from his rice production with his father, even though he continues to allocate labour to his father’s fields. Linares (1985) argues that this may be a

strategy adopted to allow young couples to make their own livelihoods and prevent “*encroachment by the older generation*” (p:9).

Cultural and religious prescriptions about women participation in the public sphere may equally influence the patterns of cooperation in the household. Seclusion norms among the Hausa of Northern Nigeria, for instance, forbid women from working in the fields (Tipilda et al., 2005) and they may be ostracized if they breach the rules. Among the Sissala and Mwamprushe of Ghana, cultural taboos that forbade women to engage in yam production have influenced the patterns of labour allocation to the production of this crop (Apusigah, 2008). Women labour is reallocated to trade activities, while men, the main producers of the crop allocate their labour and reap the benefits.

2.3.3.4. Of the dynamic nature of intrahousehold relationships in peasant households

2.3.3.4.1. Stages of household development and relations of production

The developmental cycle of the household impinges on the patterns of resource allocation, largely as a result of changing rights and obligations between different generations and genders (Goody, 1958; Hart, 1985). As the household enters a process of expansion, fission and replacement, the intergenerational and gender relations of production take on new forms and functions (Goody, 1958). Young men, in particular, may, in some instances, withdraw their labour from the collective fields of their fathers, to pursue more lucrative economic activities (Skinner, 1961; West, 2010). The right to off-farm work, however, does not preclude contributions in the form of cash to the collective wellbeing of the household. As the interests of individual household members shift, the fragmentation of the households, characterised by independent production may evolve. Because, young men often have little say over the production of collective fields, managed and controlled by older agnates, breaking with the extended group may appear as a solution to maintain some degree of autonomy (Evans et al., 2015; Sapir, 1970). The fracture between young males and their fathers may be enforced when they marry and start having children. In other words, “*this developmental moment is the starting point of a redistribution of control over productive and reproductive resources associated with a change in the jural status of the spouses*”(Goody, 1958 p:9). The sub-unit, however, may continue to farm with their fathers but these obligations become more flexible. In this case, no labour obligations bind the two generations and the son is allowed to allocate most of his time to his crop activities to provide for his members. This is observed among the Jola-Fogny of Senegal, where newly married couples establish a new separate unit of production and consumption and where cross-generational exchanges of food is forbidden (Sapir, 1970).

Similarly, mechanisms of access to resources and obligations for labour allocations evolve with the status that age confers to some household members. In more complex households, where several conjugal units coexist and share some resources, old women, or mothers in law, may “*retire*” from their labour duties as their son marries (Becker, 1996). In Mali, mothers-in-law can delegate work duties to their daughters in law, giving them more time to allocate resources to private endeavours. Labour obligations on collective fields are thus transferred to the newly recruited member of the household. The conjugal unit formed by the son and the daughter in law also forms a pool of labour, from which women can draw. The labour allocation of individual household members is therefore not static and tend to evolve with changing circumstances.

2.3.3.4.2. Agrarian change and intrahousehold labour relations

Production relations within peasant households are subject to constant change and transformation. Drivers of change are diverse and multiple, but their common features lie in their power to alter the relative values of the means of production, creating new arenas for renegotiating conjugal contracts (Afonja, 1981; Carney, 1988; Schroeder, 1996; Zwartveen, 1996). As new opportunities for accumulating capital emerge, values attached to labour, land and capital, shift. The changing nature of land, from an instrument of production for subsistence to a means for accumulating capital (Afonja, 1981) increase the demand for labour resources within the households (Alber et al., 2010). In some cases, the increased demand for household labour has translated into an increase in the work burden and proletarianisation of women and girls (Carney, 1988). In other cases, leveraging on the increased value attached to their labour, women can demand compensation for the extra labour allocated to their husbands’ fields.

The transformative power of commercialisation in shaping new rules and norms of rights and obligations in peasant households is illustrated with the introduction of cash crops and women’ involvement in petty trade in several communities of West Africa (Afonja, 1981; Perry, 2005; Schroeder, 1996b). While labour for the production of subsistence crops was freely recruited, labour allocated to the production of cocoa, among the Yoruba, was remunerated, either in cash or in-kind (Afonja, 1981). Guyer (1984) provides an interesting account of the Yoruba women, who were able to free their labour from the obligations of subsistence farming and to engage in petty trade as a result of cocoa production. The cultural meaning attached to “introduced crops” can alter cultural gender constructs as Linares (1985) illustrate with the case of groundnut among the Jola in Senegal. Even gender relations concerning land are altered through the nature

of the contract that links husbands and wives in the production of cash crops (Duncan, 2010; Guyer, 1984). *Per stirpes* inheritance was observed in matrilineal societies of Ghana, as reported by Duncan (2010).

The push towards the liberalisation of the economy, does not only reconfigure gender relations, it also causes a crisis in the patriarchal authority, reinforced by men's inability to meet their obligations as breadwinners (Perry, 2005; Schroeder, 1996). With the structural adjustments programs introduced by the World Bank in the 1980s, many of the husbands who were engaged in cash crops activities lost important sources of income, jeopardising men's status as household providers. Among the Wolof of Senegal, the crisis manifested through women and men's discourse about their labour contribution to subsistence fields. While men perceived women increased participation to market activities as a breach of the norms of the community, women complained that they were now taking on the responsibility of meeting the obligations of the men, who were unable to provide for their families. Such discourse often led to conflicts between husbands and wives, but the increased importance of women contributed to the household subsistence, mitigated the wrath of their husbands and provided room to tolerate women's freedom of movement (Perry, 2005). Schroeder (1996) refers to this shift in the relations between husbands and wives in The Gambia, by reporting the metaphor "*gone to their second husbands*" to reflect men's resentment with regards to their wives spending more times on their garden fields than meeting their roles as housewives.

2.3.4. Feminist perspectives on the household

2.3.4.1. Patterns of resource allocation within farm households: The role of conjugal contracts

Production relationships between husbands and wives take their meaning in the conjugal contract or what Whitehead (1981) refers to as the "terms on which husbands and wives exchange goods, income, and services, including labour, within the household". By laying the foundations of mutually committed relations of production (Carter & Katz, 1997; Guyer, 1981; Siskind, 1978), conjugal contracts provide the framework for the type of transaction between spouses. In some communities, conjugal contracts are perceived as a business relation, whereas husbands and wives engage in marriage to pursue economic benefits (Duncan, 2010). The propensity for household members to pool resources or to engage in separate activities, hence, derives from the rights and obligations that bind gender relations of production within the peasant household (Apusigah, 2008; Carter & Katz, 1997; Duncan, 2010; Roberts, 1991; Zwarteveen, 1996).

Production arrangements are characterised by relations of property rights and labour claims (Awe et al., 1991; Carney, 1988; Duncan, 2010; Guyer, 1980b). As breadwinners, husbands are required to provide food and shelter (Carney, 1988; Netting, 1969; Schroeder, 1996) to their household members, wives included. In addition to these obligations, they may be required to allocate plots of land to their wives for the latter's private crop enterprises (Evans et al., 2015; Linares, 1985; Perry, 2005). These arrangements were observed in many rural settings in West Africa, where collective fields coexist with private plots (Duncan, 2010). "*Kamanyango*" rights in the rice-growing communities of The Gambia is an illustration of the type of labour and land obligations that bind husbands and wives. Women are entitled to these customary land-use rights as part of the marital contract (Carney, 1988; Carney & Watts, 1990) and may demand compensation or withdraw from their obligations in the event of a breach of contract from their husbands (Carney, 1988). In exchange for the security offered to them, wives must allocate a proportion of their labour to collective fields. To take the example of the Gambian rice growers, "*Maruo*" (as opposed to "*Kamanyango*") carry different labour mobilisation obligations (Carney, 1988). On these collective fields, husbands can freely extract their wives' labour as part of the marriage contract (Carney, 1988). As opposed to the proceeds from *Kamanyango* which is appropriated by the "owner" of the plot, any output from the *Maruo* plots are controlled and managed by the household head. The mobilisation of labour for food production is, hence, linked to the type of field that is exploited.

This gendered pattern of production has implications for intrahousehold cooperation (Evans et al., 2015). In some communities, like the Beti in Northern Cameroon, men and women work closely on yam fields, supplementing their labour to different tasks, but tend to have a relationship based on exchange on their private plots (Guyer, 1980a). These principles of exchange are expressed in individual storage of crops from individual fields with a form of exchange and reciprocity on collective fields (Zwarteveen, 1996). The separation of responsibilities and rights is so entrenched that men and women may engage in outright trade (Perry, 2005; Roberts, 1991). Perry (2005) provides an ethnographic account of a woman who demanded that her husband purchased her sorghum grains as he was unable to fulfil his obligation as the household provider when food shortages hit. In the Jos Plateau of Nigeria, a woman was entitled to sue her husband in local customary courts, with a high probability of winning the case, if the latter claimed a portion of her personal income (Netting, 1969).

The segregated nature of conjugal obligations is illustrated through the absence of joint enterprises, or joint ownership of resources (Evans et al., 2015). Men and women are merely confined in their culturally-defined spaces, constraining the opportunities for collective action. Women, for instance, often prefer the autonomy over private income that traditional rights allow, to the prospects of joint activities with their spouses that may undermine their access to a secured source of income (Guyer, 1980a). While conjugal contracts influence household cooperation, they also form the structural foundation for asymmetric gender relations within the household. Such inequalities are mirrored in the gendered access to productive resources, such as labour and land (Carter & Katz, 1997; Evans et al., 2015). Expectations about who can mobilise labour, and how much of each other's labour can be extracted, or who can access land all influence intrahousehold time and labour allocation, and household efficiency and equity.

2.3.4.2. Patterns of resource allocation within farm households: Asymmetric access to productive resources

Labour mobilisation is one of the main arenas where asymmetric gender relations are exerted (Becker, 1996; Guyer, 1984). In many peasant societies of West Africa, the gendered pattern of rights and obligations translates into a socially-sanctioned appropriation of women labour (Apusigah, 2008; Duncan, 2010; Koopman, 1991). As farmhands (Apusigah, 2008), women are often required to allocate more of their productive time on their spouse's fields as a fulfilment of the terms of the contract, while such requirements rarely apply to their spouses (Carney, 1988; Duncan, 2010; Guyer, 1980a). The Madigan women of The Gambia have no claim over their spouse's labour and may not freely recruit labour from other members of the household (Carney, 1988). In Mali, women could only recruit labour from their direct offspring, but this was conditioned on the latter's obligations on their fathers' and elder brothers' fields (Becker, 1996). As a result, women patterns of production is less a result of preferences than "*women's relatively limited institutionalised means of mobilising labour*" (Guyer, 1984 p: 12). The combination of these constraints and reproductive obligations limited their ability to extract more labour for their private enterprises (Koopman, 1991). These socially-constructed constraints, combined with their limited access to land, translate into gendered preferences in production and decision-making.

Asymmetric gender relations of production also derive from unequal access to land and the tools for production (Afonja, 1981; Evans et al., 2015; Tabet, 1982). Women gain usufruct rights to land from their status as married wives, but these plots are often of a smaller size and

low quality (Evans et al., 2015). Because they are often allocated the marginal lands, women may be forced to plant crops with lower returns to their labour (von Braun & Webb, 1989). Besides, conjugal contracts require that husbands allocate plots of land to their wives, but the production possibilities of women are often constrained by the different sets of expenditure obligations and responsibilities (Becker, 1996; Koopman, 1991). Koopman (1991), for instance, observes that women in Cameroon could not grow cocoa on their private plots. Because women have the responsibility to provide the sauce (Becker, 1996; Koopman, 2009; Rousseau et al., 2019; Wooten, 2003) that accompanies the main staple food, much of their croplands are often allocated to the production of vegetables such as okra, groundnut, *Hibiscus sabdariffa* or other green leaves. These observations underscore the idea that differences in consumption or production "preferences" may reflect the gendered patterns of access and control over productive resources (von Braun & Webb, 1989).

2.4. Discussion

This review aimed to assess the adequacy of exiting household theories in explaining farm household behaviour in Sub-Saharan Africa. We also explored feminist and anthropological perspectives on the household to uncover some of the specificities of farming households that might have been overlooked by economists, and yet, are fundamental to the design of robust models. The results indicate that existing household theories do not provide an adequate conceptual framework for understanding peasant household behaviour in Sub-Saharan Africa. The findings also call for an interdisciplinary approach to improve household modelling.

One of the problems of conventional models of the household lies in the specification of the joint utility function. These models were developed in the context of the nuclear family that characterises western households, which does not reflect the reality of much of the households in Sub-Saharan Africa. The second concern is the assumption of efficient allocation of resources within the households. This approach fails to recognise some of the constraints that may prevent efficient outcomes to arise. The bargaining, model, though it recognises the individuality of preferences, make a strong assumption with respect to the symmetry of the terms of bargaining, overlooking the fundamental differences that characterise individuals in the bargaining arena. So, what are the lessons that economics can learn from other disciplines in the social sciences? We attempt an answer to the question, relying on the findings from the survey of the feminist and anthropological literature.

2.4.1. Lessons from feminist and anthropological literature

2.4.1.1. Institutions and peasant household resource allocation

Conventional theories of the household often represent households as isolated units, with clear and fixed boundaries, void of any “noise” from the wider social environment. Yet, the social organization of the household does not occur in a vacuum. Therefore, how households are formed and the activities the members pursue together are deeply affected by the institutional context. The review of the anthropological literature raises serious concerns on the economic approach to the household by highlighting the importance of social norms in the organization of households (Goody, 1958; Guyer & Peters, 1987; Meillassoux, 1972). Institutional constraints shape the notions of socially accepted behaviour and serve as channels through which access to resources and decision-making power are determined. This challenges the bargaining model of the household. Indeed, it questions the assumption that household members bargain on equal terms and that parties in the negotiation hold symmetrical positions with respect to the agency they exert in the bargaining process. There is evidence to suggest that this approach is flawed because it makes abstraction of the norms and perceptions that define the resources upon which individual members can draw upon to bargain (Agarwal, 1997; Apusigah, 2008). Further, by making reference to individual preferences and how these in turn affect the outcomes of intrahousehold resource allocation, these models fail to recognise that these preferences may be a result of the socially-constructed norms. Models would have to reassess the bargaining processes that leads to observed outcomes, by integrating the institutional constraints that each bargaining party faces.

Similarly, the unitary model of the households, by assuming joint preferences across members of the household, fails to recognise the cultural meanings embodied in separate production and consumption patterns across household members. The existence of taboos and the sanctions that ensue when they are breached may constitute strong deterrents for joint production or consumption. In some communities, women are prevented to produce specific crops and in others, they may not engage in any form of cropping activities, given the norms of seclusion that prevail in the society (Apusigah, 2008; Robson, 2004). The preferences of individual household members are thus constrained by the existing institutions, and cannot be ignored in the economic analysis of the household.

2.4.1.2. Gender bias, gender intersectionality and household behaviour

From the standpoint of neoclassical economics, patterns of intrahousehold resource allocation reflect differences in the comparative advantage and preferences across household members. In

other words, any observed inequality within the household is unquestioned because it represents the best possible allocation for households' scarce resources. This conceptualisation of the household, however, is erroneous because it ignores the structural differences of asymmetrical gender relations in households (Evans et al., 2015; Whitehead, 1979; Apusigah, 2008; Duncan, 2010; Gana, 1998; Guyer, 1980b, 1980a). Conjugal contracts, in particular, shape the nature of the transaction between household members and influence power relations, by entrusting control of resources to one party at the expense of the other (Afonja, 1981; Apusigah, 2008; Duncan, 2010; Gana, 1998; Guyer, 1980a; Jackson & Pearson, n.d.).

Feminist critiques of neoclassical conceptualisations of the household deplore the undifferentiated approach in the economic analysis of the household (Folbre, 1986b, 1986a). Within the peasant household, any understanding of resource allocation cannot be understood without taking a gender-lens. Production relations are influenced by the agency household members can exert on their life choices and how they can allocate their time to different activities. The greater contribution of women labour to crop activities (Goody & Buckley, 1973) is nothing less than the perpetuation of patriarchal norms that exploit the subordinate position of women within the household sphere. A gendered approach to household modelling would imply careful attention to material inequality within the peasant household, and how this inequality determines the level of agency individual members can exert over household outcomes. Explicit consideration of the fundamental differences across gender groups should be acknowledged in any economic analysis of the household.

These ideas bring into light the notion of gender intersectionality. The concept of how social differences (socio-economic status, age, or ethnicity) intersect with gender across scales to accentuate disadvantages among certain groups of women or men. This helps explain how different social categories interact to influence relations of production that alone cannot be explained by the single category of gender. It was clear from the review that individual access and control over resources also evolved with the age and status of household members. The case of Malian elder women, who could retire from their labour obligations after their son had married (Becker, 1996) is an illustration of the heterogeneity that exists between individuals of the same gender. In polygynous households, for instance, this intersectionality can have implications on the relations of production that take place between senior and junior wives and on the allocation of resources within the household as a whole (Akresh et al., 2016). The underlying assumption that intrahousehold resource allocation leads to efficient outcomes,

hides the ability of some household members to express preferences (Akram-Lodhi, 1997), which in turn can lead to inefficient outcomes. Economic models would have to consider these variations among household members in their analysis of peasant households.

2.4.1.3. Spacio-temporal dynamics and intrahousehold resource allocation

Static representations of households, as modelled by conventional economic theories, obscure the gender and generational dynamics of production relations. As households form, grow, and fission, expectations about each individual's rights and obligations towards the domestic unit evolve (Goody, 1958). In the same vein, as new crop opportunities appear, spouses can renegotiate their participation and claims over the proceeds from joint production (Carter & Katz, 1997; Duncan, 2010; Perry, 2005; Schroeder, 1996b). These transformations cannot be ignored if we are to provide accurate representations of farm household social and economic behaviour.

The difficulty of reaching a consensus among economists with regards to the behaviour of households lies in the dynamic nature of the peasant households. The pool of resources available to the household evolves with time and space. Labour mobilisation possibilities depend on the time of the year, and this, in turn, is linked to the rights and obligations that bind individuals within the households. Seasonal migration of young people, for instance, is a right they are entitled to, even though they can contribute in the form of cash to the maintenance of the household. The same pattern of labour obligations is observed with the change in the marital status of some of the younger generation (Goody, 1958; Sapir, 1970; West, 2010). These results imply that economists need to ask the right questions. The focus on what constitute the units of the households at the expense of how resources are mobilised can mislead our understanding of the functioning of the household. The intrahousehold organisation is characterised not only by the members that compose the household, at one given time, but also by those that participate in the on-going activities from another geographical location.

The internal struggles and renegotiation between members of the household also testify that intrahousehold resource allocation is in perpetual transformation (Carney, 1988; Duncan, 2010; Linares, 1985; Perry, 2005), readjusting to changing conditions and opportunities. For many of the households, these negotiations are enabled by the capitalist mode of production, demanded by increasing integration into the world economy. The intensification of agricultural production has therefore different outcomes on the allocation of resources and create new arenas of renegotiation of conjugal contracts between spouses. For economic models, these results imply

that intrahousehold relations cannot be taken as given. They are the results of processes of historical change that need consideration by economists if we are to make it very reliable predictions of potential policy interventions. Hitting the right target for analysis will require the inclusion of a spatiotemporal dimension and the recognition of the ever-changing behaviour of peasant households.

2.4.1.4. Methodological concerns to economic household models

From a methodological perspective, the implications of the literature review are two-fold. First, it shows that economists may be mistaken by assuming that the boundaries of the household are fixed and impermeable. Second, the findings suggest that analysis based on dyads may be too simplistic in a multi-person context, like that of Sub-Saharan Africa. Establishing the boundaries for the analysis of household behaviour is a challenging endeavour, given the disjoint between production, consumption and reproduction units within the same domestic group (Goody, 1958; Linares, 1985; Sapir, 1970). Research by Wilk (1989) provides a tentative solution to the problem of household boundaries. Using concepts from ecological anthropology, he suggests that households could be represented as ecosystems, which would eliminate the problem of the discreteness of household limits. The advantage of this approach to household decision-making lies in its flexibility. Just like in the studies of natural resources, with a variety of ecosystems functions, arbitrary lines could be set for analysis, but the researcher should keep in mind the system-wide interdependencies within which households operate (Wilk, 1989).

The neoclassical approach to household behaviour confines its analysis to dyads, and a few exceptions to triads, or more generally to couples. This approach, ignores, as we have seen from the anthropological literature, the importance and the role of youth and children in household decision-making and production (Becker, 1996; Goody, 1958; Siskind, 1978). It leads to measurement problems since it assumes that decisions are made based on the preferences and bargaining powers of two (or three in case of models on polygyny) individuals. Yet, the contributions of the youth to household production, either in the form of labour, or cash from private endeavours, influence decision outcomes, including the decision to send some members to migration. The diversity of the household, in terms of gender, but also in terms of generation and the contracts that bind individuals based on their position within the domestic group should be acknowledged by economists, and integrated in household analysis.

The practical implications for the recognition of the multi-person nature of households is the design of surveys for data collection. Most surveys in rural settings rely on the responses of

household heads, assuming that he makes decisions on behalf of the households. In rare cases, these surveys are administered to the woman but these questions are often relegated to the wife (ves) supposed spheres of control and decision making. There has been more awareness about collecting gender disaggregated agricultural data in the past decade (Doss et al., 2008; Drechsel et al., 2013; Theriault et al., 2017). Arguably, the bias towards data collection is towards asset ownership and decision-making rather than on relations of production. The literature review calls for a more inclusive approach to the study of household decision making: young people, and even children should be interviewed and their preferences and constraints integrated into the analysis. The quality and reliability of the data obtained will depend on these considerations.

2.4.2. A framework for household decision-making analysis

Reconciling economics with the anthropological and feminist literature may seem a difficult endeavour, given the different concepts applied in each of these disciplines. Yet, the diversity of household behaviours across countries and even within communities that share similar norms raises important questions about the ability of one single approach to represent peasant household behaviour in Sub-Saharan Africa. Feminists and anthropologists have the advantage of integrating some degree of flexibility in their analyses and for pointing to some of the fundamental factors that explain the diversity in the outcomes observed in different settings. Each, of these disciplines, while they improve our understanding of the household, could not single-handedly provide a robust framework for analysing intra-household behaviour. Pooling the concepts from each of these disciplines can give models that are closer to reality.

Conceptualizing household decision making using a framework may provide a starting point for overcoming some of these methodological constraints. A framework approach is appealing, for it allows the integration of several theories to the analysis of a given problem, and is best suited for a systematic enquiry. Given the multidimensional factors that influence intrahousehold behaviour, a systematic analysis may give the researcher an overview of the different variables that interact, drawing insights from both economics, anthropology and feminist literature. The recent theoretical work from Doss & Meinzen-Dick (2015) is an attempt to overcome some of the methodological challenges that existing economic household face in modelling household behaviour. The two scholars draw on insights from the natural resource management literature, to demonstrate the usefulness of the Institutional Analysis and Development (IAD) framework to household analysis. The framework allows the integration of several factors, including biophysical attributes, and integrates the socio-cultural contexts within which the household operates. The approach is yet to be empirically tested for its

validity, but it offers new avenues for improving our understanding of household behaviour, by acknowledging the system-wide interdependencies.

2.4.3. Implications for agricultural development in Sub-Saharan Africa

The success of agricultural projects is intertwined with a clear and accurate representation of the household. Knowledge about how the household operates, how its members enter relations of production, what constraints they face, are fundamental to any policy action. A one size fits all is obviously out of question. Rather, a careful assessment of the micro-processes of farm household behaviour will determine whether projects will achieve desired outcomes. The survey of the literature has two main implications for policy and development. The first relates to gender-specific targeting of policy. The second is with respect to equity concerns in agricultural interventions.

Male-centric agricultural policy interventions are based on the assumption that household heads can mobilise resources at any time, and that dependents are willing to allocate extra labour to production, provided gains from cooperation can be achieved. The findings from the review, suggest that such an approach may lead to unpredicted outcomes, including reduction in productivity (Carney & Watts, 1991; Perry, 2005; Zwarteveen, 1996). The reasons for these outcomes lie in the conjugal contract that binds spouses (Carter & Katz, 1997). When men and women hold specific domains of responsibilities and contractual arrangements on how much of each one's labour can be extracted, a renegotiation of the terms of the contract are needed to redefine labour allocations. Policymakers should be aware of these gender relations of production and think about potential mechanisms of compensation, that would provide incentives for women to allocate extra labour to their husbands' sphere of responsibility. Policies could be designed to alter the process of intrahousehold negotiation and build on a number of leverages, that would increase productivity. It is crucial to consider safeguards to accommodate (compensate for) the dynamism of gendered relations of production in different cultural and political contexts. For example, that some women can enjoy the autonomy over private incomes based on conjugal rights, while others cannot and may lose control over incomes from productivity increases (even just on women's fields) because it is the responsibility of men to be the main breadwinners.

