



**Hohenheim Working papers on Social and Institutional Change in
Agricultural Development**



Working Paper 019-2023

“We are just like ploughing bulls”:
Power relations and cooperation in
polygynous households in Burkina Faso

Viviane Yameogo, Thomas Daum, Erdmute Alber, Regina Birner

Universität Hohenheim

December 2023

Hohenheim Working Papers on Social and Institutional
Change in Agricultural Development (019-2023)

“We are just like ploughing bulls”:

Power relations and cooperation in polygynous households in Burkina Faso

Authors details

Viviane Yameogo (University of Hohenheim)
Thomas Daum (University of Hohenheim)
Erdmute Alber (University of Bayreuth)
Regina Birner (University of Hohenheim)

Corresponding author

Viviane Yameogo (guesbeogo.yameogo@uni-hohenheim.de)

Hohenheim Working Papers on Social and Institutional Change in Agricultural Development are intended to make research results available to the public in order to encourage scientific discussion and critical comments for revisions. They have not been formally peer-reviewed. The authors are solely responsible for the contents and any opinions stated are those of the author(s). Copyright remains with the authors.

Suggested citation: Yameogo, V., Daum, T., Alber, E., Birner, R. (2023). “We are just like ploughing bulls”: Power relations and cooperation in polygynous households in Burkina Faso. Hohenheim Working Papers on Social and Institutional Change in Agricultural Development 019-2023. University of Hohenheim.

Title Picture Credit: <https://www.pexels.com>

Download this working paper from our homepage: <https://490c.uni-hohenheim.de/en/75736>

Abstract

A substantial share of agricultural households in Africa is polygynous. The extent of cooperation among the members of polygynous agricultural households has implications for agricultural productivity and food security, as it influences intra-household allocation, use and distribution of resources. The economic literature on polygynous households has, so far, focused on the outcomes of intrahousehold cooperation, while less emphasis has been placed on understanding the conditions which influence the extent of cooperation and resource-pooling in polygynous households. We address this knowledge gap by studying cooperation within polygynous households as a collective action problem, applying an adapted version of the Institutional Analysis and Development (IAD) framework to the intra-household level. The framework is applied in case studies of polygynous households in rural Burkina Faso, covering two ethnic groups: the Fulani and the Mossi. Data were collected through ethnographic methods, including participant observation, supplemented by focus group discussions, Net-Maps (a participatory mapping method), and in-depth interviews. The findings of this research reveal that the propensity for household members to cooperate is linked to provision and distribution dilemmas, and to the institutional context within which they interact. The results also indicate that co-wives are more likely to cooperate under favorable institutional conditions which reduce bargaining costs and promote fairness. And finally, the findings suggest that cooperation may not always be voluntary. Policies should be wary of the contextual variations to tailor interventions for agricultural productivity and equity.

Key words:

Polygyny; Cooperation; Institutional arrangements; household; Fulani, Mossi; Burkina Faso

Acknowledgments

The authors are grateful for the financial support from the German Academic Exchange Service (DAAD).

1. Introduction

Cooperation in agricultural households has an impact on productivity outcomes (Doss & Quisumbing, 2020). Differential resource allocation across plots managed by different household members translates into productivity gaps, and reduced household welfare (Oseni et al., 2015; Slavchevska, 2015). Evidence suggests that lack of cooperation, characterized by fertilizer and labor intensity disparities between plots managed by men and women in sub-Saharan Africa, largely explains the lower yield performance observed in female-managed plots (Nchanji et al., 2021; Singbo et al., 2021; Udry, 1996). While numerous studies examine the efficiency outcomes of resource allocation in farm households (Barr et al., 2019; Kazianga & Wahhaj, 2017), there remains limited knowledge as to why members of households cooperate, and what the conditions are under which they cooperate (Doss & Meinzen-Dick, 2015). This neglect is particularly remarkable in the case of polygynous households¹, though more than a quarter of women in sub-Saharan Africa are in a polygynous unions (Arthi & Fenske, 2018).

Knowledge of the conditions that foster or deter cooperation in polygynous households is essential to broaden our understanding of the mechanisms leading to inefficiencies and productivity gaps within this household structure. The multifaceted household configuration may exacerbate the complexity of marital relationships in polygynous households. (Hidrobo et al., 2021). Collective action problems may arise, as co-wives behave opportunistically (Rossi, 2018; Tertilt, 2005), and compete for their mutual husband's resources and attention (Bryceson, 2019; Ickowitz & Mohanty, 2015). Furthermore, the differential bargaining positions between co-wives and coordination problems (Heath et al., 2020) may lead to inefficient economic behavior (Boltz & Chort, 2016), poor maternal and child welfare outcomes, and food insecurity (Owoo, 2018; Ragasa et al., 2019). Wives may also fail to cooperate with their husbands (Akresh et al., 2012), with implications for agricultural productivity. Nevertheless, interpersonal relationships in polygynous households are not only conflictual and can be amicable and supportive (Essien, 2018; Seeley, 2012). There have been several accounts of co-wives supporting one another on child care and household duties (Essien, 2018; Seeley, 2012). This made Bove & Vallengia (2009) conclude that polygyny is an example of a cooperative-conflict context where cooperation alternates with conflict. In light of the heterogenous outcomes of intrahousehold cooperation in polygynous settings some fundamental questions arise: Why

¹ Polygyny is the practice where a man is simultaneously married to several wives (Baker, 2023; Renner & Krieger, 2023).

do polygamous households' members cooperate in some circumstances, and not in others?
What drives cooperation in polygamous rural households?