Similarly, proponents of female-centric approach to agricultural development should consider the gendered dynamics of resource allocation and appropriation. Policies that aim at increasing women access to land, to increase productivity, should be synchronised with improvements of

women access to other critical resources, including labour. Productivity outcomes may not be achieved if women have no power to mobilise labour and have little say in the allocation of their time between productive and reproductive activities. This argument is in no way a critique against female-centred project interventions, it only cautions on the approach applied, and calls for a better assessment of the situation at hand. The female-centric approach of the feminist literature also fails to account for the different male subjectivities (Perry, 2005) and to the fact that husbands and wives do have domains where they cooperate (Doss & Quisumbing, 2020). In other words, the idea that gender is a zero-sum game has been propagated. On the one hand a focus on male HH headship has led to this false understanding (outright neglect) of intrahousehold dynamics which has contributed to many unintended outcomes regarding income control and a worsening of gendered divisions of labour (economics). And on the other hand, the feminist focus has served to undermine / bypass the role of ‘men’ as key decision-makers – this has in many cases led to social, economic and cultural backlash on women. The idea that men and women are oppositional categories - has had some negative consequences in agricultural development that are often overlooked in the literature (Farnworth & Colverson, 2015; Fisher et al., 2019). Depending on the objective targeted, whether in terms of productivity enhancement or improvement of household nutrition, a clear understanding of how resources are allocated and what rules define these patterns, are crucial for policy choice. A combination of policy instruments, in this case, may be more appropriate.

Implications for agricultural development also arise from equity concerns. Programmes that overlook the gendered responsibilities, resources and constraints, may reinforce the existing gender asymmetries and exacerbate the vulnerable position of some of the household members (Awe et al., 1991; Carney, 1988; Carney & Watts, 1990). Equity implies that efficiency objectives are not traded for fairness aspects. These include a clear understanding of patriarchal norms that limit women access to land and careful implementation of the project such that the burden on women’ labour is not increased, or that they lose their usufruct rights over land. Land distribution under irrigation projects, for instance, should ensure that the area allocated for the project does not encroach on women’ “private” property. Where opportunities exist to engage both men and women into cooperative arrangements, without trading off equity, such projects should be encouraged. Rather than portraying men and women as opponents in a battlefield, they could be seen as potential partners, and resources should be dedicated to creating a more conducive environment for cooperation (Doss & Quisumbing, 2020).

Finally, youth employment into agriculture would have to be accompanied by policies that reduce intergenerational conflicts over productive resources. Efforts are made to contain rural exodus and foster resilient rural communities, but policies often make abstraction of the generational conflicts (Abdul-Korah, 2011) that may prevent the participation of young people in agricultural production. As alternative opportunities outside the household emerge, such that young people become less dependent upon elder generations, migration may become the only option available to young people to gain some autonomy and avoid the asymmetric power relations that bind them to their elder agnates. The integration of this dimension in policy implementation may be a starting point for encouraging young people participation in agriculture and the sustainability of rural households.

2.5. Conclusion

This chapter has assessed the assumptions of conventional household theories, based on empirical evidence from Sub-Saharan Africa. Although existing theory provides some insights into the behaviour of households in Western societies, they did not provide a full understanding of intra-household patterns in West Africa. Drawing on studies from anthropology and feminist literature, we aimed to uncover the weaknesses of existing theories and to propose potential areas of reconciliation between economics and the other schools of thought.

The inability to extrapolate economic models of the household to peasant households in Sub-Saharan Africa can be attributed to several factors. First, they have so far been unable to model the intrahousehold gender relations of production. Second, by making abstraction of the cultural ethos of household behaviour, economists have discounted the importance of the politico-jural context in shaping the intrahousehold allocation of resources. Finally, the static representation of the households fails to recognise the influence of changing conditions on the renegotiation of intrahousehold relations. Peasant household behaviour does not follow the principle of the firm in a competitive market and household members in these societies do not behave like a single individual. The transposition of the theories of the firm to household behaviour seem inappropriate and simplistic as they fail to accommodate the underlying social relations that underpin the nature of the exchange between household members. Beyond the material exchange of commodities, household members in peasant households follow a set of rules and norms and are engaged in contractual arrangements that define the allocation of resources.

The complexity of peasant households in Sub-Saharan Africa lies in the gendered and generational relations of production and the dynamics of the rights and obligations between

individuals. Static representations, by existing theories, thus carry some flaws and underestimate the struggles that take place within the households, over conjugal rights and duties but also the intergenerational transfer of resources. The relations of production in the household are in perpetual transformation and readapt to accommodate local and global opportunities, which in turn, offer new areas to renegotiate contracts. Reaching generalisations that would integrate all the diversity that define the household, is an endeavour that seems quite challenging. Yet, economists will have to reconsider their approach to modelling household behaviour, and both anthropology and feminism can provide useful insights to a reformulation of economic theory. Of the right conceptualisation of these models depends the success of agricultural policy.

3. “*WE ARE JUST LIKE PLOUGHING BULLS*”: POWER RELATIONS AND COOPERATION IN POLYGYNOUS HOUSEHOLDS IN BURKINA FASO

Abstract

How best can interventions be implemented to ensure intrahousehold cooperation for improved productivity and food security? Actors within the gender and rural development space continue to grapple with this question in an attempt to ensure that their interventions do not deepen inequalities but foster cooperation that yields optimal and equitable benefits for all household members. While the literature has focused on the outcomes and processes of intrahousehold cooperation, insights into why and under which conditions household members cooperate are rare, especially for polygamous households for which the prevailing orthodoxy is that such households are conflict-ridden. To explain why cooperation occurs in some households, and not in others, this chapter examines the intrahousehold power dynamics, the nature of the collective dilemmas, and the institutional arrangements that shape intrahousehold interactions. The Institutional Analysis and Development framework was applied as an analytical tool to study collective action among Fulani and Mossi polygynous farming households in Burkina Faso. Data were collected through ethnographic instruments, including participant observation, supplemented with focus group discussions, net-map exercises, and in-depth interviews. The study found that intrahousehold cooperation is contingent upon the nature of the problems to resolve, the transaction costs, and trade-offs involved in performing joint endeavours. The results demonstrated that norms and rules, through rewards and sanctions, have the power to shape intrahousehold collective action. We argue that productivity-enhancing projects should be aware of the institutional environment within which households are embedded to tailor their interventions.

Keywords: Intrahousehold; Cooperation; Polygyny; Institutional arrangements; Fulani; Mossi; IAD.

3.1. Introduction

Long considered as a black box, the household has attracted attention over the past three decades with scholars exploring the intrahousehold dynamics and the efficiency outcomes of household behaviour (Becker, 1981; Bourguignon et al., 1993; Chiappori & Mazzocco, 2017; Donni, 2006). While some evidence demonstrates an efficient allocation of resources within

the household (Bourguignon et al., 1993; Donni, 2006), others reveal that productivity gains could be achieved through a reallocation of productive resources (Kazianga & Wahhaj, 2017; Mcpeak & Doss, 2006; Udry, 1996b; Walther, 2018). Interestingly, despite the contributions of current discourses to the understanding of household behaviour, there is still a lack of information as to why household members cooperate and what are the conditions under which cooperation emerges (Doss & Meinzen-Dick, 2015).

This chapter seeks to bridge this knowledge gap by framing households as multi-member corporate institutions, exhibiting similar characteristics with common-pool resources (CPRs). In commons settings, CPRs are characterised by provision and appropriation problems, arising from non-excludable and subtractable attributes (Ostrom et al., 1994). By analogy, rural households produce food for joint consumption and must allocate resources for its provision. The joint nature of the collective output, however, gives rise to conflicting private and collective interests that may lead to the sub-optimal provision of joint subsistence food.

To examine intrahousehold collective action, the study conducts a systematic empirical analysis, relying on Doss & Meinzen-Dick (2015) theoretical application of the Institutional Analysis and Development (IAD) framework. Designed by Ostrom et al., (1994), the IAD framework is an analytical tool that disaggregates collective action situations into categories of variables of interest. By diagnosing collective action problems, the IAD framework addresses methodological challenges in exploring the complex dynamics of intrahousehold behaviour. To operationalise the analytical tool, we explore the nature of intrahousehold collective dilemmas, the contextual factors that shape these dilemmas, and the institutional arrangements that emerge as solutions to intrahousehold collective action problems. By so doing, the study presents, to the best of our knowledge, the first empirical application of the IAD framework to a real household setting.

The study relies on farming communities from two distinct ethnic groups in Burkina Faso, the Fulani and the Mossi, with emphasis on polygynous households. Unlike in monogamous households, scholars have provided accounts of fierce competition in polygynous households (Jankowiak & Wilreker, 2005; Madhavan, 2002), translating into inefficient economic and social behaviour (Akresh et. al., 2012; Boltz & Chort, 2019). This type of household was also of interest to this study because the prevalence of polygyny is pervasive in rural areas in Burkina Faso with up to 64% in the Northern region (OECD, 2018).

Before proceeding, it is useful to clarify what this chapter is not about. While many scholars take a normative approach to the study of polygyny (Lawson, James, Ngadaya, Ngowi, & Mfinanga, 2015; Mcdermott & Cowden, 2018), the current research does not pursue such an endeavour. Instead, we present a methodological perspective on the study of cooperation in multi-person household contexts.

3.2. Overview of intrahousehold literature

Three main strands of scholarship dominate the intellectual debate on household behaviour. Proponents of the unitary model, formalised by Becker (1981), pose the household as an institution with a single utility function. This model assumes the existence of a benevolent member who aggregates the preferences of all household members, and allocates resources efficiently. In other words, this representation of intrahousehold behaviour discards any occurrence of collective dilemmas in the household context. The model has since been challenged on both methodological and empirical grounds (Attanasio & Lechene, 2014; Bourguignon & Chiappori, 1992; Peters et al., 2004). Peters et al., (2004), for instance, found that children behaved opportunistically in a public good game, despite the presence of altruistic parents, rejecting the unitary model.

The collective model emerged in response to the limited empirical evidence to support the unitary model. Pioneered by Chiappori (1988) and later extended (Bourguignon et al., 1993; Browning & Chiappori, 1998), the collective model relaxes the assumption of a single utility function and accounts for various preferences within the household. The model assumes efficient allocation of household resources, but does not specify the processes that lead to such outcomes. Subsequent extensions of the collective model have taken these limitations into account by introducing the concept of threat points, where resources are allocated based on each spouse's outside options (Apps & Rees, 2007; Manser & Brown, 1980; McElroy & Horney, 1981). This line of literature argues, for instance, that changes in the legal system that improves the divorce options for women, alter the bargaining process in a manner that ensures efficient resource allocation.

A third theoretical underpinning is provided by the non-cooperative bargaining model (Lundberg & Pollak, 1994; Lundberg & Pollak, 1993; Sutton, 1986). This model rejects the assumption of optimal resource allocation. In their separate sphere model, for instance, Lundberg & Pollak (1993) contend that each spouse remains in their spheres, as required by social norms, engaging in strategic behaviour that can be detrimental to efficiency. Studying

rural households in Burkina Faso, Udry (1996) found non-cooperative intrahousehold behaviour. Several empirical and experimental studies also support these conclusions (Barr et al., 2019; Kazianga & Wahhaj, 2017; McPeak & Doss, 2006).

In recent years, several studies have empirically tested household theories, and have reached diverging conclusions (Boone, van der Wiel, van Soest, & Vermeulen, 2014; Selma Walther, 2018). These studies were concerned with the extent to which changes in some contextual variables, such as communication, altered the levels of intrahousehold cooperation. The next section reviews the discourse around these variables and their effect on intrahousehold cooperation.

3.2.1. Information asymmetries, communication, and spousal cooperation

Several field experiments have proposed that information asymmetries might explain the inefficient outcomes observed in public good games (Castilla, 2019; Castilla & Walker, 2013; Hoel, 2015). To investigate the extent to which incomplete information influences outcomes of intrahousehold interaction, scholars have altered the level of information available to each spouse in collective dilemma situations. In India, for instance, Castilla (2019) reported that the incentives to conceal income windfalls from partners limit spouses' investments in joint goods. She found that 21% of subjects hide private income from their spouses, at the expense of gains to joint output. In a similar study in Ghana, Castilla & Walker (2013) argued that women conceal part of their income from their husbands in response to potential crowd-out effects. Husbands, for instance, may reduce the housekeeping money to compensate for the extra income earned by their wives. Castilla & Walker (2013) concluded that the gender specialisation of expenses affects the propensity of spouses to conceal extra income and to cooperate.

Though information asymmetries alter cooperative outcomes, some scholars argue that the actual effects of these information discrepancies are merely context-specific (Ashraf, 2009; Kebede et al., 2014). In the Philippines, Ashraf (2009) found that the responsibility of spouses in household activities influenced the patterns of contributions to joint savings accounts. Spouses, whose partners controlled joint resources, concealed their income, regardless of their gender. In a study of 1200 couples in Ethiopia, Kebede et al. (2014) argued that public information does not always translate into cooperation, and concluded that the institutional setting, more than the information asymmetries, determines the outcomes of cooperation.

While information asymmetries may prevent intrahousehold cooperation, experimental studies have documented instances where communication between spouses increased the likelihood of cooperation. In the Philippines, Ashraf (2009) found that “cheap talks” between spouses increased the likelihood of husbands transferring their earnings to their wives’ accounts, though the incentives dictated by social norms suggest the opposite. She concluded that communication allows partners to negotiate their preferences and make binding agreements that foster cooperation.

3.2.2. Household composition, social capital, and intrahousehold cooperation

Alternative explanations to intrahousehold cooperation include the strength of ties linking household members (Kazianga & Wahhaj, 2017; Lowes, 2018). In rural Burkina Faso, for instance, Kazianga & Wahhaj (2017) observed higher levels of cooperation in nuclear households than in extended households’. In the Democratic Republic of Congo, Lowes (2018) found that spouses in patrilineal households exhibit higher propensities to cooperate than their counterparts in matrilineal kinship contexts. She attributes these observations to the lower control men hold over their wives in matrilineal communities. Women in such settings derive higher bargaining power from strong ties with their kinship.

Relatedly, scholars have examined the effect of marriage structure on cooperative outcomes. Several field experiments have explored the impact of polygyny and monogamy on cooperation. While some scholars find no cooperative gains to monogamy as opposed to polygamy (Munro et al., 2010), others observe better collective outcomes in monogamous households (Barr et al., 2019). The diverging levels of cooperation between the two types of households is often attributed to the degree of altruism between household members. For instance, Akresh et al., (2016) found that output in polygynous households is higher, as a result of a lack of altruism between co-wives. But Barr et al., (2019) argue that interactions in polygynous households are based on reciprocity norms rather than altruism.

3.3.3. Autonomy, control, and intrahousehold cooperation

Another influencing factor may be the level of control over earned income and the need to safeguard autonomy over one’s resources (Ashraf, 2009, Munro et al., 2014, Verschoor et al., 2019). In a public good game, Verschoor et al., (2019) assigned the control of the joint output to either the husband or the wife. Their findings revealed that subjects contributed less when wives were in charge of allocating the joint earnings, but observed no difference in the contributions when allocation was husbands’ responsibility. Verschoor et al., (2019) concluded

that the existing social norms which entrust husbands with control of collective resources might account for the observed behaviour in the field experiment. Their findings are in line with Munro et al., (2014), who studied spouses in two regions of India, concluding that men invested less in anticipation of receiving lower amounts than their initial investment.

In summary, the literature on household behaviour has focused on testing models based on the efficiency outcomes of intrahousehold interactions. However, the conditions under which household members cooperate and why they cooperate have not been exhausted in the literature.

3.3. An institutional analysis of intrahousehold collective action in farming systems

Understanding the conditions under which intrahousehold collective action² emerges, requires knowledge about the kind of collective dilemmas households' members face, as well as an understanding of the institutional environment that shapes their incentive structures. Current household theories and models, however, do not provide a consistent framework for eliciting these problems (Doss & Meinzen-Dick, 2015).

To overcome these methodological challenges, this study applies the Institutional Analysis and Development (IAD) framework to intrahousehold collective action [Figure 3](#). Developed by Ostrom et al. (1994), the framework offers a unique perspective to structure the collective action situation into separate parameters of interest.

² Henceforth this article will employ collective action and cooperation interchangeably, to refer to any form of labour and income pooling arrangements, exchange, and joint ventures.

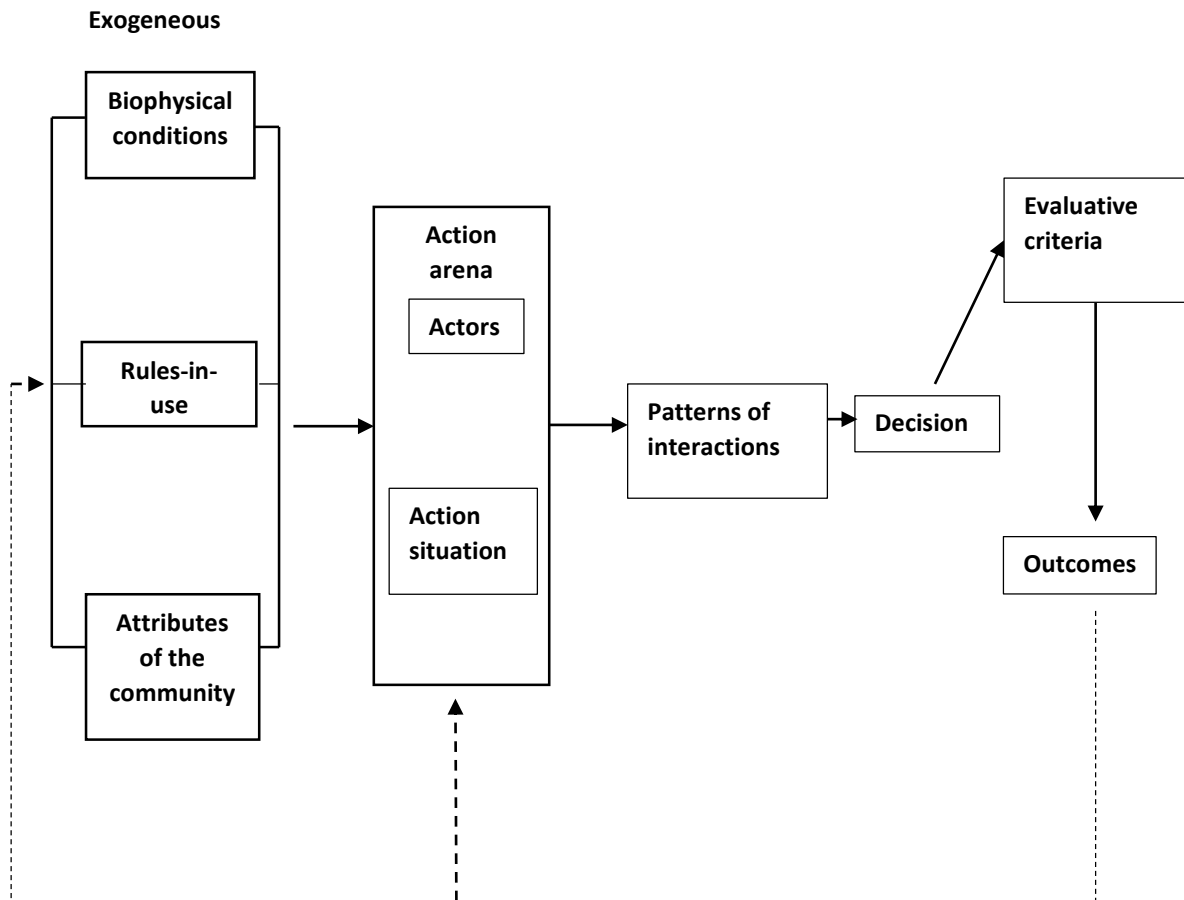


Figure 3: IAD framework. Adapted from Ostrom et al. (1994)

The action arena³ forms the core of our analysis of intrahousehold collective action. We build on the premise that collective action does not occur in a vacuum. On the contrary, we argue that cooperation dilemmas arise from the nature of the problem to resolve, the characteristics of the actors involved, and the existing social rules and norms (Kiser & Ostrom, 1982; Ostrom, 1987, 2010). In other words, the “... *rules, physical and material conditions, and attributes of the community affect the structure of action arenas, the incentives that individuals face, and the resulting outcomes*” (Ostrom, 2010. p:1). In a given action arena, household members must mobilise their resources to provide food and shelter for the group. However, each member faces dilemmas, arising from the positions they are assigned to, and to the set of actions that such positions allow (Figure 4).

³ Ostrom, (2010c) defines the action arena as a “...*social space where individuals interact, exchange goods and services, solve problems, dominate one another, or fight...*” (p8)

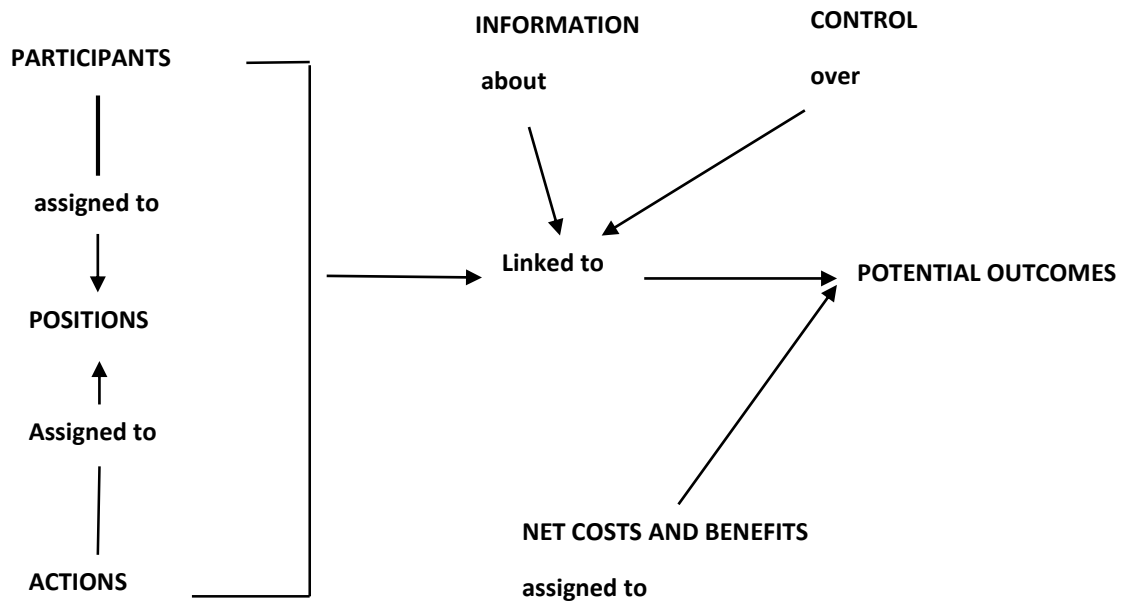


Figure 4: Internal structure of the action arena (Ostrom, 2005)

Prevailing social norms, for instance, assign tangible and intangible resources to individuals, based on their gender, age, and relative status (Lusiba et al., 2017; Staveren & Odebode, 2016). Given that each position holder is ascribed with a set of allowable actions, and ability to influence outcomes, the decision of household members to cooperate will depend upon an assessment of the costs and benefits of a course of action, and the expected outcomes arising from these decisions (Ostrom, 2005). In the following section, we present the research instruments used to collect data for the study.

3.4. Methodology

3.4.1. Case study design

Most research relied on survey data and experimental games to examine the dynamics of intrahousehold cooperation (Hoel, 2015; Kazianga & Wahhaj, 2017; Lecoutere & Jassogne, 2019). Surveys, however, preclude any in-depth analysis (Yin, 2013). Conversely, by manipulating subjects behaviour, experiments make abstraction of their natural environment and may engender confounding variables that influence outcomes (Zizzo, 2013).