This paper builds on advances in the field of new institutional economics to examine the relationship between differential power relations and resource allocation in polygynous households. It has the following objectives: 1) To identify linkages between socially-sanctioned rules and norms and resource mobilization in agrarian households; 2) to analyze the interplay between gender, rank power relations, and collective action in polygynous households; and 3) to contribute to the development of theories that explain cooperation in polygynous households.

A qualitative study of Fulani and Mossi households in Burkina Faso was conducted to this effect. According to OECD (2018), approximately two-thirds of rural women in Burkina Faso are in a polygynous union. While extensive ethnographic studies have been conducted on Fulani and Mossi, they primarily describe resource allocation patterns within these groups, and pay limited attention to the driving forces underlying these patterns. Besides, most studies date back to the 1990s (Fiske, 1990, 1992) and the early 2000s (K. Hampshire, 2006; Querre, 2003), calling for a contemporary perspective on the two groups.

The remaining sections of the paper are organized as follows. The next section describes the social structure and organization of the two ethnic groups involved in this study, followed by an overview of cooperation in polygynous households. Section three introduces the study's conceptual framework, while section four presents the methodology applied. Section five presents the major findings, followed by a discussion of the results in section six. The final section concludes.

2. Literature review

2.1. Social organization and food production among the Fulani

Fulani are one of the largest ethnic societies in West Africa (Setrana et al., 2022), practicing patrilineal descent (Langlois, 1983; Napogbong et al., 2021), and endogamy (Bird et al., 2023; Laurent, 2013), with cousin marriages accounting for about 64% of unions (Hampshire & Smith, 2007; Laurent, 2013). The major unit of Fulani's domestic organization is the *Wuro* or *Baade* (depending on the Fulani branch considered) and reflects the basic unit of co-residence, production and consumption (Hampshire, 2006). The head of the domestic unit (*Babaade*) is responsible for the social organization of its members, including his wife or wives and children, but also, in some cases, his brothers, uncles and father (Hampshire, 2006). With regards to the economy, Fulani are primarily pastoralists whose social organization revolve around livestock keeping (Timpong-Jones et al., 2023).

With limited to no property rights on land (Bukari & Kuusaana, 2018; Gonin et al., 2019), Fulani engaged in economic exchange (Bukari & Kuusaana, 2018; Soeters et al., 2017) with neighboring ethnic groups. In Northern Burkina Faso, for instance, Fulani engaged in contractual arrangements with the indigenous Mossi farmers, manuring the latter's farms in exchange for grains (Bainville, 2017; Lingane, 2001). However, following the droughts in the 1970s and 1980s, and the decimation of livestock by the trypanosomiasis disease, crop production was gradually integrated into their livelihood strategies to mitigate the uncertainty surrounding livestock husbandry (Ayantunde et al., 2015; Majekodunmi et al., 2017).

The integration of agriculture into livestock husbandry was accompanied by greater male participation into crop production (Colliot & Nguyen, 1993), as Fulani women did not farm (Delgado, 1979; Ellsasser, 1993; Majekodunmi et al., 2017). All tasks from land preparation, through weeding and harvesting are performed by male household members. Nevertheless, women participate in the household economy by engaging in milking and controlling the revenues from milk sale (Delgado, 1979; Querre, 2003).

2.2. Social organization and food production among the Mossi

Mossi are a patrilineal society with a patrilineal descent system, organized in lineages (*Buudu*). Each lineage comprises several sub-units, believed to share a common ancestor (Attané, 2008). The lineage head (*Buudkasma*) (Lidón de Miguel et al., 2022) sees to the transmission of social values and resources among members of the kin group and engages in marriage arrangements with neighboring communities (Attané, 2008), such as wife exchanges and transfers, , making exogamy the main feature of Mossi unions (Calvès, 2016; Laurent, 2013).

The *Zaka* constitutes the basic domestic unit of Mossi (Rohatynskyj, 1988; Van der Schaaf, 2008). It is made up of a head with his dependents, including his wife/wives and children and, in many cases, adult brothers and/ or elder parents, who all form a productive unit, and work collectively under the head's leadership (West, 2010).

Agriculture forms the basis of Mossi's economic activity, who hold land property rights (Banon & Jehling, 2020; Zahonogo & Séogo, 2019). More than its direct value in sustaining farmers' livelihoods, agriculture embodies the cultural and social meanings which contribute to the reproduction of Mossi (Kohler, 1971). The social organization of production and consumption articulates around individual and collective fields, shaping the relations of production (Kevane & Gray, 1999; Kevane & Wydick, 2001). Collective fields (*Puugkinga*) are dedicated to staple food production and is cultivated by all adult members (Harounan

Kazianga & Wahhaj, 2013; Tallet, 1989). Individual plots² (*Beolgo*) are managed and controlled by plot “owners” and are often used to produce cash and vegetable crops (Cavicchioli, 2018; Haider et al., 2018).

2.3. Cooperation and agricultural productivity in polygynous households

The relationship between agricultural productivity and household structure has not been clearly established. While studies comparing polygynous and monogamous households demonstrate that neither household structure allocates resources efficiently (Hidrobo et al., 2021; Munro et al., 2019). there is contradictory evidence as to whether one household structure exhibits greater intrahousehold cooperation (Akresh et al., 2012, 2016; Barr et al., 2019; Damon & Mccarthy, 2019). Using plot level data in rural Burkina Faso, Akresh et al. (2012) found that polygynous households were more productive than their monogamous counterparts. They observed lower gender productivity gaps in the former, and attributed the difference to greater cooperation between co-wives in polygynous households. The results show that that co-wives were more likely to cooperate with one another than they would with their husbands, highlighting a strong division of labor where men worked with men and women with women. In a subsequent study, Damon & Mccarthy (2019) reached similar conclusions, observing that collective plots managed by husbands and wives in polygynous households received greater application of fertilizers than plots managed by spouses in monogamous households. Using data from Tanzania, Damon & Mccarthy (2019) found that 50% more labor is applied on jointly managed fields in polygynous households than plots managed by each of the spouses.