To circumvent these shortcomings, we employed a two-case study design using qualitative methods. Given the objective of the current study to unveil the complexities of intrahousehold cooperation, a qualitative approach was the best tool for inquiry into the phenomenon. This design is suitable for addressing “why questions” and allows an in-depth investigation into why

a phenomenon is occurring (Yin, 2013). It also allows the application of several data collection instruments (Yin, 2013), including ethnographic tools (Meinzen-Dick et al., 2004). In the next section, we present the two cultural settings that served as illustrations to our study of intrahousehold collective action.

3.4.2. The Fulani and the Mossi farming communities in Burkina Faso

The current study took place in Burkina Faso where the agricultural sector accounts for up to 30% of the Gross Domestic Product, and 83% of the population deriving their subsistence from farming (World Bank, 2018). The selected villages, M'Bamga and Tougou, are part of an ILRI⁴-led project on sustainable intensification in crop-livestock systems. Both villages are located within the Sahel region of the country and are characterised by similar agro-ecological conditions, though they differ from an ethno-cultural standpoint. A large proportion of the population is Fulani in M'Bamga, and in Tougou the Mossi are the largest ethnic group.

The Fulani and the Mossi farming systems are characterised by a combination of crop and livestock activities, albeit at varying intensities. The Mossi derive most of their subsistence from crop farming (D'Aquino, 2000), while the Fulani moved from exclusive livestock husbandry to the introduction of crop enterprises into the household economy (Majekodunmi et al., 2017). Farming in both areas is labour intensive. Given limited external inputs (Theriault, Smale, & Haider, 2018) and weak agricultural labour markets, households mostly rely on internal labour to carry out productive activities. Recent rushes to artisanal gold mining sites (Bazillier & Girard, 2018), further exacerbated labour shortages for agricultural activities and reshaped intrahousehold labour organisation (Mkodzongi & Spiegel, 2018).

Though the division of labour is characteristic of both ethnic groups, Mossi and Fulani differ substantially in terms of gender labour requirements for different reproductive and productive activities (Kazianga & Wahhaj, 2017; Kevane et. al., 2008). This study will elucidate intrahousehold collective action within the two ethnic groups, using an institutional lens. In the following section, we introduce the case selection and unit of analysis.

3.4.3. Unit of analysis and case selection

We used two criteria in selecting the case study households for this research. First, we privileged households that combined crop and livestock enterprises. Second, we were interested

⁴ International Livestock Research Institute

in polygynous households with at most two wives. Given the high incidence of households that met the criteria, we randomly sampled the cases from an ILRI baseline survey conducted in 2016. Informed consent was obtained from all adult household members before the study was carried on. The next section highlights the tools employed in collecting the required data.

3.4.4. Data collection tools

Data were collected between August 2018 and January 2019. We applied a diversity of data sources to increase the reliability of our study and to triangulate information (Yin, 2013). Discussions were held in either Fulani or Moore with the assistance of an interpreter and data were recorded through field notes, photos, videos, and audio recordings. Detailed information on the tools applied are provided below.

3.4.4.1. Participant observation

As part of the data collection, the first author resided in the selected villages for two weeks respectively. This approach was well justified to assess, from an insider's perspective, the interactions between household members and the allocation of resources to different uses and tasks (Li, 2008; Spradley, 1980). By being actively involved, in both productive and reproductive activities, the first author could directly observe and document physical settings and intrahousehold arrangements, including the distribution of output across household members. Some may argue that the presence of the researcher altered the behaviour of the participants (J. Li, 2008). However, we believe that the potential bias was circumvented by the nature of the enquiry. While household members were informed about the objective of the research, no hint was provided as to what would be an appropriate behaviour or attitude. Besides, the labour requirements for activities in the cropping season would have prevented any change in behaviour to suit the researcher's expectations.

3.4.4.2. Net-mapping

To assess the power dynamics within the household and how it influences prospects for cooperation we applied Schiffer and Waale's (2008) net-mapping tool. The mapping activity allowed us to determine the flow of resources between household members and how the configuration of these exchanges, coupled with the power dynamics, affects the likelihood of cooperation. The visualisation process also allowed household members identify areas where potential gains from cooperation could be captured and the type of institutional arrangements that would be required to achieve further collaboration.

The activity consisted of a series of questions and exercises to complete. All household members were invited to participate and encouraged to provide their perspectives on the topic discussed. To recoup information, however, some aspects of the jointly produced maps were discussed individually in later stages.

The session was facilitated using tools such as large sheets of paper, coloured pencils, wooden disks, and coloured post-its. The discussion started with a general question on the sources of livelihoods. The second phase consisted of identifying the household members who contributed to the provision of food and reproductive care to sustain the household. For each household member identified, a corresponding coloured post-it was pasted on the large sheet of paper to ease understanding.

At this stage of the activity, we could visualise the household members who contributed inputs such as labour, financial resources, or fertilisers for food production, but also time for household chores. The intrahousehold resource allocation was specified for collective and private fields separately. Particular attention was also given to the distribution of collective output across household members. Household members were prompted to reflect on the underlying reasons that prompted joint activities and the challenges that arose in the process. This stage was particularly relevant to discuss questions such as *“Among all the people that have just been identified, who has the strongest influence and why?”*. To complete this task, participants were invited to build influence towers using the wooden disks, mimicking the relative power position of individual members. Upon completion of this task, household members discussed potential areas for further cooperation and how to achieve such outcomes.

In addition to the selected cases, additional net-maps were conducted with other households, until a saturation point was reached (Fusch & Ness, 2015). Eight net-maps in total were produced for this purpose.

3.4.4.3. In-depth individual interviews

To obtain detailed information on the patterns of interaction encountered during the observation and net-mapping phases, in-depth interviews were conducted. Interviews were semi-structured and revolved around the following broad themes: 1.) The organisation of household labour 2.) The nature of exchanges among household members 3.) The allocation of collective and individual output and income, and the underlying rules guiding this distribution. This set of questions guided the understanding of the nature of collective dilemmas and eliciting the incentives faced by individual members in crafting joint arrangements. To prevent participants

from exhibiting social norms rather than actual behaviour, direct questions were avoided. Rather than asking “Does your co-wife help you in your activities, we asked, “Who takes part in activity A or activity B.” We complemented these interviews with accounts from identified community elders on norms of intra-household behaviour and how these norms have evolved.

3.4.4.4. Focus group discussions

To recoup information, focus group discussions (FGDs) were conducted with eight to ten participants selected from polygynous households. Four types of groups were formed, consisting respectively of first wives only, second wives only, polygynous men, and a final group which was a mix of both senior and second wives. This last group was formed such that no pair of the same household was selected. Either the first or the second wife was invited. This selection process was preferred to prevent potential intimidation. Eight FGDs, four in each of the selected villages, were conducted in total.

Discussions revolved around the broad topics addressed in the net-map exercises described above. Additional information was obtained about the challenges and risks arising from co-wife cooperation and the rules and norms that shape expectations about individual behaviour.

3.4.5. Privacy assurance

The current study involved the participation of human subjects, giving rise to ethical concerns. The privacy and integrity of the participants were preserved throughout the study (Öksüzoglu-Güven, 2016). Sensitive topics that might have led to internal conflicts were discussed privately rather than in groups. While FGDs were used as platforms to reflect on patterns of intrahousehold cooperation, at no point in time was the privacy of the households selected disclosed.

3.4.6. Data analysis and interpretation

Data were retrieved from field notes and audio-recorded interviews. Then a detailed content analysis was carried out. Eight broad categories of cooperation were identified (Table 2). To simplify the analysis, we distinguished between two arenas of cooperation: bilateral cooperation between co-wives, and multilateral cooperation among all household members. This distinction was justified to account for the gender division of labour and for the sake of isolating the organisational linkage between co-wife cooperation outcomes and overall household outcomes (Ostrom, 2005). Reproductive activities, in particular, were analysed within the realm of co-wife relations.

Table 2: Intrahousehold cooperation activities in farming systems

| Multilateral Joint Activities | |
|--------------------------------------|--------------------------------------------------------|
| 1 | Labour pooling for crop/livestock production |
| 2 | Income pooling for the purchase of agricultural inputs |
| 3 | Decision making for output allocation |
| 4 | Decision making for labour allocation |
| Co-wife bilateral activities | |
| 5 | Joint cooking arrangements |
| 6 | Money lending |
| 7 | Joint small trade endeavours |
| 8 | Child care |

The IAD framework introduced in the third section guided the various strands of the analysis. The following steps were followed to analyse and interpret the data: 1.) specify the action situation, including the position and status held by each household member. 2.) assess the set of allowable actions household members derive from their respective positions and ranks within the household. 3.) explore the sources of cooperation risks given the different power dynamics within the household, and 4.) identify the mechanisms that resolve cooperative dilemmas.

We performed the analysis taking into account the relationship between the exogenous factors [Figure 3](#) and the extent to which they influenced each of the components of the internal structure of the action situation introduced in [Figure 4](#). For each of the components of the exogenous variables, we assessed which elements of the internal structure were affected. The attributes of the community, for instance, influences the participants, including the positions they hold and the degree to which they can influence outcomes. Likewise, the rules component affects the action situation by assigning prescribed or prohibitive actions to household members, and thus, their capacity to undertake specific courses of action.

3.5. Findings

This section follows the IAD framework to present the study's empirical findings. The main results concerning the biophysical factors, rules in use, and attributes of the community are

summarised in the tables below. Note that even though the different components are analysed separately, they jointly affect the action situation.

Table 3: Factors influencing cooperation within the Fulani and Mossi households

| CPR dilemma | Gains from cooperation | Interest in collective output | Cooperation risks | Existing social norms | | Institutional arrangements | | Sanctions to deviants |
|----------------------------------|------------------------|--------------------------------------------------------------|-------------------|----------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| | | | | Fulani | Mossi | Fulani | Mossi | |
| Food Provision and appropriation | Economies of scale | High dependency Exit options Social security/Insurance | Defection | Husband as breadwinner | Husband as breadwinner | Cash-for-grain economy | Collective field divided into equal working portions Implicit monitoring system | Shame Blame Reputation No access to the collective output |
| | | | | Women freed from labour participation in crop production | All household members must contribute labour to collective fields | Information sharing regarding sale of output from collective fields Joint cooking and consumption arrangement | Information sharing regarding sale of output from collective fields Joint cooking and consumption arrangement | Shame Blame Reputation |

Table 4: Factors influencing co-wife cooperation within the Fulani and Mossi households

| CPR dilemma | Gains from cooperation | Incentives for cooperation | Cooperation risks | Existing social norms | | Institutional arrangements | | Sanctions to deviants |
|----------------------------------|------------------------|------------------------------------------------------|-------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------------|------------------------------------|
| | | | | Fulani | Mossi | Fulani | Mossi | |
| Food Provision and appropriation | Economies of scale | Cost savings | Defection | First wife holds higher status | First wife holds higher status | Trust | Reciprocity | Shame |
| | | | | Each co-wife controls output from private plot | Each co-wife controls output from private plot | | | Blame |
| | | | Division | First wife keeps joint output in her house | Any joint output is controlled by senior wife | Equal distribution of joint output | Second wife shares and first wife is first to select | Reputation |
| | | | | First and second wife get equal quantity | First wife usually gets higher proportion | | | No access to the collective output |
| | Coordination gains | Investment in joint assets Time saving Bonding | Incoordination | Co-wives cook on a shift basis Husband provides breakfast for all his household members | Co-wives must cook on shift basis Each co-wife provides breakfast for her children | Following existing norms | Following existing norms | Shame Reputation |

3.5.1. Community attributes and intrahousehold collective action

The analysis of the attributes' component of the IAD framework revealed an imbalanced power dynamic within the household sphere. and Figure 6 are simplified versions of the net-maps conducted and illustrate cooperation in food provision and consumption among the Fulani and the Mossi, respectively.

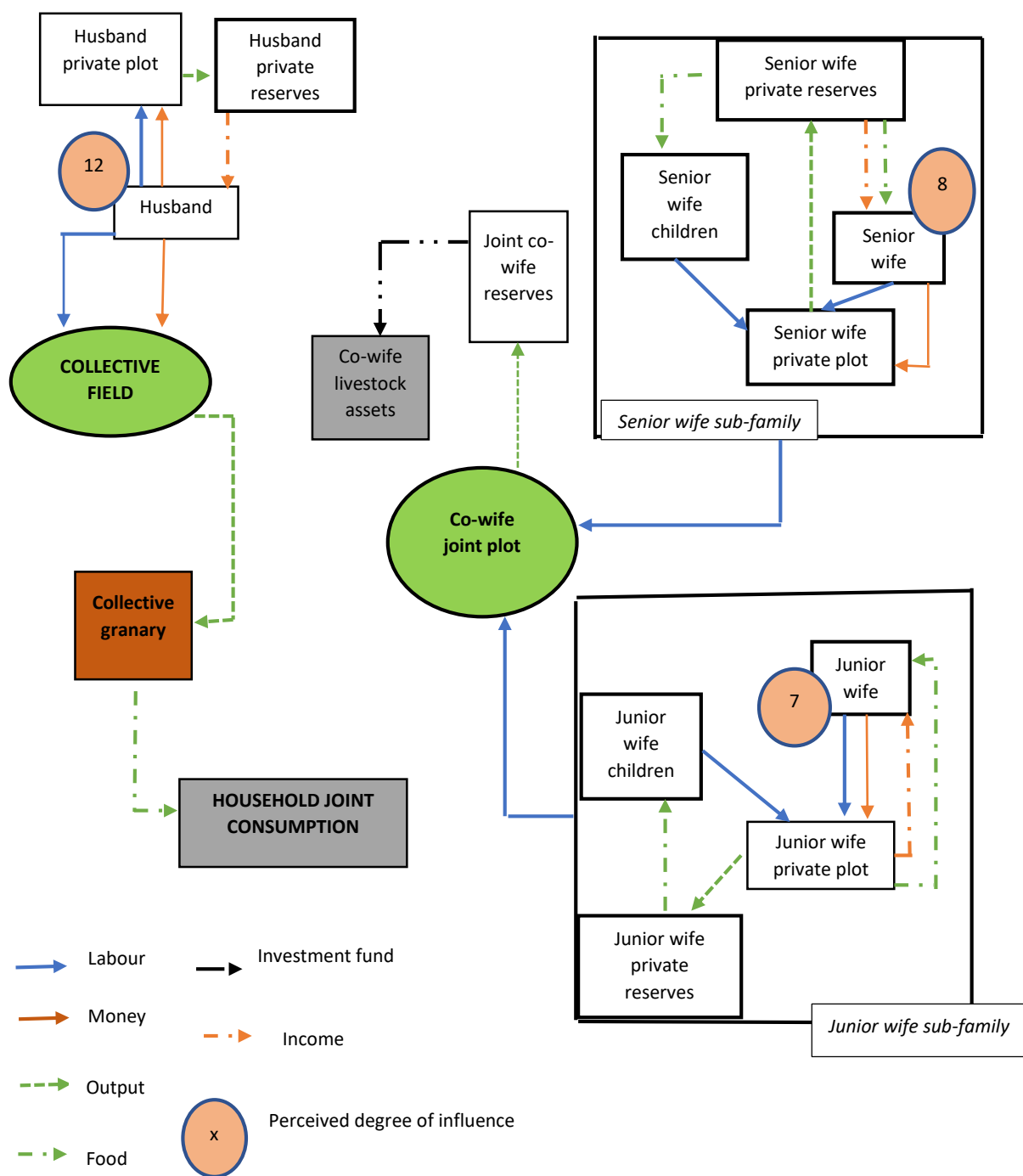


Figure 5: Net-map of food provision and appropriation within the Fulani household

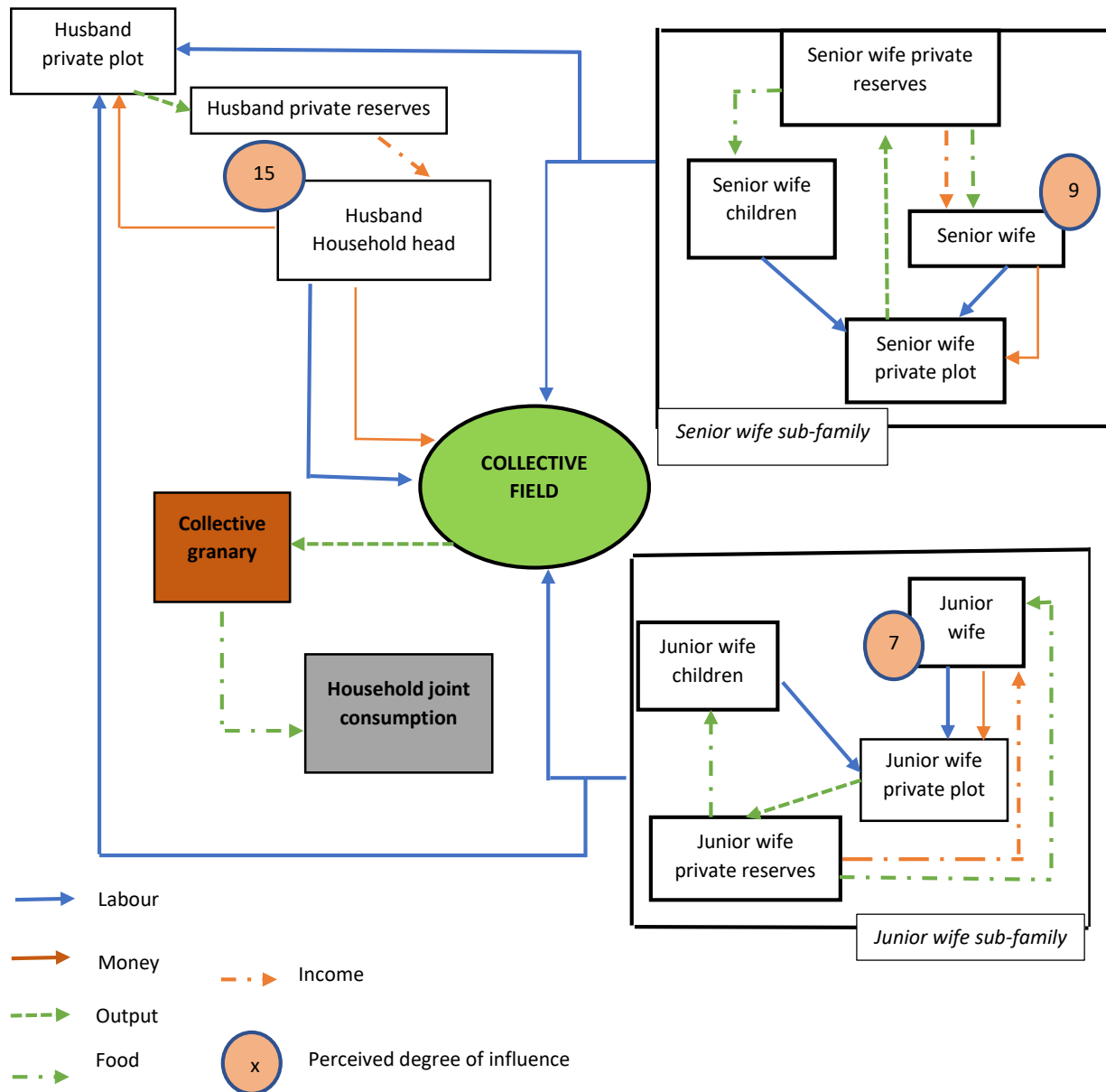


Figure 6: Net-map of food provision and appropriation within the Mossi households

The numbers in circles reflect the relative power of each household member. The higher the number, the greater influence of the individual within the household decision making sphere. For clarity reasons, the influence towers for children are not illustrated. Nevertheless, adult children participated in household decision-making but had lower influence compared to husbands and wives.

In addition to controlling productive resources, such as land or livestock manure, Mossi husbands had full control over the labour of household members. From field observations, FDGs and in-depth interviews, it was evident that husbands decided when and whose labour was required for a range of activities. Women and children received guidelines on the tasks to

perform daily. This lack of power-sharing among the Mossi, derived from social norms which assigned full ownership of household assets to the household head. Marital contracts, in particular, assigned subordinate positions to wives. As “*saana*” (strangers in Mossi language) within their husbands’ kin, wives had little voice to influence the workings of their adopted land.

“We are just like ploughing bulls for our husbands, they have got free labour to exploit” (Mossi woman, FGD, Tougou)

These unequal power relations influenced not only the political arena but also the economic structure. The observations and discussions revealed the use of coercive economic tools to restrict the nature and level of output from women’s private plots. In theory, “owners” of private parcels could freely decide which crops to grow. However, evidence suggests that prohibitive implicit rules limited the range of crops women could produce, as the quote below illustrates.

“If I start cultivating millet or sorghum, my husband may require that I feed myself and my children, that is why I mainly produce groundnuts and beans” (Mossi senior wife, FGD, Tougou)

In addition to exerting agency on their wives’ and children’ labour, evidence suggests that husbands adopted a compensatory strategy, whereby they contributed fewer labour-hours to the collective fields to account for the inputs they provided in terms of capital investments, including seeds and fertilisers.

Additional restrictive tools prevented women’ freedom to engage in livestock husbandry. While some husbands allowed their wives raise only male livestock, others prohibited their wives from raising livestock. This attitude, though economically illogical, highlighted a strong belief that a woman’s prosperity in livestock enterprise is detrimental to her husband's success.

“If you allow your wife raise livestock, you will soon realise that your livestock has died. She will only cater to her animals and let yours die. (Mossi male, in-depth Interview, Tougou)

Their position as household heads gave husbands the power to articulate the economic direction of the household enterprise. Women’s restricted freedom of enterprise limited their outside options, exacerbating their dependence upon the joint subsistence food.

“If you do not work hard, you will be punishing yourself and your children. The food I get from my private field cannot feed us all.” (Mossi Senior wife, In-depth interview, Tougou)

Comparatively, the analysis of Fulani households portrayed a different picture. Unlike Mossi husbands, Fulani household heads exerted limited control over their wives' labour. Instead, marital contracts stipulated, that husbands must free their wives from farm labour. In their positions as breadwinners, husbands allocated plots of land to their wives, but it was left to the discretion of the latter to engage in crop activities. Besides, in contrast to their Mossi counterparts, Fulani wives derived soft power from their reproductive labour. Their contribution in the form of child care, food preparation, or household maintenance, was highly valued and perceived as complementary to men' agricultural labour.

“Men cannot say that we are not participating. Who would give them food otherwise? This is our contribution, and they should be grateful for that.” (Fulani senior wife, FGD, M'Bamga)

The intrahousehold arrangements revealed no coercive measures that restricted household members' freedom of enterprise. Livestock, for instance, was highly valued, and anyone could embrace the activity. The benefits derived from livestock husbandry in the form of direct milk consumption and manure for crop fields, facilitated these intrahousehold arrangements. Besides, manure substituted for women' labour, given their limited participation in joint fields.

“Manure is essential for crop productivity. If your wives raise livestock, you can benefit through the manure produced” (Fulani husband, In-depth interview, M'Bamga)

Though the political and economic structures assigned different abilities to influence outcomes, co-wives exerted some authority over their children' labour, in reproductive activities specifically. This within-power context shaped the structure of the co-wives' action arenas. The next section analyses these relations and discusses the extent to which they influence co-wives' propensity to form joint ventures.

Rank, status and cooperation

Asymmetric power relations also characterise co-wife cooperation arenas. Though these asymmetries are subtler than husband-wife relations, the first rank as a co-wife in polygynous households confers privileges that influence the prospects for cooperation. In both cultural settings, senior wives hold a higher status. As the “elder sisters”, first wives had the power to influence the course of action and impose their rules. The subordinate position of second wives and the distributional outcomes dictated by social norms, negatively influenced co-wives' incentives to craft joint arrangements. In the Mossi context, in particular, division problems limited co-wife bilateral cooperation.

“Working jointly can be difficult because we cannot always agree how to share, so I prefer to work alone.”

(Mossi junior wife, In-depth interview, Tougou)

Surprisingly, the difference in rank and status did not prevent co-wives from crafting agreements in the Fulani setting. The net-maps and discussions revealed that Fulani co-wives formed joint ventures in both farming and livestock husbandry. In addition to their private groundnut plots, co-wives held a joint cowpea plot. Income from joint fields was invested in the purchase of small ruminants. Given the importance of livestock in this community, coordinating efforts appeared as a solution to achieving this investment. These joint efforts were made possible through the internal rules that ensured equal distribution. Grains or income from joint activities were shared equally between co-wives.

The different outcomes in co-wife cooperation among the Fulani and the Mossi can be traced to the intrahousehold political-economic arrangements. First, there was no conflict between private and collective output among the Fulani. In addition to providing staple grains, husbands were responsible for giving money for the purchase of condiments. All meals, including breakfasts, were shared collectively by all household members, and each child was given the same kind of food. Comparatively, Mossi wives were responsible for providing breakfast to their children. This led to a strong incentive to maximise resources to their uterine children. Evidence from the observation phase showed that breakfast was shared with children from the same mother and that these meals were nutrient-rich and taste-improved.

Co-wives' asymmetries also arose from the number and age of their children. The size of co-wives' sub-families altered the power relations by affecting the exit options available. The exit options, in the form of extra child labour, combined with unclear rules with regards to the distribution of the joint output, challenged the prospects for joint ventures.

The next section explores the biophysical conditions and rules-in-use that shape the incentive structures of household members and their propensity to cooperate.

3.5.2. Biophysical attributes, rules-in-use, and intrahousehold cooperation

The biophysical characteristics and rules-in-use will be conjointly discussed, for they reinforce one another in affecting the incentive structures of household members (Ostrom, 2005). The biophysical attributes are linked to the provision and appropriation problems of joint output through the stock and flow of the resource, respectively (Ostrom et al., 1994). Conversely, the institutional arrangements that shape the provision and division of joint output will influence

the incentives to form cooperative agreements. Note that the distinction between provision and appropriation mechanisms was made for analytical purposes, but they do not operate in isolation.

3.5.2.1. Institutional arrangements and provision of subsistence food

The incentive of household members to enter cooperative agreements is determined by a set of institutional arrangements that shape expectations about individuals' behaviour. In both cultural settings, husbands take on the position of breadwinner and bear the responsibility for ensuring food provision to their members. In the Fulani context, strong social norms enhance these expectations by freeing women from labour contributions to collective fields. Despite the potential scale economies that could be captured through women's labour participation, aversive emotional sanctions, in the form of shame and blame, inhibited the emergence of such cooperative arrangements.

“Your fellow women would laugh at you if they saw you bending on your husband's field. It is not good; it is a shame for both your husband and yourself.” (Fulani junior wife, FGD, M'Bamga)

The norms were so entrenched that they yielded contradictory attitudes. While most men wished their wives worked on collective fields, they were reluctant to allowing such fate to their daughters.

“If my son in law asked my daughter to work with him on his field, I would simply ask her to return home.”
(Fulani man, FGD, M'Bamga)

To circumvent these barriers, a market mechanism, based on a cash-for-grain economy, allowed women to contribute to joint food. This intra-trade economy consisted of women selling grains to their husbands, in exchange for money. The sustainability of this intrahousehold market economy was enforced by trust norms and external regulators, in the form of reputation building and kin blame. Co-wives could freely cooperate with their husbands by getting the assurance that they will get paid for their participation.

The structure of labour organisation among the Mossi gave rise to potential free-riding behaviour. However, the participant observation showed evidence of households circumventing opportunistic behaviour through implicit monitoring mechanisms. The institutional arrangement involved the allotment of collective fields into separate entities to ensure uniform participation. The first author observed that during cowpea harvesting each worker was required

to fill a number of baskets. Each household member was required to complete their task before proceeding to their respective private fields. Because output from private fields constituted the primary source of income for household members, free-riders faced the risk of crop failure and potential losses to their private income. Thus, by altering the payoffs from the actions, they took, the implicit monitoring system ensured cooperation.

“The person who thinks she is intelligent and wants to be lazy on the collective field will be hurting herself. You will not be able to work your private plot until you finish your piece of work.” (Mossi husband, FGD, Tougou)

There was no evidence of a well-established intrahousehold market economy within the Mossi household context, partly as a result of lack of commitment and contract enforcement. Women expressed doubts and were suspicious about the real intentions of their husbands.

“There have been cases of husbands borrowing money from their wives to marry another wife, and they never reimbursed” (Mossi senior wife, FGD, Tougou)

Conversely, husbands showed some reluctance in borrowing money from their wives, suspecting that such information might be made public in case of contract breaching. This mutual distrust created an environment where market exchange could not thrive.

In the next section, we discuss the rules for food appropriation and how they overcome division problems within the household context.

3.5.2.2. Division rules and intrahousehold cooperation

Biophysical and community attributes combine with the existing rules-in-use to shape the incentive structures of household members and their propensity to cooperate (Ostrom, 2005). In both cultural settings, the presence of a shared physical storage facility in the form of a granary and the rules guiding the management and allocation of the joint subsistence food shaped the incentives of household members to cooperate.

As household heads, husbands in both cultural settings managed the granaries and allocated the grains for consumption. A slight difference existed, however, between Mossi and Fulani wives with regards to their rights to access collective granaries. A Fulani woman, in the absence of her husband, could fetch the grains directly from the barn. Comparatively, Mossi women faced entry restrictions. Existing social norms prohibit women from entering or looking into the granary, or else her husband will die. The observation phase confirmed this rule. Only husbands

or male adult children were seen retrieving grains from the barn. Women stood a few meters away, collecting the grains with baskets. The threat of a potential death sentence from the gods created a disincentive to manage the granary jointly.

Despite the asymmetries in control and management of joint output, several mechanisms mitigated incentives to exit cooperative arrangements. The joint effect of potential scale economies, and the secured access to collective granaries, enhanced the emergence of collective action. In both cultural settings, strong social norms supported equal rights to the proceeds from the collective fields. While husbands controlled the collective granaries, scope rules prevented them from mismanaging the joint resource. Husbands were required to notify all household members when the collective grains were to be diverted to other uses other than joint consumption. The FGDs revealed that collective grains could be sold to solve short term emergency issues, including a member's sickness. Breaching these shared values, was subject to social sanctions, including blame.

The norm was enforced through joint cooking and eating arrangements were implemented. There is strong evidence from the field observations that husbands gave similar quantities of staple grains to each wife on cooking duty. The amounts varied throughout the year, but this reflected a shared strategy to even-out consumption when the stock of food reduced.

Conversely, the universal right to joint food engendered an insurance dividend that enhanced cooperation. Each household member facing a hardship could claim access to the collective granary. These mechanisms were present both within the Fulani and Mossi contexts. Reciprocity norms contributed to enhancing the alignment of interests towards this distributive norm.

“If you do not allow people to use the collective granary when they are in need, when your turn comes, you will also be left with your problems” (Fulani co-wife, FGD, M’Bamga)

These reciprocity norms were particularly crucial in co-wife relationships. In the next section, we discuss the extent to which social capital influenced the emergence of cooperative arrangements within the household. We elaborate on the mechanisms that foster co-wife cooperation.

3.5.2.3. Trust, reciprocity and co-wife cooperation

Discussions with Mossi co-wives revealed that strategic cooperation, based on tit-for-tat reciprocity norms, influenced collective action. The potential to retaliate to uncooperative

behaviour and the need to maintain a strong reputation in the household context played a central role in co-wife cooperation. In Tougou, for example, co-wives reported supporting one another in circumstances where unforeseen events prevented the counterpart from meeting her duties. In such situations, a co-wife or her children can work the field of her counterpart.

“I help her because, if one day I am sick, she will also take my turns.” (Mossi junior wife, In-depth interview, Tougou)

Fulani co-wives, on the other hand, relied on trust and reputation building norms to pool resources for joint production. Trust was particularly important to build, given their need to coordinate their efforts for livestock investment purposes. The analysis of the rules’ component of the IAD framework highlighted the existence of scope rules which defined, ex-ante, the distribution and use of the proceeds from joint cowpea fields. By committing to allocate the proceeds to the purchase of livestock, Fulani co-wives aligned their interests, leaving little room for opportunistic behaviour.

“I know my co-wife will cooperate. We trust each other, and so far, we never had problems.” (Senior wife, In-depth interviews, M’Banga)

Unlike Fulani co-wives, Mossi co-wives adopted a conflict-avoidance strategy due to the emotional burden that cooperative arrangements could entail. Many co-wives, during FGDs, reported that the only reason they did not craft joint agreements with their counterparts, was to avoid disputes and *“too much talking.”* Each wife believed that keeping the private sphere private, contributed to maintaining peace and harmony with the household.

3.6. Discussion

This study sought to examine why, and under which conditions, farming household members cooperate. Applying the IAD framework as a tool for analysis, the results suggest that intrahousehold cooperation is not a binary outcome. In contrast to advocates of the unitary and collective models, the results indicate that collective action operates along a continuum, depending on the set of incentives that each household member faces. The institutional arrangements provide opportunities and constraints to intrahousehold cooperation by altering the incentive structures of household members in different action situations.

3.6.1. Why do household members cooperate?

3.6.1.1. Mutual interdependencies, heterogeneity, and intrahousehold cooperation

Previous research noted that asymmetries among actors in collective action dilemmas, will prevent the emergence of cooperation (Castilla, 2019; Castilla & Walker, 2013; Hoel, 2015). However, these studies have not accounted for the underlying institutional mechanisms that shape the response of household members to these asymmetries. The analysis of the structural factors of the IAD framework revealed that power asymmetries, for instance, did not prevent labour pooling for food production among the Mossi. There are a few reasons for the observed results. First, the symmetric valuations of the joint staple food, combined with the absence of close substitutes, render household members highly reliant on collective output. Guirking et al. (2015), for instance, found that household members cooperated more for subsistence than for cash crops. These findings suggest that the pursuit of individual interests does not necessarily depart from the rational collective outcome as presented in conventional non-cooperative household models (Lundberg & Pollak, 1993; Udry, 1996).

Secondly, these findings raise fundamental questions about the effect of heterogeneity on the propensity of household members to cooperate (Kazianga & Wahhaj, 2017). They suggest that it is the nature of asymmetries between household members that determines cooperation. When defection risks arise from resource asymmetries, for instance, the group member who has a high stake for the collective good, will “...*bear the full burden of providing it himself*” (Olson, 1965: p.50). The allocation of labour and productive inputs to staple food production among the Fulani, support this argument.

Interestingly, the results showed that household members did not pool money for food production. In a study of Yoruba households, Staveren & Odebode (2007) found that economic norms supported non-pooling of income for household expenditure. They also found that family norms assign most of the labour work to women. These findings shed light on the values that money, labour and time hold within the household context and how it shapes cooperation. Furthermore, the highly valued time of Fulani women suggests that perceptions about what constitutes collective action are critical in forming joint ventures (Matta & Alavalapati, 2006; Varughese & Ostrom, 2001).

3.6.1.2. Transaction costs, institutional arrangements, and intrahousehold cooperation

The analysis of the structural components of the IAD framework revealed that intrahousehold collective action is more likely to emerge the lower the transaction costs of crafting joint

agreements. We found that both Mossi and Fulani households cooperated when potential mutual gains were supported by mechanisms that reduced the monitoring and bargaining costs of collective action. Conversely, the implicit monitoring mechanism implemented by the Mossi households ensured that the costs of opportunistic behaviour were internalised, leading to cooperation (Coase, 1960). The result underscores the argument that norms that improve access to information and ensure fairness of output appropriation enhance cooperation (Lecoutere & Jassogne, 2019; Masekele & Munro, 2020). De Laat (2014) found similar results in Kenya, where the costs of monitoring migrated labour influenced the transfer of remittances.

Successful collective action also emerges as a result of incentivised arrangements in the form of rewards and sanctions (Ostrom, 2000). Our finding that Fulani husbands cooperated to avoid kin judgement suggests that emotional sanctions can regulate intrahousehold cooperation. This result supports Ostrom's (2010) concept of a "*delta parameter*," ensuring that household members comply with existing norms. Theoretically, these findings challenge the conventional approach to intrahousehold behaviour, which consider direct payoffs (prisoner's dilemma) while overlooking the intangible incentives that shape intrahousehold cooperation.

Conversely, the analysis of the rules component of the framework revealed how trust and reciprocity norms act as transactions-cost-saving mechanisms that foster cooperation (Gächter et al., 2004; Ostrom, 2009). Fulani and Mossi relied on these norms to craft mutual arrangements, reinforcing the role of social capital in shaping cooperation (Ostrom, 2010; Bjorvatn et al., 2020). Furthermore, the Fulani cash-for-grain economy highlights how compensatory payments foster cooperation through exchange and sale (Bjorvatn et al., 2020; Coase, 1960). In practical terms, though conditional cash transfer programs present alternative solutions to efficient resource use, they may crowd-out existing mechanisms which foster voluntary cooperation.

3.6.1.3. Trade-offs and intrahousehold cooperation

The output restrictions imposed on Mossi women are an expression of the trade-offs between authority and productivity gains. These findings reflect men's need to safeguard control over household members and sustain their authority. This strategy may explain Udry (1996) finding that men's plots received more fertilisers than women's. In practical terms, interventions that aim at empowering women through better access to productive resources must be aware of the potential trade-offs. This implies that policies can exacerbate the already vulnerable positions of some household members (Vijaya et al., 2014), calling for an assessment of the benefits of

an intervention for the collective good against the possible welfare losses for individual members within the household.

We cannot rule out that the restrictions on Mossi women to raise livestock could be a strategy to limit competition over scarce feed resources for livestock. However, it is less clear why the same restrictions were absent within the Fulani context, with similar agro-ecological constraints. One obvious explanation is the importance of livestock for the Fulani. Another possible reason could be the livelihood strategies adopted by the Fulani, who practice seasonal transhumance to find feed for their animals. This suggests that improving access to feed resources could enhance cooperation by reducing competition for livestock feed.

Likewise, the results suggest that the level of relinquished autonomy influences the prospects of capturing scale economies through cooperation (Munro et al., 2014; Verschoor et al., 2019). This contradicts Seymour & Peterman (2018), who found that women in Bangladesh expressed more autonomy when they jointly made agricultural decisions with their husbands. We argue, however, that women's failure to cooperate with their husbands on private plots resulted from the underlying risks associated. Though cooperation might be beneficial in absolute terms, it might leave them worse off, in relative terms, if their spouses claim part of the output. Besides, there are reasons to believe, that cooperation could threaten women's usufruct access to land, through expropriation (Deininger, Xia, & Holden, 2019; Goldstein, Hounghbedji, Kondylis, O'Sullivan, & Selod, 2018). This result reinforces the need to look beyond efficiency outcomes, and implies that productivity-enhancing programs, through direct transfer of inputs, should be coupled with better tenure security for women.

3.6.2. Implications for household theory

From a theoretical perspective, the findings challenge the conclusions from the unitary and collective household models (Becker, 1981; Bourguignon & Chiappori, 1992; Browning & Chiappori, 1998) and reinforce the view that intrahousehold cooperation does not occur in a vacuum. As the theoretical research on household behaviour progresses, the IAD framework highlights the mediating role of institutional arrangements in intrahousehold patterns of behaviour. This calls for more rigorous household theories that factor in interaction effects between the structural and institutional conditions.

3.6.3. Limitations and future research

The IAD framework provides a rigorous and systematic approach to assessing intrahousehold collective action. However, the tool does not allow the researcher to explore the effects of mutual feelings of love, affection, care, or jealousy, on cooperation. Yet, advances in behavioural economics and experimental psychology show how emotions affect the propensity of individuals to make cooperative arrangements (Rick & Loewenstein, 2008; Van Kleef, De Dreu, & Manstead, 2010). Future research could tap into these disciplines to further our understanding of intrahousehold cooperation.

Despite this chapter's contributions to the literature, the findings can only be generalised to households with similar characteristics as those included in this study. Our examined cooperation within the same climatic zone, holding agro-ecological factors constant. In the wake of climate change, market integration and commercialisation, it would be insightful to assess the evolution of norms and values, and how they reshape the dynamics of intrahousehold collective action.

3.7. Conclusion

We started our research enquiry by asking why and under which conditions household members cooperate. Using ethnographic data from two cultural settings, we demonstrated how contextual factors combine with existing norms and values to determine the prospects for cooperation. The IAD framework provided a coherent and rigorous tool for analysing intrahousehold cooperation by structuring the household collective action problem into separate components. Advocates of the unitary and collective models represent intrahousehold behaviour as a binary outcome. However, this study provides a unique contribution to the literature by arguing that outcomes of intrahousehold behaviour are contingent upon the nature of the problems to resolve, and the set of incentives that each household member faces. The study also revealed that, through social sanctions and rewards, norms have the power to shape collective behaviour within the household.

4. TRUST AND CO-WIFE COOPERATION: EVIDENCE FROM AN INVESTMENT GAME IN RURAL BURKINA FASO

Abstract

Co-wife relationships are often portrayed as conflictual, competitive and characterised by mutual distrust, deterring cooperation and leading to inefficiencies in resource allocation. In this chapter we explore the complexities of sustaining cooperative relations among co-wives in polygynous households, examining the interplay between trust and cooperation. We designed a one-shot experimental setting, based on Berg's et al (1995) trust game to examine the relationship between co-wife trusting behaviour in the field setting and reported cooperation in the household. A sample of 184 pairs of co-wives was drawn from eight villages in the Northern region of Burkina Faso, to test whether trust correlates with co-wife cooperation. Combined with a post-experimental survey, the results from the experiment suggest that first and second wives are equally likely to trust in the investment game. We find a strong correlation between trust and income pooling for food purchase, but no relationship between trust and the likelihood of co-wives pooling labour on their individual private plots was found. Policy makers should invest in trust-building activities, to enhance co-wife cooperation in polygynous households.

4.1. Introduction

“Mutual trust is the key to actual cooperation”

Yamagishi (1986: p.2)

Ethnographic accounts of social organisation in polygynous households portray co-wife interpersonal relationships as fraught with relentless conflict, jealousy, and mutual distrust (Ickowitz & Mohanty, 2015; Jankowiak & Wilreker, 2005; Madhavan, 2002). Reports of co-wives being suspicious and accusing one another of witchcraft have been documented (Bove & Valeggia, 2009; Levine, 1962; Seeley, 2012). This distrustful environment is exacerbated by the competition and rivalry over husbands' affection and sexual services, and the need to secure resources for their offspring (Hidrobo et al., 2020; Mammen, 2019; Rossi, 2019). The resulting lack of cooperation leads to inefficiencies (Barr et al., 2019; Munro et al., 2010) and adverse consequences for intrahousehold productivity and welfare outcomes (Arthi & Fenske, 2018; Bove & Valeggia, 2009; Kazianga & Klonner, 2009). Evidence suggests, for instance, that children in polygynous households score worse on nutrition and health indicators than their counterparts in monogamous families (Arthi & Fenske, 2018; Smith-greenaway & Trinitapoli,

2014). Senior wives and their offspring are also less likely to experience food insecurity, as opposed to junior wives (Nanama & Frongillo, 2012).

Despite a rich account of co-wife interpersonal relationships and a few attempts to uncover the relational mechanisms that drive observed outcomes of these relationships (Akresh et al., 2016; Barr et al., 2019), trust has not been adequately incorporated into the dominant paradigms on explaining co-wife cooperation. Besides, most research on trust between co-wives, relies on stated accounts and direct observation (Bove & Valeggia, 2009; Jankowiak & Wilreker, 2005; Madhavan, 2002), and no study to date, to our knowledge, has provided a concrete measure of trust and how it shapes the likelihood of co-wives cooperating on a range of activities. We address this methodological gap by quantifying trust between co-wives and by linking outcomes of trust behaviour to cooperation in the household context. We do so by examining the factors at the individual level that influence co-wives' trust, and how this trust, in turn, correlates with cooperation on a range of productive and reproductive activities. The study follows a well-established experimental design, known as the trust, or investment game (Berg et al., 1995), to test this hypothesis. Mimicking co-wives' everyday interactions, the game examines the extent to which co-wives achieve mutual gains through coordination and joint endeavours.

The experiment was implemented in eight rural communities in Burkina Faso, where polygyny is predominant (Dauphin et al., 2018; INSD, 2015). Combining experimental data with a survey, we analyse: i.) how co-wives' rank influences their investment behaviour in the trust game, ii.) the extent to which the game outcomes correspond with co-wife self-reported cooperation in the household context. By so doing we contribute to the literature in two meaningful ways. First, we enrich the intrahousehold experimental research by exploring more intangible aspects of household behaviour, as opposed to the usual efficiency analyses of economic field studies (Barr et al., 2019; Hidrobo et al., 2020; Kebede et al., 2014). Secondly, we extend the literature on social capital by examining trust and cooperation within the household setting, adding to the numerous studies on social capital already conducted at the community level (Ansink et al., 2017; Bouma et al., 2008; Irwin et al., 2015; Msaddak et al., 2021).

Our results revealed no difference between first and second wives' trusting behaviour. While first wives, on average, transferred lower amounts to their counterpart, the difference was not statistically significant. When we relate the behaviour in the trust game to reported cooperation,

we found that trust is correlated with income pooling for food purchase but fails to explain variation in labour pooling for crop production. The behavioural and environmental uncertainty that characterises each of these activities may account for these variations.

4.2. Polygyny and co-wife relationships in Sub-Saharan Africa

Polygyny, the practice of a man marrying more than a wife, is widespread in much of Africa, particularly in rural areas (Dalton & Leung, 2014; Tertilt, 2005). In Northern Burkina Faso, for instance, two in three women are engaged in a polygynous marriage (OECD, 2018). Polygyny has drawn much attention from the literature in the past decades, ranging from studies on the causes of polygyny (Dalton & Leung, 2014; White & Burton, 1988) to its consequences on several welfare indicators (Lawson et al., 2015; Owoo, 2018; Smith-greenaway & Trinitapoli, 2014; Tabi et al., 2010). Ethnographic studies, in particular, were concerned about the nature of co-wife relationships (Jankowiak & Wilreker, 2005; Madhavan, 2002; Mason, 1988; Seeley, 2012) and how it shapes intrahousehold organisation and resource allocation.

The quality of co-wife relationships shows some heterogeneity across and within communities (Jankowiak & Wilreker, 2005; Madhavan, 2002; Mason, 1988). While outright conflict and opposition might cripple this relationship (Mason, 1988), co-wives in some instances, develop a sister-like bond, providing mental support to one another and sharing household duties, including child care and other reproductive activities (Seeley, 2012). Nevertheless, co-wife relationships cannot be painted as black or white, but rather as operating along a conflict-cooperation continuum (Sen, 1987), depending on the circumstances and the incentives they face. Most competition arise from rivalry over husband's love and sexual services (Jankowiak & Wilreker, 2005; Tabi et al., 2010), and the need to maximise resources for their uterine families. In a cross-country study, Jankowiak & Wilreker (2005) found that conflict in polygynous households is pervasive and is intensified by the emotional burden of sharing a mutual husband and the rivalry over his sexual attention. Competition is also expressed in the patterns of child birth, each wife raising her fertility in response to her co-wife's (Rossi, 2019). Furthermore, Tertilt (2005) noted that Senegalese women altered their economic behaviour, once the prospects of having a co-wife become probable, increasing savings and reducing investments.

Some empirical evidence supports the presence of cooperation in polygynous households. For example, Akresh et al., (2016) concluded that the higher yields observed in polygynous households, relative to monogamous households', can be attributed to co-wife cooperation.

They linked the observed outcomes to the lack of altruism between co-wives, forcing them to cooperate, thus avoiding retaliation from non-cooperation. Seeley's (2012) account of Ugandan co-wives, also tend to support evidence of cooperation, with co-wives sharing their tribulations, and coordinating their efforts in several household activities.

Despite the contributions of current discourses to the understanding of co-wife relationships, the mechanisms underlying co-wife collective action within the households are still not yet well understood. Several interpersonal factors have been identified, including Akresh et al., (2016)' lack of altruism argument. Others, have concluded that reciprocity is the most important feature that explains co-wife interpersonal relationships (Barr et al., 2019). This chapter adds to the existing paradigms by exploring the effects of trust on co-wife cooperation in polygynous households. The next section presents the theoretical framework underling the study, introducing the hypotheses.

4.3. Theoretical framework and hypotheses

Trust is a multidimensional construct (Alesina et al., 2000; Dasgupta, 2000; Deutsch, 1958; Ostrom, 2010; Uslaner, 2002; Yamagishi, 1986). Scholars have studied trust from an evolutionary perspective (Axelrod, 1984), from a moral standpoint (Uslaner, 2002), or defined it as a commodity (Dasgupta, 2000). Though there is no universally accepted definition of trust, the relational view of the concept has attracted the most attention in the literature in the social sciences (Li, 2012). This view of trust posits that an individual inclination to trust is influenced by their expectations of trustworthiness (Barr, 2003; Ostrom, 2003b, 2010a). In other words, people place trust in individuals, whom they believe will act in their interest, despite the risk of being exploited. In this chapter we rely on the definition provided by Cook et al. (2005):

“Trust exists when one party to the relation believes the other party has incentive to act in his or her own interest or to take his or her own interests to heart.” (p.2).