Other studies contradict these results and, instead, support that monogamous households are more efficient than their polygamous counterparts (Barr et al., 2019). In a public good game in rural Burkina Faso, Barr et al., (2019) observed that husbands and wives in polygynous households contributed less to the collective pool in a monetary game, and achieved lower collective gains than their monogamous counterparts. Also, co-wives contributed lower amounts when they played with one another than when they each played with their husband, a result that contradicts Akresh et al.'s (2012) conclusions. Interestingly, a similar game with polygynous pastoralists in Senegal showed that second wives were more likely to send larger amounts to their husband, and yet, received lower amounts from their husbands compared to first wives (Hidrobo et al., 2021). Though Munro et al. (2019)

² In the 1970s, the individual plots constituted less than 20% of the total area cultivated (Ancey, 1974). More recent data are not available.

found no efficiency premium for either monogamous or polygynous households, they observed that under husbands' control, the share of income redistributed to first wives was greater than the share of second wives, putting the latter at a disadvantage in polygynous households.

If polygynous and monogamous households are equally inefficient in allocating resources, one should wonder what are the conditions under which household members cooperate. Thus far, studies have compared monogamous and polygynous households, as if they were homogenous groups, with characteristics cutting across different environmental and socio-ecological contexts. The lack of consensus in the literature seems to indicate that these relationships are more complex than they appear. Despite substantial research on polygynous households, some critical questions as to why spouses fail to coordinate their efforts and achieve efficient outcomes remain largely unanswered. In an attempt to explain these outcomes, Akresh et al. (2016) argued that the fear of retaliation deters opportunistic behavior between co-wives. On the other hand, Barr et al. (2019) proposed that reciprocity underlies co-wives' interpersonal relationships.

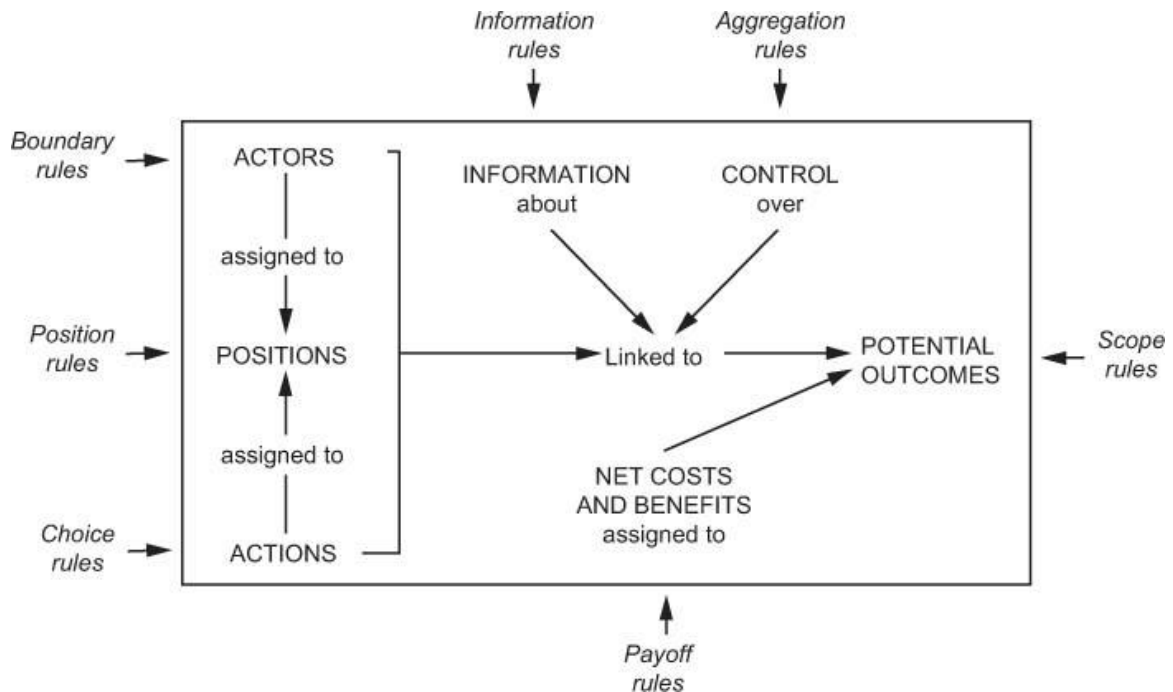
Others have argued that differential power relations may create coordination, communication, and free-riding problems, which constrain cooperation (Castilla, 2019; Rossi, 2018). However, experimental evidence has suggested that communication and information does not necessarily lead to efficient outcomes, indicating that their role is context-specific (Kebede et al., 2014). Hence, there are reasons to believe that intra-household behavior and the socially sanctioned rules and norms that influence this behavior may be at odds with agricultural efficiency goals in polygynous households (Dauphin, 2013). As sites of power struggles and contestations (Wood & Iii, 2021), polygynous households may face cooperation problems, where structural inequality and the rules-of-the-game deters or foster collective action.

3. Conceptual framework

To examine the conditions which influence cooperation in polygynous households, the paper proposes a conceptual tool adapted from Ostrom's (2005) "Institutional Analysis and Development" (IAD) framework (see Figure 1). Widely applied in the natural resource literature, the tool has proved useful in identifying the structural conditions and the rules governing the emergence of collective action in the management of common pool resources (CPR) in multi-actor settings (Doss & Meinzen-Dick, 2015; Nigussie et al., 2018). As multi-member institutions, polygynous households lend themselves to similar analyses. Considering the focus of the paper, we pay particular attention to the structure of the rules

to identify the extent to which these rules shape the decisions of individuals in polygynous households.

Figure 1. Linkages between rules and action situation



Source: Ostrom (2005: p189)

3.1. Action situation and collective action in CPRs

The action situation is one of the two building blocks comprising the IAD framework, and is represented by the framed area in Figure 1. The action situation comprises the set of actors, whose actions are constrained by the positions they hold and by other factors, notably how much information they have, the extent to which they can influence outcomes, and the costs and benefits they incur based on the choices they make (Kiser & Ostrom, 1982; McGinnis, 2011). An action situation occurs whenever a group of individuals have to make decisions that jointly affect potential outcomes (Ostrom, 2005). Accordingly, all decisions related to agriculture and the utilization of agricultural produce that household members make occur in the action arena.

In their pursuit of sustainable livelihoods, agricultural households face cooperation dilemmas, characteristic of all common pool resources (CPR). These dilemmas stem from the problems inherent to the provision and appropriation of CPRs. According to Ostrom (1990), provision problems arise from the difficulty in aligning individual interests with collective pursuits, as private and social marginal benefits diverge. This situation may translate into opportunistic behavior, causing an undersupply of collective goods. Similarly,

agricultural households may find it challenging to mobilize the necessary resources for food production, as individuals fail to allocate the required labor and/or capital towards the provision of joint food.

Coordination problems arise when actors within an action situation try to organize their activities towards a common goal (Ahn et al., 2004). In agricultural settings, the joint purchases of inputs, including fertilizers, or the organization of reproductive activities, may constitute a major coordination dilemma. While household members may have aligned interests in the joint food, the costs of obtaining reliable information about the actual preferences and expected behaviors of other participants may hinder cooperation. Evidence from the experimental literature, for instance, suggest that prospects for cooperation reduces with limited information, as opposed to when information is readily available (Castilla, 2019; Hoel, 2015).

Division problems, on the other hand, occur when household members are unable to reach agreements on the share of costs and benefits across participants to the joint endeavor. While stakeholders may have a joint interest in the collective good, the perceived fairness in the distribution of the costs and benefits may alter the incentive structures (Ostrom, 1990; Poteete & Ostrom, 2004). Also, the costs of entering such arrangements and agreeing on the appropriation of the collective good may be prohibitive, preventing any form of cooperation. Thus, the ability of households' members to overcome these dilemmas is determinant in shaping cooperation. In this regard, the rules and norms governing labor organization in households play a central role.

3.2. Rules-in-use and collective action in agricultural households

The second building block of the IAD framework comprises the rules that affect the action situation. According to Ostrom (2011), "Rules are shared understandings among those involved that refer to enforced prescriptions about what actions (or states of the world) are required, prohibited, or permitted" (p:17). Ostrom (2005) identifies seven types of rules, which govern and order behavior in collective action situations. Table 1 summarizes these rules and specifies their relevance for polygynous agrarian households. Though each rule is discussed separately, it is worth stressing that none of these rules works in isolation, but rather combines with the other sets of rules to affect the prospects for cooperation.

Table 1. Rules configuration and relevance for polygynous households

Type of rule	Action	Regulated component of the action situation	Relevance for polygynous households
Position	Be	Positions	Define positions of husband and wives
Choice	Do	Actions	Determine the rights and obligations in resource mobilization and allocation Determine forbidden actions in food production and consumption
Boundary	Enter or leave	Participants	Define the conditions for entry within and exit from the household Define the claims on household resources and property upon exit
Information	Send or receive	Information	Set the procedure for information sharing and information channels Define public and private information
Payoff	Pay or receive	Costs/Benefits	Set the sanctions and rewards for cooperation and non-cooperation
Aggregation	Jointly affect	Control	Determine who makes decisions Determine whether decisions are made jointly or by an individual
Scope	Occur	Outcomes	Define the production possibilities

Source: Authors, based on Ostrom (2005)

3.1.1. Position rules

Position rules determine the place occupied by a person, or group of persons in an action situation (Ostrom, 2005). Each position-holder has distinct roles and responsibilities, and the actions that each position allows reflects the authority associated with the position (Bastakoti & Shivakoti, 2012; McGinnis, 2011; Ostrom, 2005). In agrarian settings, holders of specific positions have rights and responsibilities regarding access to productive resources, decision-making power, agency and control over labor and capital resources. In polygynous households, in particular, members' gender and rank dictate their positions within the household configuration (Hidrobo et al., 2020; Jankowiak & Wilreker, 2005; Madhavan, 2002). These position rules may influence cooperation by affecting the extent to which household members can act according to their preferences and interests.

3.1.2. Choice rules

These rules are also referred to as authority rules, and affect the “actions” in the action situation. Choice rules determine the actions which are allowed, permitted, or forbidden (Ostrom, 2005) for each position. In agricultural households, these rules determine who gets what, who has access to what resources and who has the decision-making power to influence the outcomes in an action situation. In other words, choice rules shape the power relationships between individuals. In agrarian households, these power relationships are often unequal (Anderson et al., 2017), reflected in the different capacities to mobilize land and capital, and extract labor from other household’s members (Kofi Teye et al., 2021; Lebaron et al., 2020). Similarly, the distributional arrangements of joint production, or the shares of family income controlled by households’ members are contingent upon the choice rules affecting the bargaining positions of individuals in the households (Matz, 2016).