The relationship between trust and cooperation has been examined in several social settings (Bouma et al., 2008; Gächter et al., 2004; Kormelinck, 2014). For this study, we build on Ostrom's (2003) theoretical framework, which provides a systematic approach to investigating the relationship between trust and cooperation (Figure 7). More specifically, we examine the interplay between power asymmetries, reputation and trust on co-wife propensity to cooperate. We rely on the premise that in conflict-prone environments, trust can facilitate cooperation, by acting as a transaction cost-saving mechanism (Cook et al., 2005; Dyer et al., 2003). In polygynous households, therefore, competition and rivalry for the husband's scarce resources

may render trust essential to the emergence of collective action (Balliet & Lange, 2013; Larzelere & Huston, 1980).

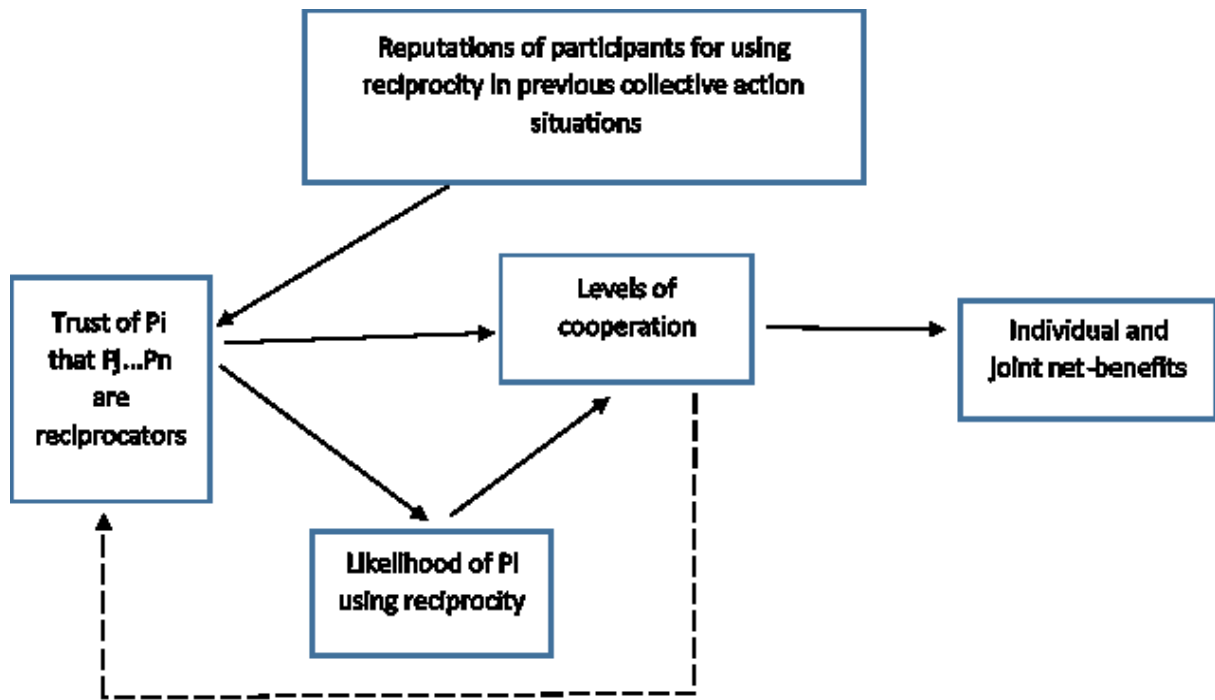


Figure 7: Core relationships at the individual level affecting levels of cooperation in social dilemmas (Ostrom, 2003; p.51)

4.3.1. Power relations and trust between co-wives

The dynamics of co-wife relationships is symbolized by a de-facto *senior-junior* hierarchy that confers authority and power to first wives, relegating junior wives to a subordinate position within the household configuration (Hidrobo et al., 2020; Jankowiak & Wilreker, 2005; Kazianga & Klonner, 2009; Madhavan, 2002; Matz, 2016). First wives' power is often expressed in their capacity to influence intrahousehold outcomes in terms of resource and work allocation (Bove et al., 2014; Henderson, 1986; Lundeen, 1996). Among the Mossi ethnic group in Burkina Faso, for instance, senior wives (*Pogkiema*) have considerable influence on household decisions and can allot work to their junior counterparts (H. Henderson, 1986). Senior wives are often in charge of the distribution of household supplies, resulting in better appropriation of household resources and income and imbalanced power relationships (Kazianga & Klonner, 2009; Munro et al., 2010). Conversely, the respect due to first wives can result in an imbalanced power relation in favour of the former (Bove & Vallengia, 2009). Aside from the de-facto hierarchy that define co-wife relationships, co-wives can derive soft power from being the favourite wife in the polygynous union (Bove et al., 2014; Jankowiak & Wilreker, 2005; Solanke & Kupoluyi, 2018; Tabi et al., 2010) or for giving birth to male heirs.

Given that junior wives, often have the advantage of receiving the most attention and care from their husbands (Solanke & Kupoluyi, 2018; Tabi et al., 2010), the relative power of first wives, would have to be nuanced, and placed into context.

From the perspective of the social distance theory of power, power-holders within a dyadic relationship will tend to be less trusting relative to those in a low power position (Magee & Smith, 2013; Schilke et al., 2015). This is because the former experience more subjective distance than lower power individuals, as they can more readily influence outcomes and can afford to betray their commitments (Magee & Smith, 2013). The literature is unclear whether co-wives' rank influences their inclination to trust. Most ethnographic studies report co-wives perceptions and feelings about the nature of trust towards their counterparts, but no distinction is made concerning a wife's propensity to trust based on their rank (Bove et al., 2014; Ickowitz & Mohanty, 2015; Jankowiak & Wilreker, 2005; Madhavan, 2002). In this research, we assume that seniority gives more power and greater command over shared family income to first wives (Bove & Vallengia, 2009; Matz, 2016). Based on this assumption, we would expect the co-wife's rank to influence their inclination to trust. We formulate the following proposition to test our hypothesis:

Hypothesis 1: *Ceteris paribus*, first wives are less trusting than second wives.

4.3.2. Reputation and trust between co-wives

In social dilemmas, boundedly rational individuals rely on several heuristics to make decisions (Ostrom, 2003b). Research suggests that trust reduces after experiences of trust violations and increases after positive feedbacks from trusting others (Li et al., 2017; Schwerter & Zimmermann, 2020). This outcome is expressed through tit-for-tat or grim-trigger strategies, whereas trust and reputation are mutually reinforcing (feedback loops in Figure 77). In the context of polygynous households, as co-wives repeatedly interact, they rely on past experiences to evaluate the trustworthiness of their partners (Huang & Murnighan, 2011; van den Bos & Dijk, 2011) and to act accordingly (Boero et al., 2009; Ostrom, 2003). In other words, the information gleaned over time, will generate positive or negative triggers into placing trust in one's co-wife and engaging in mutually beneficial cooperation. The inclination of co-wives to trust their counterpart will thus depend on the reputation of their counterpart in reciprocating trusting behaviour and in being trustworthy (Ostrom, 2003b, 2010a).

Furthermore, co-wives' trust can evolve with time and the frequency of interactions. Indeed, mistrust is usually pervasive in the early years of marriage (Essien, 2018). Newly co-residing

wives may be suspicious, engaging in a cautious interaction with their counterpart to build sufficient reliable and accurate information. Over time, however, co-wives may develop closer ties and trust due to the promiscuity and reduced rivalry (Mason, 1988; Seeley, 2012). In examining co-wives' relationships in Uganda, Seeley (2012) notes that jealousy and competition subside as co-wives face similar tribulations in life, share household chores, giving room to a more sister-like relationship where trust thrives. The length of the relationship and the prospects for future interactions also influence trust by reducing the social uncertainty between participants in a joint action (Alarcon et al., 2016; Yamagishi, 1986a). Based on this theoretical description, we expect the scope for repeated interactions and reputation building to increase familiarity among co-wives and their likelihood to trust their counterpart.

Hypothesis 2: All things being equal, co-wives' inclination to trust is positively correlated with the duration of co-residence.

4.3.3. Trust and co-wife cooperation

Co-wife interpersonal relationships are characterised by instances of cooperation (Kringelbach, 2016), and expressions of outright conflict (Jankowiak & Wilreker, 2005; Rossi, 2019). Most competition arises from rivalry and the pursuit of resource maximisation for their uterine families (Cunningham et al., 2013; Jankowiak & Wilreker, 2005; Mammen, 2019; Tabi et al., 2010). This inherent competition often exacerbates the externalities caused by co-wives, in the form of greater appropriation of resources, resulting in intrahousehold inequality (Gibson & Mace, 2007; Hidrobo et al., 2020). Rather than pooling resources, co-wives may engage in self-protecting strategies, including more savings (Boltz & Chort, 2019; Tertilt, 2005), at the expense of consumption. Besides, the fear of being exploited, combined with the long-term benefits of investing in children's capital, constitutes a strong disincentive to cooperation (Bove & Vallengia, 2009; Rossi, 2019; Tabi et al., 2010). Yet, in the case of child nutrition-related health, for instance, co-wives could coordinate their efforts and investments through joint production or income pooling arrangements for the production or the purchase of nutrient-rich foods for their children well-being.

Nevertheless, co-wives could achieve substantial economies of scale if they trusted each other enough to engage in mutually beneficial interactions (Barr et al., 2019; Ostrom, 2003b). Indeed, where opportunism and fear of being exploited deters cooperation (Irwin et al., 2015; Yamagishi & Sato, 1986), trust can promote mutually beneficial interactions, by reducing the social uncertainty inherent to interpersonal relationships (Yamagishi, 2011). It does so by

generating a co-operator's dividend (Ostrom, 2003b), that would lay the foundations for mutually beneficial cooperation (Balliet & Lange, 2013; Irwin et al., 2015). Against the above theoretical background, we hypothesise that trust between co-wives would be a strong indicator of cooperation on a range of productive and reproductive activities. We formulate the following hypothesis:

Hypothesis 3: All things being equal, trust is positively correlated with cooperation between co-wives.

4.4. Methodology

This study combined a field experiment and a survey to elucidate co-wife trust and cooperation. Subsequent sections elaborate on the study methods and experimental procedures.

4.4.1. The trust game

To investigate the relationship between trust and co-wife cooperation, this study built on Berg's et al. (1995) investment game. As its name indicate, the investment game measures the potential of a set of players to reach the highest possible return on investment from a given endowment. Structured in two stages, the game involves a pair of players, a trustor and a trustee, each with a defined role. In the first stage, the trustor, or investor, is endowed with an amount of money, A_1 , and decides whether to invest. The amount invested can take any value X such that $0 \leq X \leq A_1$. Any positive amount, X , invested by the trustor is tripled and transferred to the trustee. In the second stage of the game, provided a positive amount was sent by the trustor, the trustee decides whether to return a share of the tripled amount $3X$ to the trustor. The amount returned can take on values such that $0 \leq \alpha 3X \leq 3X$, where $0 \leq \alpha \leq 1$. Joint payoffs are maximised when the first mover invests the full initial endowment.

The unique sub-game perfect equilibrium, however, predicts that no amount will be invested and that the trustor, acting as a rational agent will keep the full initial endowment. Conversely, provided she is transferred a positive amount, the trustee has an incentive to exploit the first-mover by returning no money. Thus, individually, the dominant strategy for both players is to defect but collectively, it would be mutually beneficial to cooperate. The Nash equilibrium would thus reflect a sub-optimal outcome.

According to Berg et al., (1995), any deviation from the Nash equilibrium, i.e. any positive amount transferred by the trustor, is a sign of trust towards the trustee. The difference between the zero-equilibrium outcome and the amount sent is proxied as trust (Bouma et al., 2008).

Likewise, if the trustee returns some money to the sender, she is said to have exhibited reciprocity towards the trustor, and the amount returned is measured as a sign of reciprocity.

4.4.2. Study site

The experimental game was implemented in the Yatenga province, in Burkina Faso. Located in the Northern region of the country, the Yatenga province has a predominantly Muslim population (INSD, 2016). The incidence of polygyny in this region is among the highest in Burkina Faso, with about 64% of women engaged in a polygynous union (OECD, 2018). The majority of the population is of the Mossi ethnic group, a highly hierarchical and patriarchal society (Kevane & Gray, 1999; Thorsen, 2002; West, 2009). Traditional institutions among the Mossi are characterised by a patrilineal descent system and a patrilocal marriage arrangement that requires wives to reside with their husband's kin (Dash, 2004; Laurent, 2013; Schildkrout, 1973).

In polygynous households, co-wives share the same compound but live in separate huts with their children. Upon marriage, each wife is given a small plot of land (*beolgo*), the proceeds of which she controls and can use to her discretion (Kevane & Gray, 1999; Maïzl, 1989; Theriault et al., 2017). Women often produce crops such as cowpea, groundnut or sesame, a source of income that serves to meet day to day expenses and the care and education of their children. Co-wives take turns to cook and meals are shared commonly by all household members. Mason (1988) reports from an ethnographic study among Mossi co-wives, that their relationships can be amicable but also conflictual. She provides several accounts of Mossi co-wives having a sister-like bond, sharing household chores, supporting each other in difficult times, such as the loss of a kin member, and jointly performing activities, even when only one is on duty. Such evidence was also reported by Jankowiak & Wilreker (2005). In other instances, co-wives may engage in overt hostility towards one another, with no room for collaboration.

4.4.3. Sampling frame and subjects' recruitment

The sample size for this study was obtained through a prospective sample and power analysis using Gpower (Cunningham & Mccrum-Gardner, 2007). Applying a 0.05 significance level, a power of 80% and a minimum effect size of 0.3, an optimal sample size of 184 pairs of co-wives was calculated. Once the sample size was determined, a stratified random sampling approach was employed to recruit subjects for the experiment. Of the nine communes comprising the Yatenga province, three were excluded from the sampling procedure, for

security reasons⁵. In the first sampling stage, three communes were randomly selected. The second stage consisted of the selection of two to three random villages from each of the communes. Eight villages in total were included in the sample. Once the villages were identified, preliminary visits were organised, where a comprehensive list of all polygynous households was established in close collaboration with the village leaders. Because households with two-wives constituted the majority of polygynous households observed in these communities, they were retained for the selection of the pool of subjects. In each village, between 15 and 24 households were randomly selected, making up the initial sample of 184 pairs of co-wives.

4.4.4. Experimental design and procedures

The experimental design resembled that of Castilla's (2015), except that the play took place between co-wives, as opposed to spouses in Castilla's case. In addition, the dictator game (introduced in subsequent sections) was administered to both trustees and trustors, while in Castilla's setting, only trustees received this treatment. The design presented in this section was pretested in a pilot study before implementation. All sessions were conducted in village schools' classrooms, offering a conducive environment to preserve privacy and confidentiality.

Table 5: Total number of participants in trust game

| Role | Rank | | |
|----------------|-------------|--------------|-------|
| | First wives | Second wives | Total |
| Trustor | 92 | 92 | 184 |
| Trustee | 92 | 92 | 184 |
| Total | 184 | 184 | 368 |

Upon arrival to the experimental lab, co-wives were randomly assigned to the roles of trustor and trustee (Table 5), and a card with a unique identification number was given to each participant. Each trustor and trustee groups were then gathered in separate rooms. Each group was informed that they would take part in an experiment to assess how they make decisions. In contrast to previous studies (Ansink et al., 2017; Bouma et al., 2008), however, the instructions for the game were not provided publicly. Rather, they were privately explained to subjects in

⁵ There was a perceived high level of risk of a terroristic attack during the time of data collection (December 2018-January 2019)

the experiment rooms. This decision was taken to prevent participants from discussing the game. Figure 8 summarises the structure of the game.

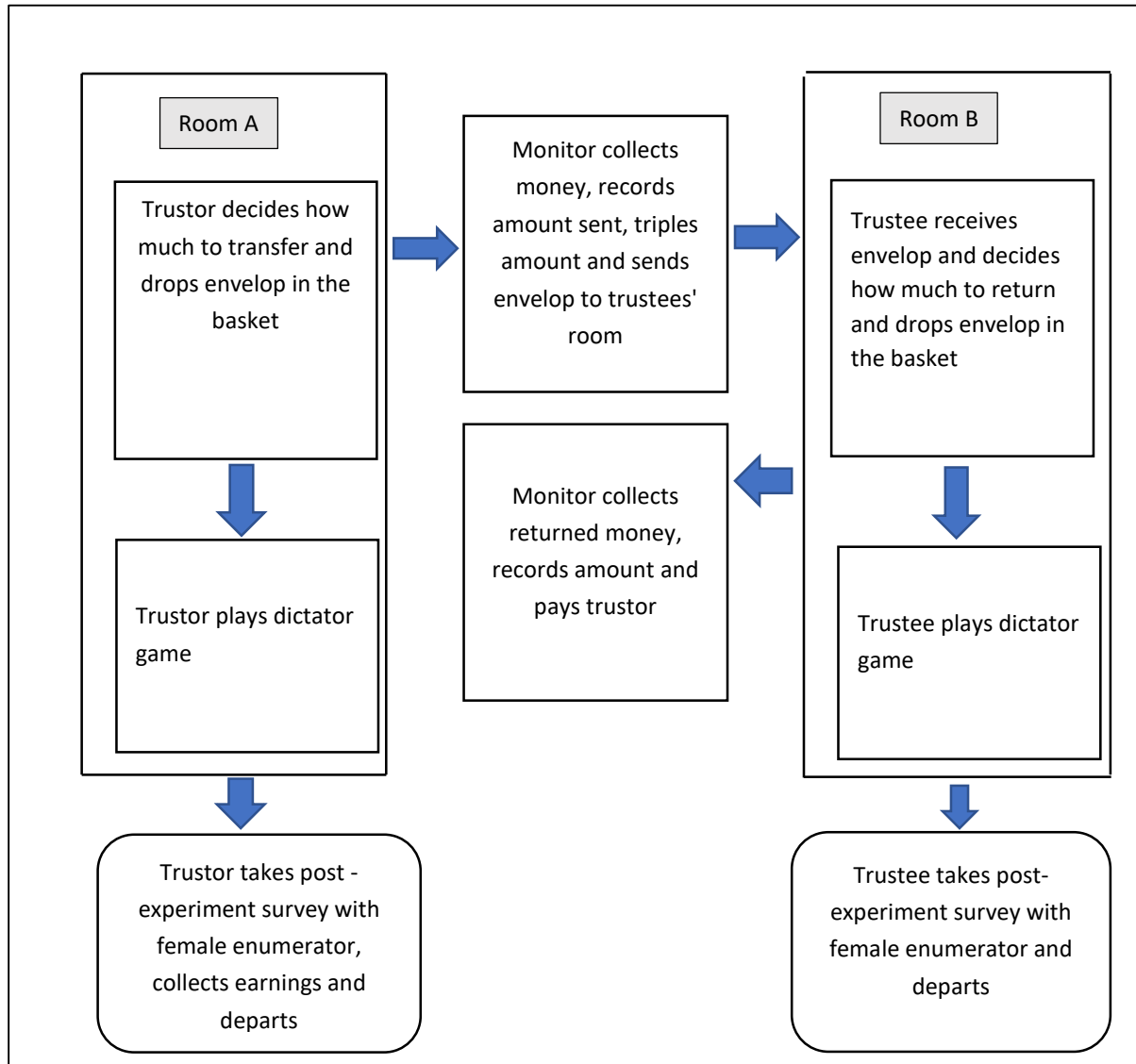


Figure 8: Experiment set-up

At the start of the game, a pair of co-wives (sharing a mutual husband) was simultaneously invited and each was directed to either room A or room B, subject to their assigned role. Once installed, participants received the instructions of the game (Appendix A) with the support of visual aids (Appendix B). To ensure that subjects understood the game, they were encouraged to restate the instructions in their own words. Where needed, guidelines were repeated and follow-up questions were asked to confirm understanding.

Upon completion of this step, trustors received a coded envelope containing 500 CFA⁶ (in units of 100 CFA), slightly above the average daily per capita expenditure in the province (INSD, 2015). Once the subject received her endowment, she was asked to make her decision. Possible transferrable amounts were {0, 100, 200, 300, 400, 500}. To minimise demand effects (Zizzo, 2010), subjects were invited to go to a corner of the room, while the experimenter turned their back. Once the trustor made her decision, she dropped the envelope in a basket. After she left the room, the envelope was collected by a monitor who recorded the amount sent, tripled it, and a second monitor took the envelope to room B where the trustee, already briefed about the game (Appendix A), was waiting to make her decision. Possible amounts received by the trustee were within {0, 300, 600, 900, 1200, 1500}. Trustees were invited to make their decision on whether to return a fraction of the amount received to the trustor. They left the envelope in the basket and the amount returned was recorded.

4.4.4.1. Trust-control treatment: the dictator game

In this chapter, the dictator game was administered as a trust-control treatment following Cox (2004), to disentangle trust from altruism. The dictator game is a version of the classic ultimatum game, where subjects endowed with a fixed amount of money decide whether to share a fraction of their endowment with a counterpart. The main difference with the trust game was the information available to the trustee. In this treatment, trustors were endowed with an additional 500 CFA and asked whether they would like to share part of the amount with their counterpart. This time, however, their counterparts would not be informed about the additional windfall. Furthermore, the amount endowed did not bear any interest as was the case in the trust game. Assuming the trustor still transfers some money from this extra windfall to their co-wife, their behaviour is said to have resulted from altruism. Cox (2004), therefore concludes that trust exists when the difference between the amount sent in the trust game and the amount sent in the dictator game is statistically significant.

4.4.4.2. Post experiment survey

To supplement the experiment's data, a survey was administered to the participants and socio-economic and demographic information were collected. The characteristics of co-wives, including their age, the number of children, the resources they possess within the household and their perceived wealth difference was collected in parallel with the joint activities they performed with their co-wife. Questions were structured to prevent participants from exhibiting

⁶ 1 USD=550 CFA.

social norms. Instead of asking direct questions such as “*Does your co-wife help you on your private plot?*”, we formulated the question as “*Who are the people who contribute labour to your private plot?*”. If the respondent mentioned their co-wife as a worker, the outcome was recorded as cooperation. The combined experiment and survey lasted between 5 to 6 hours and the survey was administered by female enumerators. A combined set of 736 observations was obtained from the trust and dictator games.

4.4.5. Model and data analysis

The quantitative data analysis was performed using the statistical software STATA12. Descriptive and regression analyses were carried out to examine the socio-demographic attributes of co-wives that influenced their inclination to trust and to assess the likelihood of co-wife cooperating based on the trust they expressed in the field-lab.

4.4.5.1. Measuring cooperation

In this chapter, cooperation is considered as any action that requires the pooling of resources, including labour, or income, and any coordination of activities to capture economies of scale. In polygynous households, many aspects of household life present opportunities for mutual gains from cooperation. From the coordination of reproductive activities to joint activities in crop and livestock production, co-wives can achieve economies of scale by coordinating their efforts and investments. Table 6 summarises the categories of variables included in the post-experiment survey to capture co-wife (self-reported) bilateral cooperation.

Table 6: Classification of co-wife cooperation activities

| Category | Description | Measurement |
|-----------------------|----------------------------------------------------------------------|----------------------------------------------------------|
| Money pooling | Co-wives pool money to purchase food items for household consumption | Cooperation =1 if the respondent answers yes to the item |
| Labour pooling | Co-wives mobilise each other’s labour on their private plots | Cooperation =1 if the respondent answers yes to the item |

For analytical purposes, cooperation was classified into money pooling (CM) and labour pooling in crop production activities (CP). Distinguishing between categories was important, as cooperation on these different activities may require different levels of trust and commitment. Furthermore, some activities may be shaped by social norms and intrahousehold division of labour. For each item in each category, cooperation was measured as a binary outcome (y_i),

taking on the value 1, when the respondent reported that the activity was performed jointly, and 0 otherwise. The model was specified as follows:

$y_{ij}^* = \text{constant} + \beta_{ij} X_{ij} + \mu_{ij}$, where y^* is a latent variable and satisfies the condition

$$y_i = \begin{cases} 0, & y^*_{1i} < 0 \\ 1, & y^*_{1i} \geq 0 \end{cases}$$

X_{ij} is a vector of the characteristics defining each co-wife in the trustor role (including trust), and β_{ij} is a corresponding coefficient vector, with μ_{ij} as an unobserved error term.