3.1.3. Boundary rules

The conditions which govern the entry and exit from a corporate entity are referred to as boundary rules (Ostrom, 2005). These rules specify the process required to occupy a given position, and determine the conditions under which a person holding a certain position may leave. In many collective action situations, adherence to a given organization or association requires a contribution or the holding of a specific attribute, either in the form of a fee payment or the ownership of a resource (Bastakoti & Shivakoti, 2012; Villamayor-Tomas et al., 2019). In the household context, boundary rules are inherently linked to marriage and divorce. Indeed, these rules will determine who is and becomes a household member, what contributions new members must make, and the conditions that must be satisfied prior to exiting the household (Lambrecht, 2016; Murphy & Priebe, 2011). In agrarian households, individuals have different rights to and control over resources. Hence, boundary rules, such as claims over property and children, upon divorce (Lambrecht, 2016) may influence the household members’ exit opportunities, and their incentive to cooperate.

3.1.4. Information rules

The nature and level of information held by participants in an action situation plays a critical role in shaping cooperation. Information rules define the level of information available to actors in an action situation and set the guidelines for information sharing, including the channels through which information must be transmitted (Ostrom, 2005). Furthermore, these rules determine the obligations and permissions to communicate on specific issues. To develop mutually beneficial voluntary arrangements in food production, household members would have to agree on the set of information to be shared and create a conducive environment that reduces the transaction costs of obtaining information (Janssen & Ostrom, 2006; Kenkel, 2019). Hence, the ability of household members to gather the necessary

information to make cooperative arrangements shapes their incentive structures and their motivation to cooperate.

3.1.5. Payoff rules

Payoff rules determine the costs and benefits assigned to specific actions and outcomes (Ostrom, 2005). They constitute the incentives and deterrents for specific actions and thus influence cooperation (Ostrom, 2011). In agricultural households, payoff rules determine whether individuals occupying given positions are entitled to the proceeds of joint activities, and fix the sanctions for non-cooperative behaviors. Thus, the distributional outcomes of cooperation are inherently linked to the incentive structures of household members, who make decisions based on the benefits and costs they incur in collective action. The perceived fairness in the distributional outcomes of cooperation shapes the incentive structures of individuals, determining whether voluntary cooperation would emerge (Lecoutere & Jassogne, 2017).

3.1.6. Aggregation rules

Aggregation rules govern the decision-making processes in an action situation. These rules define who can participate in decision-making on permitted actions. They further define whether a single person makes all decisions or when a consensus is required in the definition of rules and the ensuing changes (Ostrom, 2005). In multi-member households, aggregation rules would identify the people in given positions who make authoritative decisions on behalf of household's members, and determines the conditions under which other households' members must be consulted. The empirical literature provides rich evidence of how such rules operate. For example, husbands may have the final say regarding some activities pertaining to production or consumption (Acosta et al., 2020; Doss & Quisumbing, 2020; Kafle, Michelson, & Winter-Nelson, 2018; Meijer et al., 2015).

3.2.7. Scope rules

Rules that constrain the production possibility frontiers of participants in an action situation, are referred to as scope rules. These rules affect the outcomes which must or must not be affected by actors within an action situation (Ostrom, 2005). The rules are not directly related to the actions that participants can take, but rather fix a level of performance that should not be exceeded or a minimum that should be achieved. The natural resource management literature identifies a number of scope rules, including the levels or quantities of the resource that can be withdrawn by actors in an irrigation system, or restrict the uses of water (Bastakoti & Shivakoti, 2012; Villamayor-Tomas et al., 2019b). In agricultural households, scope rules would affect the nature of activities that household members can undertake or the quantities of a specific resource or input –land or fertilizers- members in

specified positions can withdraw. These rules will also determine how much of a given food can be appropriated by household members.

4. Methodology

4.1. Study context

The study was conducted in two distinct villages in Northern Burkina Faso³. Both villages are located within the Sahel region of the country characterized by arid climate conditions with an average annual rainfall ranging between 400 mm and 600 mm (Kiema et al., 2012; Thiombiano & Kampmann, 2010). From a socio-demographic perspective, the Sahel comprises heterogeneous socio-ethnic groups (Ganaba et al., 2005), translating into a diversity of socio-economic and agricultural structures and organizations. According to the research design, the selected villages are dominated by Fulani and Mossi, respectively. Farming systems in both villages are characterized by crop and livestock production, though to varying degrees.

4.2. Case selection

A qualitative case study design was selected for this study. To uncover the mechanisms underlying cooperation in polygynous households, case households were purposefully selected, following three main criteria: 1) the household had to be engaged in both crop and livestock enterprises, 2) the structure of the household had to be polygynous with at most two wives, and 3) the household had to agree to take part in the study (informed consent was obtained from all adult household members). In each village, the initial sample consisted of a list of 200 households obtained from an ILRI-led baseline survey conducted in 2017. The survey collected data on household demographic characteristics, land and livestock assets, and production patterns. For this study, the list of households with exactly two wives was retrieved from the baseline data. Because a detailed investigation precluded a large sample size, four households were identified in each of the study areas for in-depth study. Then one household was randomly selected for further investigation, using participant observation.

³ The names of the villages are concealed, to preserve the participants' anonymity.

4.3. Data collection tools

Data were collected between August 2018 and January 2019. Four different methods (Table 2) were applied to increase data reliability and to triangulate information (Yin, 2013). Discussions were held in either Fulfulde or Moore (the major languages spoken in the Fulani and Mossi villages, respectively) with the assistance of an interpreter, and data were recorded through field notes, photos, videos, and audio recordings.

Table 2. Summary of data collection instruments

Instrument	Sites		Comments
	Fulani	Mossi	
Participant observation	1	1	A single household was selected for in-depth observation
Net-mapping	4	4	Net-Maps were conducted in each of the four selected households; All adult members of households participated
In-depth interviews	5	7	Interviews were conducted with village elders, the husband and each of the co-wife in the households where participant observation was conducted
Focus group discussions	4	4	One focus group in each site consisting of “first wives only” randomly selected from the study village; one focus group consisting of “second wives only”; one focus group consisting of “husbands only”; and one focus group consisting of both first and second wives. Group size varied between 8 and 10 participants
Informal conversations	~17	~20	

Source: Authors

4.3.1. Participant observation

This approach allowed the researcher assess, from an insider’s perspective (Li, 2008; Spradley, 1980), the interactions between household members and resource allocation for various activities. For two weeks, the first author resided in each of the selected households, and was actively involved in productive and reproductive activities, observing and documenting the physical settings and intrahousehold arrangements, including the distribution of joint proceeds among household members. These interactions facilitated trust-building between the researcher and the household members, giving room for free and open discussions. While the researcher’s presence might have altered the behavior of the participants (Li, 2008), the potential bias was mitigated due to the nature of the enquiry.

While households' members were informed about the research's purpose, expectations about what should be the right organization were not implied. Besides, the labor requirements for activities in the cropping season have likely prevented any change in behavior to suit any expectations.

4.3.2. Net-Map exercises

To uncover the nature of the relationships among household members with respect to food production and consumption, the Net-Map tool developed by Schiffer (2008) was applied. The tool allowed participants to visualize their interactions, identify the underlying power relationships and give meaning to their daily actions. It also helped household members to identify areas where potential gains from cooperation could be captured and the type of institutional arrangements that would be required to achieve further collaboration.

Four Net-Maps were constructed in each village, including a Net-Map from each participant observation (hereafter referred to as "PO") household. The Net-Map activity consisted in a series of exercises to complete, which gathered all adult members within each household. Forming a circle around a large sheet of paper, participants received a set of tools, including colored pencils, wooden disks, and colored post-its. To start the discussion, participants were asked to write the names of all household's members on a sticky note and paste it on the sheet of paper. Once all members were identified and visualized on the sheet of paper, participants defined the relationship between each of the members (husband-wife, father-daughter, etc.). Then participants identified common and private plots (with colored stickers). Using colored pens, participants sketched the flow of resources, land, labor and fertilizers, across the diverse plots. Lines were drawn linking each household member's contributions in terms of resources, to the various plots and fields. While visualizing the map and the interrelations, participants were asked to give the underlying reasons for the current input arrangements, and to specify the household's members who made decisions on resource' allocation, and why.

The next stage consisted of building "influence towers" with the wooden flat disks, reflecting the relative status of households' members. The higher the tower, the greater the power of the individual within the household. Following this exercise, discussions revolved around the challenges which arose from organizing food production, and how household members resolved these challenges.

4.3.3. Focus group discussions

To recoup information and uncover shared understandings of production relations, focus group discussions (FGDs) were conducted. Participants were randomly selected from a list of polygynous households (with exactly two wives) in the village. Each FGD comprised eight

to ten participants. Four types of groups were formed, consisting respectively of first wives only, second wives only, polygynous men only, and a mixed group comprising both first and second wives. To prevent any intimidation, participants in the latter group were selected such that no pair of the same household was simultaneously present. 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 individuals' behavior.

4.3.4. In-depth individual interviews

To obtain detailed information on the patterns of interaction encountered during participant observation and the Net-Map exercises, in-depth interviews were conducted with the husband and the two wives in the households where participant observation was carried out. In addition, two and four elders were selected in the Fulani and Mossi villages, respectively. They were the village chief from each of the villages, one participant in the male Fulani FGD, two from the Mossi male FGDs and one from the Mossi female FGD. The interviews were semi-structured and revolved around the following broad themes: 1) the organization of household labor; 2) the nature of exchanges among household members; 3) the allocation of collective and individual output and income; and 4) the underlying rules guiding this distribution.

4.4. Privacy assurance

To preserve the privacy of participants and ensure the confidentiality of the statements made during the research, sensitive topics were discussed in private. Discussions in the FGDs made no reference to the conversations previously had in PO households, and participants were told to feel free not to give an answer to a question they found uncomfortable. The data collected and saved did not mention the actual names of participants, and were stored in a safe folder.

4.5. Data analysis and interpretation

Data were retrieved from field notes and audio-recorded interviews, and the relevant topics were transcribed. Then a content analysis was carried out. Three broad categories of cooperation were identified: Labor pooling on joint fields, money pooling for purchase of fertilizers, and co-wife cooperation on individual plots. This distinction was important to capture the mechanisms driving cooperation at the household level, and the micro-processes which influenced co-wife bilateral cooperation. The analytical framework (see Figure 1) guided the analysis, which involved the following steps: 1) examining the rules underlying food provision and appropriation in polygynous households; 2) assessing the incentives of household members to cooperate based on their respective position and rank

within the household; and 3) examining the mechanisms that facilitate cooperation in polygynous households.

5. Findings

5.1. Households' attributes and composition

Table 3 describes the structures of the case households selected for PO in the two villages. Both households exhibited extended family characteristics: the household was composed of the head and his dependents (wives and children), as well as his brothers. The size of the household was 17 and 22 members for the Fulani and the Mossi PO households, respectively, with a high dependency ratio in both settings. For the other three households, the average number of people was 16 and 19 for the Fulani and the Mossi, respectively. The total cultivated areas were 3.75 ha for both the Fulani and the Mossi. In both villages, private plots co-existed with collective fields, scattered across different parts of the village. In-depth discussions revealed that none of the PO households output met their annual food requirements. For the Fulani, harvests covered seven months of the food requirements, as the husband expressed: "*We do have to purchase food a few months before entering the cropping season.*" The same pattern was observed for the Mossi household, where only nine months of food needs were covered by own production. In both PO settings, the difference was covered by purchasing grains on markets.