4.4.5.2. Socio-demographic variables

The main variables of interest in the current analysis were the rank of the co-wife and the length of co-residence (Table 7).

Table 7: Regression and Socio-demographic variables

| Variable | Description | Type |
|-------------------------------------------|--------------------------------------------------------|------------|
| Rank in marriage (1=First) | First or second wife | Dummy |
| Age | Age in years | Continuous |
| Duration of marriage | Number of years of marriage | Continuous |
| Type of marriage (1=Arranged) | Arranged or Consensual | Dummy |
| Literacy (1= Illiterate) | Whether participant can read or write | Dummy |
| Income-generating activity (1=yes) | Earns income from other activities (i.e., petty trade) | Dummy |
| Co-residence | Number of years living with co-wife | Continuous |
| Children | Number of children | Continuous |
| Son (1=yes) | Participant has a male child | Dummy |
| Dependency | Ratio of children under 5 to total number of children | Continuous |
| Child agricultural labour (1=yes) | Gets own children support on private fields | Dummy |

We also controlled for other covariates, which we believed could influence co-wives trusting and cooperation behaviour. The age difference between co-wives may also influence the propensity to cooperate. When the age difference is large, elder wives may freely break cooperative arrangements given their relative position and the respect due to them from their age. Likewise, junior wives may be less enticed to cooperate if the age difference gives them little room to make their voice heard in any kind of cooperative arrangements. As co-wives get older, we expect more pragmatic cooperation. Postmenopausal wives, in particular, would be less likely to engage in conflictual relationships with their counterpart (Jankowiak & Wilreker,

2005; Seeley, 2012b). “Son” was included to capture the lack of trust that may result from the rivalry for inheritance (Rossi, 2019; Seeley, 2012b). Having an income-generating activity may reduce the competition for husbands’ resources, which could give room to more cooperation (Bove & Valeggia, 2009). Finally, the type of marriage may influence conflict and cooperation through pair bond relationships (Jankowiak & Wilreker, 2005; Kringelbach, 2016). Women engaged in arranged unions, may be less inclined to conflicts for husbands’ sexual services, leading to a more pragmatic cooperation relationship.

4.5. Results

4.5.1. Sample characteristics

Table 8 describes co-wives’ socio-economic and demographic characteristics. Results are differentiated by the co-wife’s rank in the marriage order. The means t-test and chi2 tests showed statistically significant differences between first and second wives in most of the variables. As expected, senior wives, on average, were older than junior wives. They also had more children and had been married for a longer period than junior wives. Results also revealed that first wives were more likely to be in an arranged union than their junior counterparts. About a third of second wives reported having access to child labour for their field activities, while up to 48% of first wives reported using their child labour to assist them in their private fields. Income-generating activities were more common among first wives.

Table 8: Co-wives socioeconomic and demographic characteristics ^a

| Factor | Statistic | Co-wife Rank | | Chi ² /ttest | p-value |
|------------------------------------------|-----------|----------------|----------------|-------------------------|---------|
| | | First | Second | | |
| N | | 184 | 184 | ---- | |
| Age (Years) | mean | 42.4 [12.8] | 35.0 [12.3] | | <0.001 |
| Duration of marriage (Years) | mean | 24.2 [11.7] | 16.3 [11.7] | | <0.001 |
| Type of marriage (1=Arranged) | frequency | 130 (70.7%) | 114 (62.0%) | | 0.078 |
| Illiterate | frequency | 126 (68.5%) | 96 (52.2%) | | 0.001 |
| Income-generating activity | frequency | 133 (72.3%) | 107 (58.2%) | | 0.004 |
| Co-residence (Years) | mean | 14.9 [10.4] | 15.7 [11.0] | | 0.45 |
| Number of children | mean | 5.5 [2.0] | 4.1 [2.2] | | <0.001 |
| Son (1=yes) | frequency | 174 (94.6%) | 163 (88.6%) | | 0.039 |
| Dependency ratio | mean | 0.2 [0.3] | 0.4 [0.3] | | <0.001 |
| Child agricultural labour (1=yes) | frequency | 89 (48.4%) | 56 (30.4%) | | <0.001 |

^a Notes: Standard deviations in brackets. Percentages in parentheses.

4.5.2. Experimental findings

4.5.2.1. Co-wife behaviour in the investment game

Table 9 summarises the average amounts sent and returned by trustors and trustees, respectively. The results revealed some heterogeneity in the trusting behaviour of co-wives within and across ranks (Figure 9).

Table 9: Summary of the trust game

| Variable | Total (mean) | First wife (mean) | Second wife (mean) | Means test | Mann- Whitney test |
|------------------------------------|----------------------|----------------------|-----------------------|---------------------|-----------------------|
| Amount sent | 229.347 [107.162] | 221.739 [106.251] | 236.956 [108.518] | -0.962 (0.336) | -1.105 (0.269) |
| Share of money returned | 47.2 [18.372] | 46.1 [17.4] | 48.3 [19.4] | -0.83 (0.407) | -1.599 (0.109) |
| Payoffs | 586.956 [138.072] | 602.173 [166.395] | 571.739 [100.903] | 1.500** (0.0677) | 1.431 (0.1526) |

Standard deviation in brackets. *p*-values in parentheses.

***Significant at 1%, **Significant at 5%, *Significant at 10%.

All co-wives in the trustor role, but one, transferred positive amounts to their paired counterpart. Comparing investment behaviour across ranks, we found that first wives, on average, transferred lower amounts to their counterparts than junior wives, but the difference was not statistically significant ($p=0.336$) among the two groups. However, second wives had a higher

inclination to send more than half of their endowment. Of subjects investing more than half of the amount received, 61% were second wives.

About 6.5 % of subjects transferred the full amount received and the majority, representing 47% of participants, transferred 200 CFA from their initial 500 CFA endowment. On average, however, subjects did not maximise joint gains, transferring 229 CFA which represents 46% of their initial endowment. These findings are slightly different from standard trust games conducted in the field of natural resource management (Ansink et al., 2017; Bouma et al., 2008). Ansink et al. (2017) reported that trustors sent 31% of their initial endowment. Comparatively, Castilla (2015) found slightly different results with Indian spouses, where trustors invested 57% of the amount received.

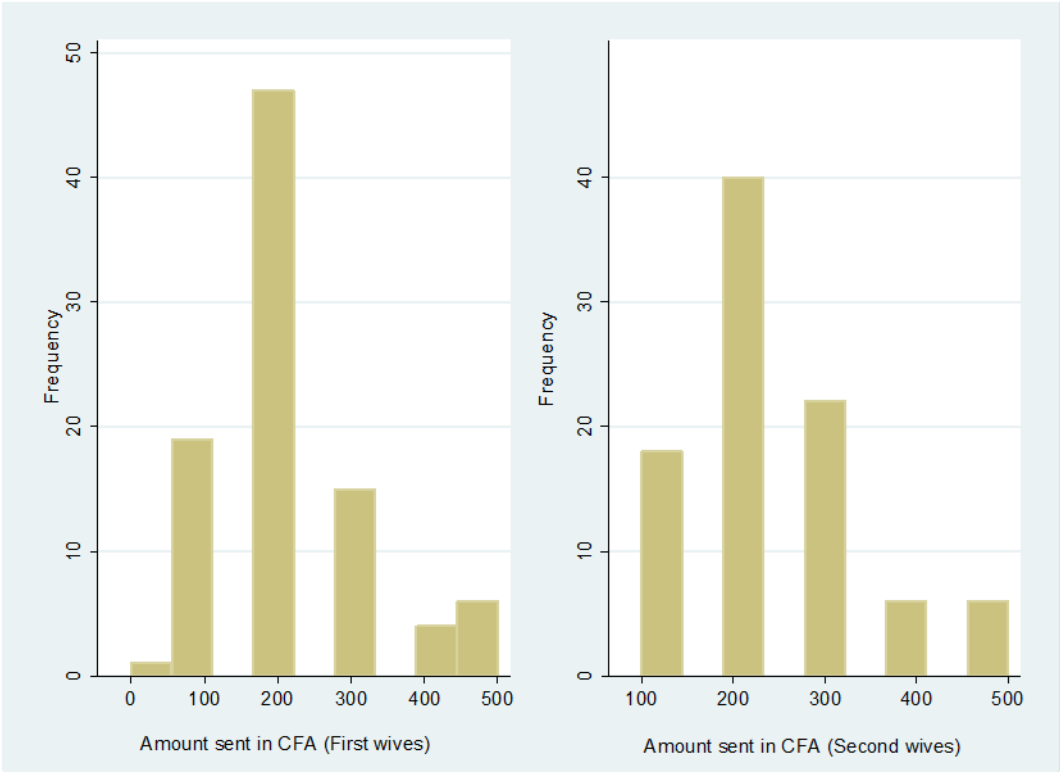


Figure 9: Amount sent in the investment game

The amount returned by trustees also showed some disparity across subjects and between co-wives. To account for the variation in the amount of money transferred we estimated the share of the money returned by trustees (Table 9). We found that on average 47.2 % of the tripled amount was returned to the trustor, slightly lower than the 53.7% share returned in Castilla’s (2015) game setting. This result suggests that senders on average receive a positive return to investment, given that trustors would have break-even if a third of the tripled amount was returned. While only one subject returned the full amount received, about four subjects returned

nothing to their co-wife. Some trustees behaved egoistically, sending back the exact amount of money initially transferred by their counterpart. The means test and non-parametric Mann-Whitney test statistics revealed no significant difference between the proportion returned by first and second wives, though the latter reverted a higher share of the tripled amount received.

4.5.2.2. Trust, reciprocity and altruism

To disentangle trust and reciprocity from altruistic preferences, subjects played the dictator game as a trust-control treatment (Cox, 2004). Results are presented in Table 10.

Table 10: Decomposition test for trust and reciprocity and altruistic preferences

| <i>Parametric and non-parametric tests of trustors' and trustee's data</i> | | | | | |
|----------------------------------------------------------------------------|-----------------------------|----------------------|--------------------------------|-----------------------|------------------------|
| | Amount sent (Trust game) | Amount returned | Amount sent (Dictator game) | Means tests | Mann- Whitney tests |
| Trustor | 229.347 [107.162] | --- | 136.111 [101.256] | 8.4752*** (0.0000) | 8.517*** (0.0000) |
| Trustee | --- | 316.304 [209.228] | 220.329 [106.547] | 5.545*** (0.0000) | 6.156*** (0.0000) |

Standard deviations in brackets. *p*-values in parentheses.

***Significant at 1%, **Significant at 5%, *Significant at 10%.

The one-tail test of the two-sample means shows that the amount sent in the first treatment is greater than the amount transferred in the dictator game. Both the means tests and the Mann-Whitney non-parametric tests support these conclusions ($p=0.000$). Cox (2004) argues that a positive difference between the amount sent in the dictator game and the amount remitted in the investment game is a sign of trust. Likewise, any positive difference between the amount received and the amount remitted in the dictator game would reflect reciprocity. Following a critique from Ashraf et al. (2006) that reciprocity only partially explains the amount returned in the investment game, we run a series of regression analyses (see Annex C) with the share returned as the dependent variable and the amount remitted in the dictator game (measured as altruism) and the amount received as covariates. We would expect a positive relationship between the share returned and the amount received in the presence of reciprocity. The results demonstrated, however, that there is no significant relationship between the amount received in the trust game and the share returned, though the coefficient was positive. Conversely, we noted a positive relationship between the amount sent in the dictator game and the share of money returned ($p=0.063$). The positive and significant intercept in the regression analysis ($p=0.000$), however, confirmed that co-wives derived some intrinsic satisfaction by returning a share of the amount received (Ashraf et al., 2006). The remaining of the chapter will examine the

behaviour of trustors in the investment game and the underlying factors that determine these outcomes.

4.5.3. Determinants of trust between co-wives

Table 11: Determinants of the amount sent in the trust game

| VARIABLES | OLS (1) | OLS (2) | OLS (3) |
|------------------------------|------------------------|-----------------------|-----------------------|
| <i>Log (amount sent)</i> | | | |
| Rank | 0.0572 (0.0757) | 0.0642 (0.0771) | 0.102 (0.0987) |
| Age (Years) | -0.00970* (0.00583) | -0.00955 (0.00615) | -0.00903 (0.00636) |
| Literacy | -0.0387 (0.0730) | -0.0474 (0.0726) | -0.0507 (0.0736) |
| Type of marriage | -0.0935 (0.0790) | -0.118 (0.0801) | -0.121 (0.0795) |
| Duration of marriage (Years) | 0.0111* (0.00619) | 0.0115* (0.00636) | 0.0156** (0.00756) |
| Income-generating activity | 0.0510 (0.0858) | 0.0311 (0.0865) | 0.0272 (0.0861) |
| Number of children | | 0.0353 (0.0217) | 0.0366* (0.0213) |
| Son | | -0.0816 (0.175) | -0.0829 (0.173) |
| Dependency ratio | | 0.200 (0.161) | 0.194 (0.164) |
| Co-residence (Years) | | | -0.00659 (0.00755) |
| Age of co-wife | | | 0.000697 (0.00388) |
| Constant | 5.449*** (0.236) | 5.306*** (0.292) | 5.221*** (0.313) |
| Observations | 183 | 183 | 183 |
| R-squared | 0.032 | 0.051 | 0.056 |

Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

To examine the factors that drive trust between co-wives, we ran a series of least squares regressions (Table 11). The amount sent (a proxy for trust), was converted into its natural log to correct for non-normality of the variable (Skewness/Kurtosis test: $p=0.0001$). Only variables suspected as having a potential effect on the amount sent were included as covariates in the analysis. Multicollinearity tests across all models rejected the presence of multicollinearity (VIF < 10 for all variables). The basic model (OLS1) included a sub-set of socio-demographic variables specific to the sender, including their rank in the marriage order. The coefficients for age and the length of marriage were statistically significant, with an inverse relationship

between the amount remitted and the age of the sender. Conversely, the relationship between the duration of the marital union was positively correlated with the amount sent. An increase in one year in the duration of marriage increases investment by $\exp(0.0111) - 1 = 1.1\%$. The other covariates did not affect the amount sent.

Model 2 expands the basic model, controlling for the demographic composition of the co-wife's sub-unit. The inclusion of these covariates did not significantly alter the stability of the variables included in Model 1. The signs of the coefficients are also preserved. The rank of the co-wife remains insignificant in explaining the amount remitted. The duration of marriage was still significant but age did not influence the amount sent. The rank of the co-wife remains insignificant in explaining the amount remitted. Whether the co-wife has a son, unexpectedly, did not influence the amount remitted.

To determine whether the number of years of co-residence (as a proxy for repeated interactions) influenced the outcomes in the investment game, we ran a third model (OLS3) controlling for the impact of repeated interactions on the inclination to trust. We also controlled for the age of the co-wife to capture the influence of age differences on the propensity to trust. Adding these characteristics did not greatly impact the magnitude and significance of the covariates in the previous models, and none of the additional covariates affected the dependent variable. However, the duration of marriage was now significant at 5% and the number of children were also found to be correlated with the amount sent in the investment game, with a unit increase in the number of children leading to a 3.7% increase in the amount invested.

Summarising the above findings, we conclude that the position of the co-wife in the marriage does not affect trusting behaviour. This result does not support our initial hypothesis that first wives would exhibit less trust towards their counterpart. Indeed, the amount invested reflected no difference between the order in marriage and the amount invested. Likewise, repeated interactions did not seem to explain trusting behaviour between co-wives.

Result 1: *Co-wives' inclination to trust is not linked to their position/rank within the household configuration.*

Result 2: *There is no relationship between trusting behaviour and the frequency of interactions between co-wives.*

4.5.4. Trust and co-wife cooperation

In this section we examine whether trust is correlated with co-wife (self-reported) cooperation in money pooling (CM), and crop production activities (CP). To solve the endogeneity problem arising from the potential relationship between cooperation and the amount invested in the game (the feedback loop in Figure 7), we used the predicted value of the natural log of the amount sent (from an OLS regression with all variables in Model3 (Table 11)), as an instrument for trust in the subsequent Probit models. Due to the biased standard errors resulting from this approach, we performed a bootstrap with 1000 replications (Pattengale et al., 2010) to obtain more accurate estimates. To check for multicollinearity, we ran a series of OLS regressions with each of the independent variables as a regressand and the other independent variables as regressors. After testing for multicollinearity, the variable with the highest variance inflation factor (“Duration of marriage” in the current model, VIF= 8) was excluded from subsequent Probit analyses. The following sections present the results from these Probit analyses.

4.5.4.1. Trust and money pooling between co-wives

Table 12: Determinants of money pooling between co-wives

| Money pooling | Probit, marginal effects | | | |
|----------------------------|--------------------------|----------------------|-----------------------|------------------------|
| | (1) | (2) | (3) | (4) |
| VARIABLES | | | | |
| Trust | 0.443 (0.329) | 0.624* (0.324) | 1.121** (0.522) | 1.091** (0.521) |
| Rank | | -0.143** (0.0709) | -0.162** (0.0824) | -0.170* (0.102) |
| Age (Years) | | | 0.00752* (0.00398) | 0.00663 (0.00571) |
| Literacy | | | 0.138* (0.0777) | 0.137* (0.0779) |
| Type of marriage | | | 0.0383 (0.0958) | 0.0346 (0.101) |
| Income-generating activity | | | -0.0121 (0.0789) | -0.00955 (0.0778) |
| Number of children | | | -0.0424 (0.0289) | -0.0419 (0.0287) |
| Dependency | | | 0.122 (0.182) | 0.133 (0.200) |
| Co-residence (Years) | | | | 0.00145 (0.00687) |
| Age co-wife | | | | -2.51e-05 (0.00440) |
| Observations | 183 | 183 | 183 | 183 |

Bootstrapped standard errors (1000 replications) in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 12 shows the marginal effects of four Probit regressions assessing the relationship between co-wives' trust and income pooling for food purchase. To capture this outcome, participants were asked the following question: "*Do you sometimes pool money with anyone in your household to purchase food?*". If the respondent mentioned their co-wife in their response, the outcome was recorded as cooperation. Several covariates were included as control variables. The variable "Son" was excluded from the models because it perfectly predicted money pooling, that is respondents who had no son, all reported that they did not pool money to purchase food. Child labour was theoretically irrelevant in this model and thus was ignored in the Probit regression.

Results from Probit1, with trust as the only explanatory variable, showed that trust is not statistically significant. Controlling for the rank of the respondent in Probit 2 improved the significance of the model and both variables were found as good predictors of the probability of pooling money. The negative sign of rank suggests that second wives are less likely to report income pooling with their co-wives. Probit 3 incorporates all other demographic characteristics of the respondent. Age was found as a significant variable in this model and both trust and the order in marriage remained significant in explaining cooperation for food purchase. The inclusion of the additional covariates in Probit 4 increased the magnitude and significance of trust ($p > 0.011$). Age was no more significant and we found a positive relationship between literacy and the probability of income pooling. All other covariates were uninfluential in explaining the outcome variable. Based on the above findings we conclude that:

Result 3: *Co-wives are more likely to pool income for the purchase of food for household consumption when there is trust.*

4.5.4.2. Trust and labour pooling in crop activities

Table 13: Determinants of cooperation in crop production activities

| Labour pooling | Probit, marginal effects | | | |
|----------------------------|--------------------------|---------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) | (4) |
| VARIABLES | | | | |
| Trust | 0.501 (0.356) | 0.499 (0.367) | 0.308 (0.570) | 0.380 (0.554) |
| Rank | | 0.00184 (0.0728) | -0.0531 (0.0954) | 0.00892 (0.117) |
| Age (Years) | | | 2.62e-05 (0.00440) | 0.00307 (0.00581) |
| Literacy | | | 0.0941 (0.0856) | 0.0878 (0.0889) |
| Type of marriage | | | -0.0840 (0.102) | -0.0709 (0.0997) |
| Income-generating activity | | | 0.134 (0.0937) | 0.134 (0.0934) |
| Number of children | | | -0.0308 (0.0321) | -0.0294 (0.0313) |
| Son | | | -0.0310 (0.158) | -0.0221 (0.169) |
| Dependency | | | 0.263 (0.200) | 0.200 (0.205) |
| Child-labour | | | -0.0469 (0.0870) | -0.0510 (0.0876) |
| Co-residence (Years) | | | | -0.00111 (0.00736) |
| Age co-wife | | | | -0.00480 (0.00502) |
| Observations | 183 | 183 | 183 | 183 |

Bootstrapped standard errors (1000 replications) in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table 13 reports the marginal effects of four Probit regressions linking trust to cooperation on crop production activities. To measure this outcome co-wives were asked who contributed resources to the production of food crops on their private fields. Their response was recorded as cooperation if they mentioned that either their co-wife or their co-wife's children assisted them in this regard. Four models were specified to assess this relationship and Model 1 included trust as the only explanatory variable. This model, and subsequent ones, however, showed no correlation between trust and cooperation on private plots. In Model 3 we controlled for child labour to examine whether the availability of a pool of labour (as a fall-back option) influenced the propensity of co-wives to cooperate on their private fields. The negative sign of the coefficient suggested an inverse relationship as expected, but this was not statically significant.

After controlling for both the respondent's socio-economic and demographic characteristics, we found no model that predicted a significant relationship between trust and co-wife labour pooling on private plots. All other parameter estimates failed to explain the variation in cooperation in crop related activities.

Result 4: *There is no relationship between trust and co-wife cooperation on private plots.*

4.6. Discussion

In this chapter, we examined the role of trust in shaping co-wife cooperation on selected activities, where potential gains from coordination and economies of scale could be achieved. The findings from the combined experiment and the survey, revealed that co-wives express trust towards their counterparts, but the trust levels were insufficient to obtain socially efficient outcomes. The findings revealed a mixed relationship between trust and co-wife cooperation. While it strongly influenced the likelihood of co-wives pooling income, it did not influence their propensity to pool labour on their private fields. In the next sections, we discuss the implications of these results, and make some policy recommendations.

4.6.1. Co-wife attributes, repeated interactions and trust

Contrary to our expectations (*hypothesis 1*), there was no relationship between the marriage order and the trust expressed in the investment game. Results revealed no statistical difference in the amounts sent by first and second wives, though first wives on average, remitted lower amounts than second wives. This result deviates from Schilke et al.' (2015) who found that power position had an inverse relationship with people's inclination to trust. A plausible explanation for our results could be that co-wives derive power from various sources (Bove et al., 2014; Jankowiak & Wilreker, 2005; Solanke & Kupoluyi, 2018; Tabi et al., 2010), or that co-wives interpersonal relationships are shaped by principles such as inequality aversion. The 47% participants who sent almost half of their initial endowment (200 CFA) seem to support this conclusion.

Furthermore, in contrast to theoretical expectations (Alarcon et al., 2016; Charness et al., 2011; Huang & Murnighan, 2011), we found no relationship between the length of co-residence (as a proxy for repeated interactions) and trust (*Hypothesis 2*). This result was puzzling from the standpoint of mainstream literature that supports that trust between co-wives builds over time and with the frequency of interactions and that familiarity breeds trust (Essien, 2018; Seeley, 2012b). One possible reason for this finding may be that the proxy did not accurately measure repeated interactions. The assumption that co-residence implies repeated interactions may be

farfetched, given that co-wives may live within the same compound without necessarily engaging in constant exchange. Another implicit assumption is that these repeated interactions are void of conflict. Nonetheless, our results support the mixed results obtained in the experimental game literature (Burnham et al., 2000; Cocharde et al., 2004; Engle-warnick & Slonim, 2004). While Burnham et al. (2000) find that trust erodes with repeated interactions, Engle-warnick & Slonim (2004) find that repeated interactions are correlated with more trust. These inconclusive findings may highlight differences in contextual factors, including the norms that prescribe socially-accepted behaviour. Indeed, co-wife relationships may rely less on trust than on the existing norms that define the nature of exchange between them.