Table 3. Household composition of the participant observation households in selected research areas

Household demographics	Ethnic group	
	Fulani	Mossi
Age of household head	56	52
Age of first wife	37	45
Age of second wife	36	39
Household size	17	22
Male	3	10
Female	14	12
Labor force*	7	10
Dependents**	10	12

*Labor force refers to number of members of the households who actively participate in food production.

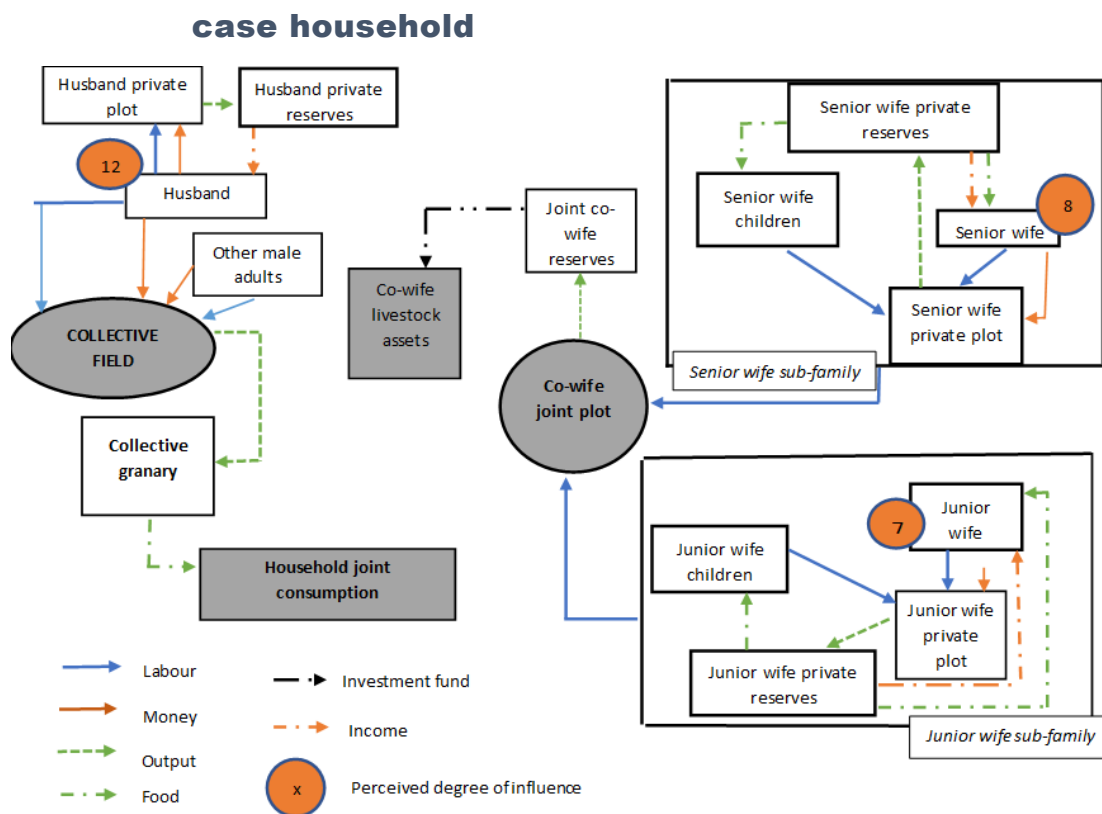
** Dependents are children under the age of 15.

Source: Authors

5.2. Resource allocation for food provision in agrarian households

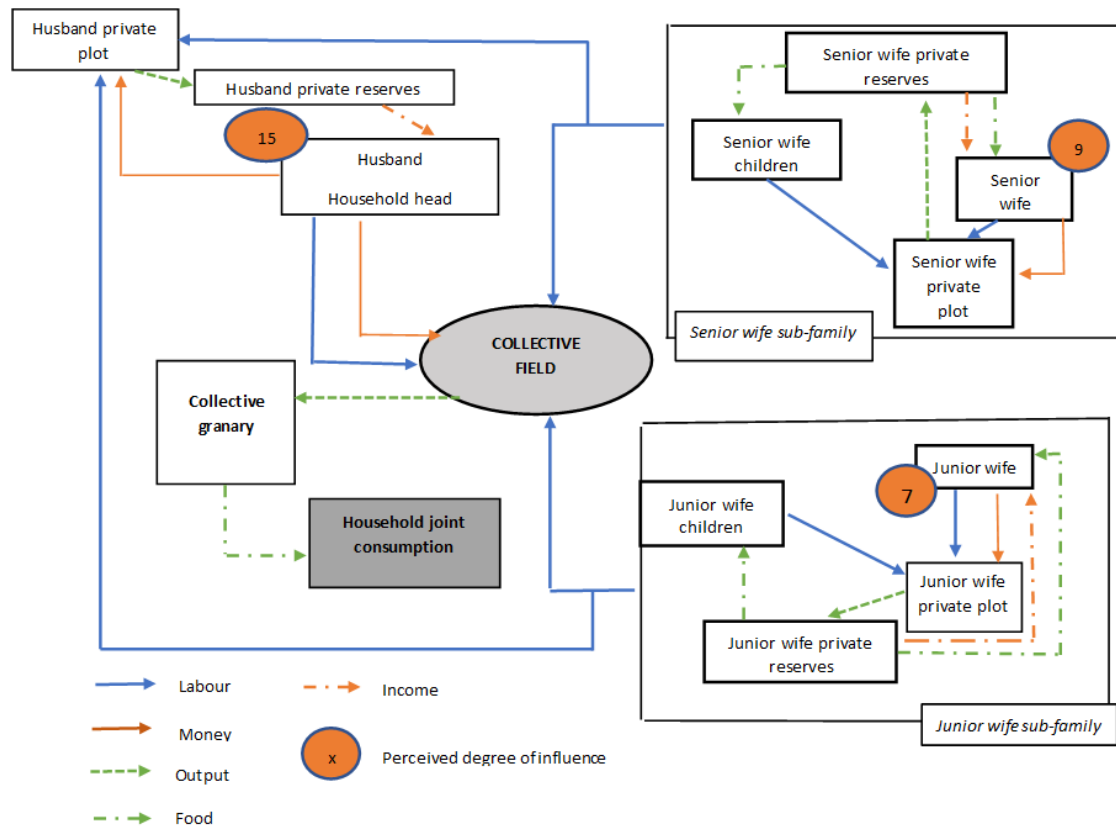
Figure 2 and Figure 3 are the maps drawn from the Net-Map activities with the Fulani and the Mossi households, respectively.