4.6.2. When does trust matter for co-wife cooperation?

The relationship between trust and co-wife cooperation is not straightforward (*Hypothesis 3*). The findings of this study suggest that trust may play a significant role depending on the nature of the activity that requires cooperation between co-wives. While a strong correlation was found between trust and income pooling, no such relationship was confirmed for labour pooling for crop activities. These outcomes may be attributed to the level of risk and uncertainty underlying each of these cooperative activities (Balliet & Lange, 2013; Larzelere & Huston, 1980; Yamagishi, 1986a). Where cooperation entails high risks and individuals cannot rely on enforcing mechanisms to ensure compliance to joint agreements, trust emerges as a transaction-cost saving mechanism that fuels cooperation (Alarcon et al., 2016; Wilson, 2000; Yamagishi, 1986a). When pooling money with their counterpart to purchase food, co-wives face the uncertainty of future returns in the form of old age insurance (Bove & Valeggia, 2009; Cunningham et al., 2013), given that there is no guarantee that a co-wife's children will provide support in older age. Besides, pooling income entails an opportunity cost of using money for other expenses and investments (Boltz & Chort, 2019; Tertilt, 2005). In such uncertain environment, trust may form the basis of mutually beneficial exchange by reducing the costs of entering cooperative arrangements. From a practical perspective, policies that aim at improving child nutrition and health in polygynous households could combine interventions with trust-building mechanisms to foster cooperation between co-wives. The business and natural resource literature can provide insights in this respect (Lander et al., 2004; Meier et al., 2016). Improving co-wife communication and sense of common goal for instance can contribute to this objective.

Under certain circumstances, however, trust may not be influential in enhancing cooperation between co-wives. We did not find a significant correlation between the amount sent in the trust game and the likelihood of cooperation in crop production on private plots. This finding chimes with some results in the natural resource literature (Bouma et al., 2008). While Bouma et al.(2008) found a relationship between trust and investments in soil and water conservation, trust played no significant role in operating and maintenance activities in a watershed. Our results suggest that the relationship between trust and co-wife cooperation may be contingent on other factors, including the environmental uncertainty (Krishnan et al., 2006) that characterises crop production. In a study of alliances between companies, Krishnan et al. (2006) posit that trust matters the more under behavioural uncertainty than under environmental uncertainty. This is because the exogenous factors cannot be controlled by the actors in a partnership, increasing the costs of making joint arrangements, and mitigating the importance of trust. In our example of co-wife cooperation on private plots, environmental uncertainty arises from factors such as erratic rainfall patterns, weak input markets and access to credit. The practical implication of such findings is the need to increase polygynous women' access to reliable weather information, and to facilitate their access to credit and insurance markets. While these policies may not directly influence the level of trust between co-wives, it may foster trust through the reduction in the environmental uncertainty of agricultural production. Future research could explore the mediating effect on trust on co-wife cooperation in productive activities under different agro-ecological conditions to test this hypothesis.

4.6.3. Limitations and further studies

Though our research provides a lens for examining the trust-cooperation relationship in a dyadic setting, it overlooks the potential influence of husbands' behaviour on co-wife trust and cooperation. Yet, husbands' treatment and obvious preference for one wife could fuel mistrust and trigger negative incentives for cooperation. Future experiments could explore co-wife investment behaviour following a public good game with their husbands, to elucidate co-wife patterns of investments in the presence of their spouse. Furthermore, a one-shot game may not reflect the dynamic nature of co-wife relationships. Though we included the number of years of co-residence to circumvent the problem, the non-significance of the coefficient may reflect the wrong choice of a proxy for repeated interactions. This calls for repeated experimental game designs to capture the dynamics of co-wife investment behaviour and cooperation in the long run. Likewise, in as much as games can provide a controlled environment for assessing individual behaviour, it still may contain some confounding variables (Zizzo, 2013). In our

research setting, we cannot rule out that fear of retaliation might have triggered other emotions into sending positive amounts of money. The additional dictator game, with private information, was applied as a trust-control tool (Cox, 2004), but an assessment of co-wives risk preferences may help elicit the extent to which these risks influence sending behaviour in the investment game. Finally, by relying on self-reported cooperation, the study might have recorded social norms, rather than actual behaviour. Though questions were asked indirectly to prevent such outcomes, we cannot rule out that some participants replied based on ideal behaviour. This opens new avenues for research into co-wife actual cooperation.

4.7. Conclusion

Understanding the relational mechanisms that foster cooperation in polygynous households is of relevance to both academics and policy, given the implications of these relationships on household welfare and productivity. In this study, we combined an experiment and a field survey in rural Burkina Faso, to uncover the interlinkages between trust and co-wife cooperation on selected activities. Pairs of co-wives played the investment game, allowing us to determine whether they trust one another and to link behaviour in the field-lab to reported cooperation on crop production and income pooling for food purchase. The results revealed that the linkage between trust and cooperation is not straightforward. Rather, it is contingent upon the nature of the joint activity. Co-wives were more likely to pool income to purchase food, under the presence of trust but this relationship could not be established with respect to labour pooling on private plots.

From a theoretical perspective, this study challenges discourses that paint co-wife relationships as based on mutual distrust and relentless conflict. It also provides a rigorous methodological approach to measuring social capital in the household context. Many experiments have been conducted with spouses in field settings, but our study shows that more intangible resources can be framed in a lab setting, providing useful insights to further understanding of household behaviour in complex environments.

5.DISCUSSION AND CONCLUSIONS

This thesis endeavoured to uncover the institutional context within which members of agrarian households cooperate, exchange resources, coordinate efforts and work towards the common goal of achieving food security. Three main objectives were pursued in this study. First, it assessed the adequacy of conventional household models as they apply to sub-Saharan West Africa. Second, the thesis aimed to examine the conditions under which members of agrarian household cooperate, including when they pool resources for crop production. The third and final objective aimed to assess the role of social capital in shaping intrahousehold cooperation. Using case studies from the Fulani and the Mossi in Northern Burkina Faso, it opened the black box of agrarian households, exploring the conditions under which cooperation emerges for mutual benefits. This discussion chapter provides a joint summary of the above objectives. It discusses the implications of the research findings for the household literature and the broader field of collective action. The limitations deriving from the choice of methodologies and tools are also discussed, including potential areas for future research. Finally, the practical implications of the findings are discussed, including potential areas for policy reform.

5.1. Summary of main results

Chapter 2 reviewed the existing literature on agrarian household behaviour, examining some of the postulates advanced by conventional household theories. Drawing on empirical studies in West Africa, the review provided strong evidence against the extrapolation of western household models to more complex environments, including those found in sub-Saharan Africa. Insights from the anthropological and feminist literature revealed that the allocation of resources in agrarian households in West Africa follows specific gender and intergenerational relations of production, which define how resources must be allocated, who must provide specific resources towards household production and whether opportunities to pool resources and work collectively exist. The review and critique of the economic literature highlighted the need to reconsider the representation of agrarian households in sub-Saharan Africa, redefining the units of production and being cautious about the implications of those theories for agricultural development programmes. More importantly, the review called for a framework, that would encompass all the complexities and diversity of agrarian households' behaviour. In practical terms, this would imply the integration of several theories from different disciplines to provide more accurate conceptualisations of agrarian households' behaviour.

Chapter 3 explored the dynamics of intrahousehold resource allocation, focusing on the structural conditions and the institutional arrangements that shape the interaction between members of agricultural households. Using a case study design from the Fulani and the Mossi in Burkina Faso, the study explored the attributes of household members, their relations to one another and their dependence upon the joint food produced. Combining participatory methods with focus groups discussion and innovative instruments, such as net-mapping, the study dived into the complexities of these households' organisation, exchange of resources, areas of potential conflicts and the rules and norms which supported the smooth participation of household members in agricultural activities. The results revealed that norms and rules, which define the roles and responsibilities of each household member, had a strong influence on the patterns of labour mobilisation for food production. Among the Mossi tribe, conjugal contracts entrust the responsibility of food provider to the male household head, while requiring women full labour contribution in the stages of production. The unequal power relationship between men and women, and the lack of agency of women in terms of decision making, influenced the opportunity set available and the options to engage in economic activities, including livestock rearing. Male subjectivities, including the fear to lose authority, led them to restrict their wives' options to the expense of potential household economic growth. Among the Fulani, the gender relations of production, and expectations in the provision of household food followed slightly different rules and norms. Women' labour in the household was rarely recruited for food production and norms forbade their participation in crop-related activities to feed the household. This situation led to an exchange of resources among household members, with male household heads purchasing grains from their wives' private granaries. The norms were so entrenched that the potential feeling of shame for mobilising a wife's labour on collective fields, prevented the emergence of any form of joint labour on collective fields. Male subjectivities among the Fulani, thus took a different form than the Mossi's, Fulani men supporting their wives' engagement in economic activities, including livestock rearing and petty trade.

Agrarian households' organisation for the provision and appropriation of staple food, followed specific rules and arrangements to mitigate opportunistic behaviours. Implicit monitoring systems, for instance, where household members are assigned specific areas to cultivate on a given cropping day, altered the incentive structures, ensuring that labour and time were distributed across household members. Furthermore, these norms and rules were enforced by a sanctions' system, contributing to household members' compliance.

Chapter 4 examined the role of trust, as a component of social capital, on the prospects of cooperation among co-wives in polygynous households. Using a controlled environment, in the form of an experiment, the study explored the propensity of co-wives to trust one another and the correlation between trusting behaviour in the field and actual cooperation in the household, as reported by participants. The trust game (Berg et al., 1995), was used as a research design, with monetary payments to determine whether co-wives trusted one another and what were the factors which determined their propensity to trust. A sample of 184 pairs of co-wives from the Yatenga province in Burkina Faso took part in the experiment. The findings reveal that co-wives trust one another, as the majority of participants transferred positive amounts to their counterparts. First wives, transferred lower amounts on average to their counterparts, but analysis revealed that this difference was not statistically significant. Interestingly, wives with more children were more likely to transfer greater amounts of money to their counterparts. The same conclusion applied for wives who were in the union for a longer period, controlling for other variables. An assessment of the relationship between trust in the experiment and reported cooperation in the household yielded mixed results. On activities relating to income pooling for the purchase of food, trust was strongly related to the likelihood of co-wives putting money together to purchase food. On the other hand, the results revealed no correlation between trust in the game and the probability of co-wives pooling labour on their private plots. The environmental uncertainty underlying the production of food combined with the existing norms on the appropriation of output from individual plots rendered the influence of trust less important in explaining the patterns of labour allocation and resource pooling on private fields. On the other hand, the propensity to trust had a positive correlation with the probability of co-wives pooling income to purchase food for the household. The study concluded that behavioural and environmental uncertainty had different impacts on the likelihood of trust affecting the emergence of cooperation on a range of activities.

5.2. Contributions to the household literature

This thesis contributes to both the household literature and the broad literature on collective action in several meaningful ways. The main contributions can be seen in both the methodological and theoretical aspects of the broad literature.

Chapter 2 furthered the debate on agricultural household behaviour, examining the strengths and weaknesses of existing household theories as they apply to agrarian settings in sub-Saharan Africa. By questioning the adequacy of these theories, with empirical evidence from the literature, this chapter revived the dialogue on adequate conceptualisations of agrarian

households, especially in West Africa. The results emphasise some of the aspects ignored in the conventional representations, and how other disciplines, such as feminist economics and anthropology, can offer novel perspectives into households' studies. Though previous research provided a critique of existing models (Alderman et al., 1995; Strauss et al., 2000), this chapter took the debate further by proposing potential avenues to overcoming the inconsistencies and lack of generalisation crippling the conventional models. The contribution of the chapter lies principally in its attempt to reconcile the household economic theories with other equally important concepts from other disciplines in the social sciences, namely feminist economics and anthropology.

The results did highlight the need to integrate gender relations of production (Carter & Katz, 1997; Guyer, 1981; Siskind, 1978), as well as the politico-jural domain (Becker, 1996; Goody, 1958; Guyer & Peters, 1987; Meillassoux, 1972) in the assessment and evaluation of agrarian households' behaviour. Conventional theories often make abstraction of these factors (Becker, 1965; Bourguignon et al., 1993; Browning & Chiappori, 1998; Lundberg & Pollak, 1993), even though they play a crucial role in the structure and organisation of agricultural activities and resource allocation in agrarian households. Indeed, the results from the review showed that factors such as conjugal and cross-generational contracts, norms of resource transmission as well as the taboos and potential sanctions, the stages of household development, all contribute to determining how resources are mobilised, and thus how they are allocated to different uses and appropriated by different household members. Conventional models, in their current states, are thus inadequate in capturing the complexities of households in farming systems, requiring urgent revisions. A closer look at the gender relations of production and the inclusion of power dynamics, as well as the consideration of the different stages of household development, would have to be considered. These revisions could take into account the gender dynamics within the households, and the integration of households' stages of development into the enquiry.

Taking an institutional approach to the study of agrarian households, Chapter 3 makes both theoretical and methodological contributions to the literature. Few studies considered the household as a corporate institution, with underlying rules and norms, that shape the allocation of resources and the division of labour. The theoretical contribution of this chapter is in highlighting the crucial role of institutional arrangements in shaping the patterns of resource allocation in farming households. The household literature in agrarian settings, had so far, focused on the outcomes of the interactions within the households, whether resources are allocated efficiently (Guirkinger et al., 2015; Kazianga & Wahhaj, 2017; Udry, 1996). Other

scholars were interested in the processes that lead to the observed outcomes. However, few of the studies systematically investigated the reasons underlying the patterns of resource allocation and division of labour observed.

In addition to making a theoretical contribution by exploring these foundations, the study used a rigorous analytical tool, the Institutional Analysis and Development (IAD) framework (Ostrom et al., 1994), to examine the structural conditions that underlie the organisation of agrarian households. The findings reveal that institutional arrangements have the power to articulate cooperation or separation, depending on the set of incentives facing household members in a given context. In agrarian households, labour pooling to produce food follows distinct rules, which embody the rights and obligations of each household member. The institutional approach also allowed an understanding of the sanctioning systems within these households, including the implicit monitoring strategies put in place by farming households, to overcome the provision and appropriation problems crippling production activities.

Taking this institutional stance, enlightened the understanding of the agrarian households, by going beyond the dichotomous representation of agrarian household behaviour, as observed in the literature (Becker, 1965; Chiappori, 1997). In this sense, households are not merely the arena of either cooperation or non-cooperation, but is rather the reflection of an underlying institutional structure which define when cooperation should emerge. Labour pooling on collective fields follows the norms of obligations on the part of household members, while the control of joint output by the male household head among the Mossi, reveals an imbalanced decision-making power. Therefore, outcomes in terms of joint activities are not straightforward, but rather emerge from the rules and norms operating at a particular time, at a particular stage of the household development. Besides, most studies investigating the allocation of resources in agrarian households, rarely give special attention to the nature of the goods produced (Akresh et al., 2016; Guirkingner et al., 2015; Kazianga & Wahhaj, 2017). Cooperation is examined merely on the allocation of inputs without a clear understanding of the crop that is produced, and whether they carry similar meanings with respects to labour and input obligations. The results from the study, show that staple crops, for instance, require full participation of household members in Mossi households and that the high dependence upon the joint food constraints opportunistic behaviour on the part of the group.

Chapter 4 makes a methodological contribution to the household literature. Drawing on the extent experience in natural resource management, the study designed a lab-in-the field

experiment. Despite a surge in the application of these innovative tools in the household context, few studies have explored the less tangible components characterising relations of production in households. Few studies, for instance, have explicitly measured trust between household members, to the exception of Castilla (2015). Going beyond theoretical and observational studies, the chapter aimed to examine a potential link between trust and cooperation in polygynous households. It focused specifically, on the propensity of co-wives to pool income for joint food purchase or to pool labour for food production, and whether the outcome was correlated with the trust they expressed towards one another in the experiment. The literature on co-wives and co-wife interpersonal relationships often advanced that they are in constant completion, and are often suspicious about each other's intentions (Seeley, 2012a). The distrustful environment, as portrayed by scholars, often leads to inefficiencies in resource allocation (Arthi & Fenske, 2018; Barr et al., 2019). This study, however, revealed that co-wives do express trust towards one another. The controlled research environment, based on a rigorous research design, where co-wives could freely appropriate some amount of money for themselves, without sharing any to their counterpart, underscores this hypothesis. The results show that trust is an important aspect of co-wife interpersonal relationships, and can be a driving factor in enhancing cooperation in a number of household activities.

The results also revealed that the influence of trust on cooperation depends on the type of collective action. Income pooling, for instance, was found to be highly correlated with trust, while no such relationship was found between trust and labour pooling on private fields. The inconsistency in the outcomes of trust highlights the need to remain cautious on the conclusions derived from field experiments. While they offer a controlled environment for assessing the behaviour of agents in a given situation, it only portrays a partial picture of the reality in the actual setting. Therefore, researchers, should thus be aware of these potential inconsistencies before jumping into outright conclusions regarding household behaviour.

5.3. Lessons for the collective action literature

Olson's (1965) work on collective action (CA) has sparked a tremendous amount of studies concerned about the governance of common resources. In the natural resource management sector, in particular, scholars have explored the conditions under which stakeholders, who depend on a common pool resource, organise to sustain their joint resource. This study complements the broad collective action literature that has mainly focused on natural resource management. Chapter 3, in particular makes a significant contribution to the literature in the natural resource management by highlighting a few aspects ignored in the CA literature.

Households, in many respects, resemble common pool resource settings. They both comprise a group of heterogeneous people/stakeholders, having a joint interest in providing or maintaining a given resource. A number of aspects, not considered in the collective action literature but that the study highlighted include the nature of the attributes characterising the resource. In the common Pool Resource (CPR) literature, the attributes of the resource often refer to the physical characteristics of the resource. In other words, the size, the flow, the storage and delimitation of the resource are all components that affect the potential emergence of collective action.

In studying the Mossi and Fulani agrarian households, a major aspect, which is the meaning of the resource, in terms of its cultural value, also plays a critical role in the propensity of stakeholders to engage in collective action. Staple food for instance attracts different labour requirements than other crops. The value of staple crops, as a source of food but also as a granary for social events, gives a strong meaning to the staple. This situation also applies to the sanctions to trespassers. Chapter 3, for instance, revealed that sanctions from the gods were one reason women did not enter collective granaries. The fear of punishment, in the form of the husband's death, constrained women behaviour, limiting the agency they had in influencing outcomes in household decision making and control of joint resources. The CA literature, has overlooked this cultural component. Most sanctions addressed in this literature are either in the form of in-kind payment or fees, but little attention has been given to the potential sanctions arising from godly figures, or "supernatural actors", and how it influences the patterns of behaviour and the emergence of cooperation.

Chapter 2 also highlighted an important aspect of group dynamic which can influence the nature of cooperation among actors in a CPR. The CA literature, often emphasises the size of the group as an important determinant of collective action. The results from the literature review of agrarian households revealed that size, per se, does not affect collective action, but the stage of the household development, and the underlying relations of production linking household members at any particular time, do affect the patterns of resource allocation. In other words, the changes operating at the group level, with recruitment, growth and decline, and the change in the obligations between household members, redefine the nature of the exchange and resource allocation that takes place. The collective action literature could thus be enriched, by including in their analysis not only the changes in the state of the resource under study but also the changes operating within the stakeholders who depend or use the common pool resource.

An additional distinction between households, as corporate institutions, and other CPRs settings, lies in the complexity of the dilemmas which operate at the household level. Collective dilemmas in food production, in agrarian households, are intertwined with dilemmas deriving from the provision of other household public or semi-public goods. In addition to producing food, household members produce human capital. Chapter 3 highlighted the complexity of household organisation and resource mobilisation. In studying CPRs, the collective action literature often focused on one resource, the problems encountered in sustaining the resource, and the rules and norms devised to overcome these problems. In agrarian households, however, problems of food provision interact with problems for the reproduction of the household, including the competition for sustaining the livelihoods of one sub-family, as was observed among polygynous households.

5.4. Institutions, resource allocation, and productivity in agricultural households

Policymakers are grappling with efforts to boost agricultural productivity and ensure food security. This concern mainly arises from the lack of understanding of agrarian households, especially concerning the mechanisms underlying resource mobilisation and allocation. Indeed, resource mobilisation constitutes an important component of project success, given that some of the interventions require an increased application of resources to the provision of food. Furthermore, policymakers need to be wary of the equity implications of these projects, to mitigate the trade-offs between productivity and equity.

Resource mobilisation in rural households does not occur in a vacuum. As depicted in the conceptual framework in chapter 1, the structural conditions of agrarian households play a significant role in shaping input allocation patterns, with implications for productivity and food security. Likewise, food distribution and consumption take its meaning in the underlying rules and norms which dictate the appropriation rights of the food produced. In light of this, the thesis aimed to uncover the underlying institutions which shape the allocation of resources in agrarian households. It focused mainly on the constraints and drivers of intrahousehold collective action in rural settings, including the arrangements designed by household members to ensure compliance. The next sections discuss the implications of these findings.

5.4.1. Contracts, sanctions and labour mobilisation

Labour constitutes a major input in agricultural production in sub-Saharan Africa. The capacity of households to recruit labour in the critical stages of production is crucial to the production and productivity of food crops. These stages often follow specific patterns, recruiting labour

based on gender and age. Yet, labour mobilisation does not occur in a vacuum. On the contrary, each stage of production follows specific patterns, embodied in the relations and contracts that bind members of agrarian households.

Conjugal contracts form the basis of labour and input exchange between spouses. They edict the rules of labour allocation and determine the nature and intensity of each individual's participation in the production process. As depicted in the introductory conceptual framework, structural conditions may act as constraints to or drivers of cooperation between household members. The underlying norms which define appropriate behaviour can take on different meanings depending on the socio-cultural context within which household interactions operate. The cases of the Mossi and the Fulani illustrate the differences in outcomes which emanate from variations in the nature of contracts linking husbands and wives with respect to food provision for household members. Women's labour mobilisation among the Mossi, for instance, is included in the marriage contract, where they must allocate their labour to collective fields in exchange for the food they eat and for some small plots of land for their private endeavours. Conversely, the norms among the Fulani define contractual arrangements, preventing women's labour to be mobilised for food production. Therefore, like in many organisations involving a contractual arrangement, breaching the rules underlying the nature of the relationship, in terms of labour allocation, or remuneration in the form of food, carries sanctions, ensuring compliance to the stated rules.

Sanctions to rule-breaching agents are equally important for the relations of production in agricultural households. In some circumstances, sanctions may prevent any form of cooperation, if they imply negative feelings, blame or a potential death as a result of rule-breaching. Women restricted access to joint granaries among the Mossi, and the sole control by male household heads, illustrate some of the prohibitions that prevent cooperation to emerge. The potential punishment from the gods, with the death of a husband as a wife enters the main granary, reinforce the importance accorded to rituals and how it edicts the behaviour and organisation of agrarian households in many cultural settings in sub-Saharan Africa (Sapir, 1970). The lack of joint control of collective resources, thus, emerges from these cultural values and norms, internalised by society's members, and shaping behaviour in the allocation of the agrarian households' resources. Among the Fulani, ostracization plays a significant role in shaping labour arrangements on joint fields. Though women slowly participate in crop production through private endeavours, mobilising their labour on the "husbands' field"

remains a shameful act which prevents the emergence of labour pooling on collective fields. Like the *Kujaama* in the Gambia, where intergenerational eating arrangements are forbidden, potential sanctions influence the patterns of labour allocation (Sapir, 1970). In other words, relations of production and the underlying rules and sanctions that enforce these relations are more important in shaping the patterns of resource allocation than any pursuit of economies of scale.

Agricultural intensification in agrarian households, hence, depend on the relations of production and the contracts binding household members. Opportunities to embrace productivity-enhancing technologies, require a clear negotiation of contract arrangements between spouses. Where additional labour is needed, the outcomes of agricultural intensification will require a renegotiation of contractual arrangements, including the distribution of costs and benefits across household members. Beyond a given threshold of expected behaviour on the part of each member, and with no change in the exchange that should occur in the, some members may withdraw their labour from collective activities, threatening the sustainability of agricultural production along the way. Women' ostracization among the Fulani may constitute a limiting factor for the introduction of labour-intensive technologies, if they are not accompanied by the necessary support or some changes and alterations of these contracts. The lack of adoption of labour-intensive technologies in some contexts, may be a result of the inability of husbands to draw labour from their wives for any collective endeavour. Technologies that require labour intensification of agricultural production will have to understand the underlying norms which distinguish intrahousehold labour and input arrangements.

In other circumstances, such technologies may exacerbate the labour and inequity in labour allocation, given the unbalanced power relationships in the household. Conjugal contracts among the Mossi for instance, are in favour of women labour extraction, making them vulnerable to any increases in the demand for labour. Besides, the political economy underlying the relations of production and the unbalanced power influence the opportunities to intensify agricultural production, as illustrated in the case of the Mossi. Because women, in general, were restricted in their private livestock raising activities, intensifying agriculture through crop and livestock integration is limited. The conflicts of interest emanating from the separation of private activities prevent agricultural production intensification through the application of livestock manure to cropping fields. The nature of conjugal contracts and the rules embodied

in them therefore influences the processes of labour mobilisation with implications for agricultural productivity (Apusigah, 2008; Duncan, 2010).

5.4.2. Transaction costs, institutional arrangements and resource allocation

Transactions costs constitute potential threats to voluntary cooperation. The costs of initiating collective action, and the subsequent costs of enforcing joint agreements, combine to determine the set of incentives faced by actors in a collective dilemma situation. In agricultural households, these costs are exacerbated by the very nature of production, which depends on erratic rainfall patterns and uncertainty in the outcomes of joint efforts in production. With limited inputs, including fertilisers or the use of climate-adapted varieties, reaching collective agreements on the distribution of costs and benefits of cooperation entail important transaction costs which can influence household members' commitment to contracts, with implications for the success of collective action.

The costs of gathering the necessary information to enforce contractual agreements are among the few challenges, which affect the propensity of cooperation in agrarian households. Results from Chapter 3 demonstrate that the lack of reliable information on the distribution of future benefits, and the real intentions of partners in the agreement, restrict household members' willingness to form joint endeavours, where social norms provide no clear recommendations about the most appropriate behaviour. The absence of income pooling for the purchase of some inputs, including fertilisers or other capital goods, stem not only from the obligation of husbands to provide for these inputs but also from the high transaction costs involved in obtaining reliable information to enforce any agreement outside the rules included in the contracts. Nevertheless, household members mitigate information asymmetries through the establishment of implicit monitoring systems, as was observed among the Mossi households. The ability of agrarian household members to devise monitoring tools, such as work distribution on collective fields, partly circumvent the costs of gathering the required information to ensure compliance (Chen, 2013; De Laat, 2014; Masekele & Munro, 2020; Ostrom, 1987). Furthermore, the implicit monitoring system also served as cost-internalisation mechanisms, by transferring the costs of free-riding to potential rule-breaches.

Any cooperative arrangement beyond the rules underlying the conjugal contract entails significant bargaining costs, which have to be overcome. This would imply a renegotiation of the conjugal contract (Schroeder, 1996b), requiring strong mechanisms to operate a smooth and effective implementation of joint endeavours. Where social norms define the roles and

obligations of each party in the conjugal contract, and their expected contribution to the production of joint food, any arrangement beyond the rules stated in the contract, must overcome several barriers for cooperation to emerge (Kazianga & Wahhaj, 2013). Women reluctance to pool money for the purchase of capital inputs for food production, and men's restraints to borrow money from their wives, reinforces the importance of conjugal contracts and how they shape the bargaining costs subsumed in any contractual agreement beyond the socially-sanctioned behaviour. This may explain why men do not transfer more of their fertilisers to women's plots, even though, such an arrangement would be economically rational (Udry, 1996b). Indeed, additional resource transfer may entail new rules of appropriation and may alter the existing separation of private and joint accounts, and the distribution of benefits from each of the accounts, exacerbating the costs of bargaining and renegotiation. In the absence of external agents to enforce the agreements between household members, some institutional mechanisms can serve as transaction-cost-saving mechanisms which ensure compliance to agreed-upon arrangements.

Institutional mechanisms for cooperation on crop and livestock activities play a central role in making sure that contracts and commitments are respected. Among the mechanisms which ensure the smooth on-going of cooperative arrangements is social capital (Ostrom, 1994). It plays a crucial role in shaping the willingness of agents to engage in joint endeavours by reducing the transaction costs involved in enforcing agreements. Chapter 4 for instance, showed that the propensity of co-wives to pool money for food purchase was highly correlated with the level of interpersonal trust between both counterparts. Thus, the existing norms, which tend to encourage a more individualistic tendency in resource allocation, can partly be overcome by some trust norms between co-wives and encourage cooperation for household nutrition. As demonstrated in Chapter 4, trust can also form the basis of cooperation and the emergence of some form of collective endeavours on a range of activities. Nevertheless, the importance of trust in shaping cooperation depends on the nature of the activity involved. Where transaction costs are very high, trust can act as a transaction costs saving mechanism (Balliet & Lange, 2013; Ostrom, 2009), ensuring that actors engage in mutually beneficial arrangements. From the point of view of food and nutritional security, trust can form a binding arrangement where actors such as co-wives in polygynous households, pool resources to make the best of the nutritional development of their children.

5.5. Limitations of the study

Uncovering the complexities of agrarian household behaviour offer a wide range of research methodologies and designs, each with strengths and weaknesses. In this study, in-depth qualitative methods were combined with quantitative approaches to explore the conditions under which household members in agrarian household pool resources. Chapter 3 employed a case study design. This approach has a strong advantage of allowing in-depth research, answering why questions, and allowing a more flexible investigation of a given phenomenon (Yin, 2013). However, this research design prevents any kind of generalisations and mostly applies to the case included in the study. In other words, some conclusions from the third chapter, only apply to households that exhibit similar characteristics, in similar agro-ecological conditions. The specificity of households, and the interactions between several factors, influence their patterns of resource allocation. The difficulty in measuring and observing some of the intangible factors, constitute a limitation to the generalisations that can be made of the basis of these observations. These constraints were partly circumvented by conducting both focus group discussions and several net-maps with different household members, but they still do not make room for extrapolation to other conditions. Future research could include larger samples to the study, or conduct the research in the same communities, with households that portray different food security situations. It may be insightful to distinguish the institutional conditions of households that are food-secure from those that struggle to meet their food needs.

Another limitation of the study is that it ignored the intersectionality between economic conditions and the propensity of household members to cooperate. The fundamental question remains whether norms are still respected under adverse economic and resource conditions. Among the Fulani, for instance, can households that have limited resources afford to free women labour from collective fields? These are questions that need further scrutiny to improve our understanding of agrarian households and the choices they make in their allocation of resources. Finally, it cannot be ruled out that my presence might have altered the behaviour of the household members, who might have exhibited a pattern of behaviour they thought I expected. Though there are few reasons to believe this was the case, such potential bias cannot be ignored.

Chapter 4 employed an innovative methodological tool, in the form of a lab-in-the-field experiment, to investigate the relationship between trust and cooperation between co-wives in agrarian households. Though the approach allows the observation of behaviour in a controlled

environment, it does not guarantee the absence of confounding variables, which may affect observed outcomes. The research was conducted with co-wives from the same households, with implications for anonymity in the experiment design. Several factors, including fear of retaliation, might have influenced the behaviour in the field setting, thus skewing the results. The additional treatment in the second stage of the experiment, controlled for these potential confounding variables, but the behaviour might have also been motivated by other factors, including attitudes to risk. Further research could precede the trust game with risk assessments of participants to evaluate the behaviour of subjects with different risk profiles. This may help disentangle risk from trust and provide more rigorous conclusions on the relationship between trust and cooperation.

Furthermore, to capture cooperation on income and labour pooling, respondents in the post-experiment survey were asked to report their behaviour in the household. This approach assumed that co-wives would genuinely report their actual cooperation with their counterparts, and will not exhibit social norms instead. The formulation of survey questions was designed to circumvent such behaviour but it cannot be ruled out that some participants might have given responses that comply with socially-accepted behaviour. Observational studies could reduce the occurrence of these behaviours but they have to be rigorously designed to repeat the same errors. Alternatively, questions could be asked to other permanent members of the household, to compare responses with those provided by participants.

5.6. Policy recommendations and conclusions

In light of the thesis' rationale, to uncover the workings of agrarian households for informed interventions, a set of recommendations are formulated in this section. Though each potential instrument is presented individually, most interventions will require a combination of actions to ensure successful implementation of projects and programmes.

a) Empowering women and ensuring equity

The results from chapter 3 highlighted how the political economy operating at the household level, is in disfavour of women within the household. Women's limited agency in decision-making processes stems not only from the social norms, which relegate them to the position of subordinates but also from the limited opportunities they have to expand their economic well-being and contribute to the overall household productivity. The case of the Mossi women and their restricted livestock raising opportunities illustrate these constraints, which need to be addressed accordingly. Policymakers should, therefore, aim to improve women access to

productive resources. van den Bold et al., (2015) provide strong evidence of how nutrition-enhancing programs in Burkina Faso have changed attitudes towards women's access to land for home gardens.

Nonetheless, depending on the objective at stake, improving women's access to land, for instance, may not automatically translate into productivity increases if they are not accompanied by actions that promote women recruitment of crucial resources for production, including labour. The findings suggested that conjugal contracts restricted women power and agency over their labour and the labour of other members within the households. These results raise fundamental questions about female-centric approaches to agricultural development, which often fail to consider the intrahousehold dynamics and the labour mobilisation processes in some cultural contexts. These interventions would be best suited if they are complemented with technologies that reduce the demand for labour. These interventions, however, might be most suited in the short run. Given how norms are entrenched and how both male and female household members internalise these norms, long term agricultural development would have to consider both male and female self-perceptions in policy actions.

Women empowerment cannot be understood outside male and female sense of self. The results from Chapter 3 highlighted the importance of male subjectivities and their fear to relinquish some authority by lifting restrictions on women's economic development. This result implies that interventions that aim at empowering women's economic freedom may face reluctance and sabotage by male household heads, who might perceive such approach as a threat to their virility and undermine their role as household heads and breadwinners. The relations of production, subsumed in the conjugal contracts, alter and shape both male and female subjectivities and their expected obligations in the food production process. The separation of responsibilities, thus, determine the willingness of household heads to accept projects that would increase women agency and autonomy. Policymakers should invest in long-term behavioural change, through education and sensitisation for example, or leverage on existing areas of cooperation between spouses (Doss & Quisumbing, 2020). Context matters in such conditions. As the results revealed, conjugal contracts prevent Fulani women from contributing labour for food production on collective fields, but greater cooperation is observed in livestock production. Understanding these dynamics calls for targeted interventions. Labour-intensive technologies for crop production among this community may be counterproductive if men are unable to withdraw labour from their wives and without any renegotiation of contracts in the short run.

The existence of a cash-for-grain market institutions, which encourages exchange among spouses could offer a leverage point for policy interventions.

The results also call for more careful consideration of the equity implications of policy interventions. Agricultural growth or productivity increases should not be achieved at the expense of some members' welfare. Most agricultural technologies require intensive labour participation in production. Yet, conjugal contracts often put the burden of labour contributions on women, thus, exacerbating their vulnerable position by limiting opportunities to pursue private activities. Policymakers should be wary of these internal forces and how they influence the division of labour. More than the need to know who should be targeted in the household, policymakers and development agents should understand how resources are mobilised in the household, and how each of these processes affects individual members within the agrarian household.

b) Improving access to reliable information and improved resources

The findings from the study suggest that the lack of cooperation often stem from the high transaction costs arising from the lack of information on many aspects of agricultural production. The uncertainty inherent to agricultural production, constitute potential threats to the formation of cooperative arrangements by altering the incentives structures of household members. Where social norms call for separation of private activities, improvements on the reliability of the information on weather conditions could create a more conducive environment for cooperation to emerge. Given the relatively high trade-offs involved in entering cooperative arrangements, especially on private plots, reducing the costs of gaining this type of information, can create a more conducive environment for cooperation. Extension services could be exploited for this purpose, providing up to date and accurate information to households with particular consideration for gender and age. Insurance schemes, which would buffer households in the event of crop losses, may also create strong incentives against adverse decision-making.

In livestock development programs, promoting the availability and access to feed resources may mitigate the intrahousehold conflicts over scarce resources and husbands' restrictions on their wives. The results from Chapter 3 suggested that the threat of resource dilution, may partly explain, the reluctance of male household heads to allow their wives to engage in private livestock rearing. Fearing that the only available resources will be diverted to the production and the development of their wives' own enterprises, constraints on animal rearing appeared as

the only solution to avoid such outcomes. Therefore, actions should be geared towards the improvement of access to feed resources, either by making supplements more readily available and affordable. Alternatively, extension services could provide trainings on how to produce and store feed resources to avoid post-harvest losses, and encourage the use of dual purposes varieties. The reduced conflict could thus, reallocate resources within the households, and create room for a renegotiation of conjugal contracts between husbands and wives.

c) Conditional transfers

Providing the right incentives for cooperation to emerge in agrarian households could be one policy action for development agents. Results from the studies have revealed that most decisions and choices made by household members are shaped by a set of incentives, with an evaluation of the costs and benefits of engaging in mutually beneficial cooperation. Policies that incentivise cooperation through conditional resource transfer could offer opportunities for a reconsideration of contractual arrangements for more efficient resource allocation. Provided efficiency is not traded for equity, such transfers, such as fertilisers, could be conditioned by a proportional share to women's private plots. Signed contractual arrangements with commitments to comply to the contract could be encouraged for this purpose. Future transfers would depend on the output in previous years, controlling for environmental factors. As women slowly gain access to these resources, the nature of the production relationships may evolve, translating into a more balanced share of resources for agricultural production.

d) Strengthening trust between household members

Trust has a crucial role to play in shaping cooperation for mutual benefits in agrarian households. Results have revealed a correlation between the propensity of co-wives to pool money for the purchase of food and the trust they exhibited in the experimental setting designed for this purpose. In polygynous households, therefore, ensuring stronger trust between co-wives may be a starting point for mitigating the disparities between the welfare of children of senior and junior wives and can contribute to better nutritional outcomes if co-wives can pool resources. These results call for long term policy actions to strengthen trust between members of agrarian households, to facilitate more efficient resource allocation and further improvements in food and nutritional security. This can be done through trust-building activities. These activities could be borrowed from the fields of education (Farini, 2012; Gausdal, 2012), or management (Long, 2018). The application of role plays, airing of radio programs or elaboration of skits that portray model households, could slowly change attitudes

and behaviours, and create conducive environments for collaborative processes within agrarian households.

5.7. Conclusion

In conclusion, cooperation within farm households emerges from the set of norms and rules which dictate socially-accepted behaviour. These rules form the basis of the relations of production which exist between the different members of the household. The outcomes of such arrangements may sometimes lead to inefficient outcomes, but they are just the expression of the underlying contracts that bind individuals in agrarian households. Beyond the pursuit of economies of scale, farm households' members exhibit patterns of behaviour as expected by the roles they are assigned to, based on their gender and age. The position each member is assigned to determines the action set available to them, whether they can freely mobilise, not only their own labour, but also the labour of other individuals in the household. This internal organisation, in turn, determines the conditions under which cooperation occurs. Policy makers and development agents should be aware of the complexities characterising agrarian households, before implementing projects and programs. The path to food security depends on a better understanding of these complexities and their evolution. Hopefully, this study has contributed to addressing this concern.

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Appendix A. Game instructions with public information

To trustors

Welcome and thank you very much for accepting our invitation. I know that you are very busy and I very much appreciate the time you took to come today. We have also invited your co-wife (who is waiting in the next room) and the objective is to better understand how you make decisions within your households. We are going to do an exercise now. I will give you the instructions shortly and subsequently I will give you time to make your decision.

I came with 500CFA, which I freely give to you as a gift. The money is yours and you can use it as you wish. You can either decide to keep the full amount, or if you want you can send part of the amount to your co-wife (who is sitting in the next room). There are two important things I need to clarify here. First, your co-wife will know that you have received this amount from us. Secondly, if you decide to send some amount of money to your co-wife, we will take that money, multiply it by three and send it to her. This means that she will get a triple of each of the amount you will receive (here is a visual representation of the different outcomes depending on the choices you make). So, for example, if you decide to send 100 CFA, she will get 300CFA. If you send 200, she will get 600, for 300, she will receive 900, for 400 she gets 1200 and if you decide to send everything, she will get 1500CFA. If you keep all the money, she will receive nothing. Is that clear? Please, kindly tell me in your own words what you understood of what I just explained to you.

Ok, now I will give you a few minutes to decide what you want to do with this money. In the corner of the room, you will find an empty basket. Once you get there, you can make your choice and leave the envelop in the basket. Once you are done, kindly come back for an additional exercise.

To trustees

Welcome and thank you very much for accepting our invitation. I know that you are very busy and I very much appreciate the time you took to come today. We have also invited your co-wife (who is sitting in the next room) and the objective is to better understand how you make decisions within your households. We are going to do an exercise now. I will give you the instructions shortly and subsequently I will give you time to make your decision.

In the next room, 500CFA was given to your co-wife. She was to decide how much to transfer to you. We multiplied the amount she sent by three and here is the envelope containing the money. You can decide whether you will keep all the money you received or whether you would want to return part of it to your co-wife. The decision is yours to make. Ok, now I will give you a few minutes to decide what you want to do with this money. In the corner of the room, you will find an empty basket. Once you get there, you can make your choice and leave the envelop in the basket. Once you are done, kindly come back for an additional exercise.

Ok, now I will give you a few minutes to decide what you want to do with this money. In the corner of the room, you will find an empty basket. Once you get there, you can make your



















choice and leave the envelop in the basket. Once you are done, kindly go to the ladies sitting outside with the tables. They have a few questions to ask you. Kindly go to them. We will call you again once you are done. Thank you again for making it here today.

Appendix B. Game instructions with private information

To both trustors and trustees

I have an extra 500CFA to give to you. This time however, the information about this additional amount of money will not be shared with your co-wife. She will not know that we have given you this. You can decide if you want to send of the money to your co-wife. This time, however, the amount will not be tripled as was the case in the first exercise. So, you can go again to the corner of the room and make your decision. Kindly leave the envelop in the basket provided. Once you are done, kindly go to the ladies sitting outside with the tables. They have a few questions to ask you. Kindly go to them. We will call you again once you are done. Thank you again for making it here today.

Appendix C. Visual aids experimental game

| | | | | | |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Truster sends |  |  |  |  |  |
| Trustee receives |   |   |    |    |    |

Appendix D. Survey questionnaire

1. Demographic data

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Commune: | |
| Village: | |
| Name: | |
| ID: | |
| Age: | |
| Religion: | |
| Ethnic group: | |
| Education (code) | |
| Type of marriage (code) | |
| Rank in marriage (code) | |
| Number of years of marriage | |
| Education: 1. Illiterate 2. Koranic 3. Adult literacy 4. Primary 5. Secondary 6. Post-secondary Type de marriage: 1. Arranged 2. Consensual 3. Levirate Rang marriage: 1. First 2. Second | |

1a. Have you ever taken part in an exercise as the one conducted today? 1. Yes 2. No

1b. Have ever heard about this kind of game? 1. Yes 2. No

2. Ressources

2a. How many children do you have? **Response**

| Children | Age | 1. Yes 2. No | Number |
|-------------|------------------------|--------------|--------|
| Girl | ≤5 years | | |
| | Between 5 and 15 years | | |
| | More than 15 | | |
| Boy | ≤5 years | | |
| | Between 5 and 15 years | | |
| | More than 15 years | | |

2b. Do you have any children who are engage in off farm income? **1.** Yes **2.** No

If yes, do you receive any money from them? 1.Yes 2. No

3. Personal assets

3.1. Do you own livestock? 1.Yes 2. No (*If no, go to question 4*)

| Species | Number | Female | Male |
|-----------------|---------------|---------------|-------------|
| Cattle | | | |
| Sheep | | | |
| Goat | | | |
| Bird | | | |
| Other (Specify) | | | |

3.2. For the following activities that relate to management of your personal livestock, please state who participates (cite all the people involved)

| Activities | Person in charge*(many responses allowed) |
|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Watering | |
| Pasture | |
| Feeding | |
| Health | |
| <i>*Person in charge, use:</i> 1. Myself 2. Husband 3. My children 4. My co wife's children 5. My co wife 6. Other (specify) | |

4. Revenues

4a. Do you have any income generating activity?

1. Yes 2. No (Go to question 5...)

If yes, what type of activity is this?

1. Trade 2. Processed food 3. Handicraft 4. Other (specify)

4b. Do you sometimes sell produce from your crop production? 1.Yes 2. No

If yes, who sells it for you? (**Many answers possible**)

1. Myself 2. Husband 3. My children 4. My co wife's children 5. My co wife 6. Other (specify)

4c. Last year how much did you earn from your extra farm activities?

1. Less than 20000 2. Between 20000 et 50000 3. Between 50000 et 100000 4. More than 100000

4d. What was that income used for? (**If necessary, tick several responses**)

1. Health 2. Purchase food 3. Purchase clothes 4. Savings 5. Events 6. Children education
7. Other (specify)

4.d. Can you estimate how much on average you spend on a daily basis?

Answer (in CFA): 1. Less than 500; 2. 500 3. More than 500

5.PERCEPTIONS AND EXPECTATIONS

5.1. Perceptions on own and co wife wealth

Please indicate on a scale of 1 to 10 your perception on the following points (1 being very low and 10 very high)

| Item | Score |
|------------------------------------|--------------|
| Your revenues | |
| Co wife revenues | |
| Own Yield from crop production | |
| Co wife yield from crop production | |

5.2. Perception of husband treatment

5.2.1. Who pays for your children's education? 1. Myself; 2. My husband; 3. My co-wife; 4. Someone else (specify)

5.2.2. Who pays for your co-wife's children's education? 1. Myself; 2. My husband; 3. My co-wife; 4. Someone else (specify)

5.2.3. Who pays for your medication when you are sick? 1. Myself; 2. My husband; 3. My co-wife; 4. Someone else (specify)

5.2.4. Who pays for your co-wife's medication when she is sick? 1. Myself; 2. My husband; 3. My co-wife; 4. Someone else (specify)

5.3. Joint activities and mutual support (Insurance)

5.3.1. Who takes care of your children when they are sick?

1. Myself; 2. My husband; 3. My co-wife; 4. Someone else (specify)

5.3.2. Who takes care of your co-wife's children when they are sick? 1. Myself; 2. My husband; 3. My co-wife; 4. Someone else (specify)

5.3.3. When you travel and one of your children falls sick who takes care of him/her?

1. My husband; 2. My co-wife; 3. Someone else (specify)

5.3.4. When you are absent or indisposed, and cannot work your private field is there anyone who does it for you? If yes, who? 1. My husband; 2. My children; 3. My co-wife's children; 4. My co-wife; Someone else (specify)

5.3.5. Do your co-wife and you share any joint plot? 1. Yes 2. No. If no, why?

5.3.6. Do you sometimes jointly put money with your co-wife to purchase food? 1. Yes 2. No. If no, why?

5.3.7. Who do you ask help from when you are financially stranded?

1. Husband 2. Co wife 3. Relative (specify) 4. Other (specify)

5.3.8. Who do you leave your children with when you travel? (**Many responses possible**)

1. Husband 2. Co wife 3. Grands-parents 4. Other (Specify)

5.3.9. Do you sometimes ask someone to keep money for you?

1. Yes 2. No

5.3.10. Who fetches the water you use for cooking and household chores?

1. Myself; 2. My children; 3. My co-wife's children 4. My co-wife 5. Other (specify)

5.3.11. Apart from you, who else in the household uses this water?

1. Myself; 2. My children; 3. My co-wife's children 4. My co-wife 5. My husband 6. Everyone
7. Other (specify)

5.3.12. Who collects the wood you use for cooking?

1. Myself; 2. My children; 3. My co-wife's children 4. My co-wife 5. Other (specify)

5.3.13. Apart from you, who else in the household uses this wood?

1. Myself; 2. My children; 3. My co-wife's children 4. My co-wife 5. Everyone 6. Other (specify)

5.3.14. Do you sometimes make uniforms during special events? If yes, with whom?

1. My co-wife 2. All the other women within the household 3. Other (specify)

5.3.15. How do you organise cooking? 1. Joint cooking 2. Each wife has her own kitchen (pot)

5.3.16. Do you have a separate cooking pot for children? 1. Yes 2. No

5.3.17. When it is your turn to cook, who whins the millet? 1. Myself 2. My co-wife 3. My children 4. My co-wife children 5. Other (specify)

6. Associations and information sharing

6.1. Do you belong to any farmers' association?

1. Have you ever participated in any training on agricultural or financial issues?

1. Yes 2. No

6.2. Did you share this information with anyone?

1. Yes 2. No, If yes, with whom? (**Multiple answers possible**)

1. Husband 2. Co wife 3. Children 4. Other (specify)

6.3. Who do you confide in when you have an important decision to make?

1. My husband 2. My co-wife 3. Other (specify)

6.4. When your husband is absent who takes decisions on his behalf?

1. Myself 2. My co-wife; 3. Other (specify)

6.4.1. If you are the one making the decisions, who do you consult?

1. No one 2. My co-wife 3. Other (specify)

6.4.2. If it is your co-wife making decisions, who does she consult?

1. No one 2. Myself 3. Other (specify)