Figure 2. Intrahousehold resource allocation in selected Fulani



Source: Authors

Figure 3. Intra-household resource allocation in selected Mossi case household



Source: Authors

The labor input configuration observed during the Net-Map exercise and subsequent FGDs revealed that all labor on common fields was provided solely by the male household members, in the Fulani setting. The head and other males also covered all costs relating to the purchase of tools and other inputs. Women cultivated their individual plots, where they grew vegetable crops, cowpea, and groundnut. In the PO household, co-wives shared a joint plot where they cultivated cowpea.

In the Mossi household, the collective field was cultivated by all adult members as the PO demonstrated. These arrangements were confirmed in FGDs and in-depth interviews. Co-wives worked their private plots independently, and produced vegetable leaves and cash crops, including groundnut, cowpea and sesame. Discussions with each of the wives revealed that they mostly relied on their own children's labor to cultivate their private fields. All capital investments, including the purchase of fertilizers and tools, for the common food production, were covered by the husband.

5.3. Husbands-wives' relations and cooperation in polygynous households

Unions in both Fulani and Mossi settings were arranged. The Fulani husband in the PO household had married two of his cousins. Conversely, the Mossi had married outside his kin and both wives came from distinct villages. The FGDs and the interviews with the village elders indicated that once married, women became an integral member of the household. As a Mossi woman stressed in the FGD, *"You now belong to your husband's family once the bride price has been accepted"*.

An assessment of the "influence towers" from the Net-Map activity and the discussions that followed highlighted husbands' higher status. Both men and female FGDs showed that first wives held a higher position within the polygynous household, relative to second wives, and that both had a subordinate position relative to their mutual husband. The PO within Mossi clearly indicated this relationship, as co-wives referred to one another as "elder sister" and "junior sister"⁴. However, as confirmed by the elders during the in-depth interviews, husbands were to treat their wives equally as recommended by Islam. When the marriage failed, divorce was allowed for both the Fulani and the Mossi. For Fulani women who initiated a divorce, a full reimbursement of bride price was required, as the FGDs confirmed. The same rule applied to Mossi wives, and for the ones who remarry, the new spouse may be asked to refund the bride payments to the former husband.

In both cultural settings, husbands were identified as breadwinners, a position which gave them full responsibility for ensuring the subsistence of their household members. Nevertheless, when asked about who contributed what resources to food production, and why, significant disparities were noted across the responses of Fulani and Mossi.

5.3.1. Factors influencing cooperation within the Fulani polygynous households

Existing social norms prevented Fulani husbands from recruiting their wives' labor on collective fields. Participants in the husbands' FGDs recognized that women's participation in collective fields would be beneficial in terms of increased output, but many were reluctant to breach the established rules. They insisted that it would be shameful to ask one's wife to farm on common plots, and that no amount of grain could justify this behavior, which explains their unwillingness to pool labor to produce subsistence food. A male participant in the FGD expressed this resentment by stating that his daughter will never marry a person who requires her participation in the household's food production. FDG participants even indicated that this was a sufficient motive for divorce. Women expressed similar attitudes.

⁴ Discussions revealed that this was meant to foster a sororal relationship between them.

To them, working on collective fields implied facing the judgement of their peers. In the female FDGs, participants stressed that wives who transgressed the rule were ostracized by their fellow women, and their husbands were considered “incapable and irresponsible” by the community. The following quote illustrates this general perception and shows the influence it had on cooperation between Fulani husbands and wives. *“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).

Subsequent discussions revealed that Fulani had developed an exchange system, permitting husbands to purchase their wives’ crops. This cash-for-grain market ensured women’s contribution to the collective good, especially during lean periods when collective granaries went dry. The in-depth interviews revealed that wives were required to propose their reserves for sale to their husbands before considering selling them in the market. When asked why they accepted such arrangements, women in the FDGs indicated that this was a way to support the family in hard times and that they trusted that their husband would repay the money. As a woman during an FGD stressed *“Men are very proud here, he will not feel good until he gives you the money, he owes you”*.

Fertilizers played a minimal role in food production in Fulani settings, as respondents indicated. The widespread use of manure on cropping fields limited the burden on fertilizer application. Nevertheless, the PO and Net-Map showed that only men purchased fertilizers and any other tools needed for agricultural production. To explain why women did not contribute money for the purchase of this input, the male and female FDGs revealed that the same restrictions that prevented Fulani women from getting involved in their husbands’ and common fields applied to the purchase of fertilizer. The FDGs indicated that everything involved in the production of subsistence food was the husbands’ responsibility. Interestingly, men insisted that they would not use their wives’ money to purchase fertilizers, as this was shameful, even when she would give it voluntarily. As one of the participants in the male FGD stated, he would borrow money from his wives, in exceptional cases, but would reimburse them in the shortest time possible to preserve his dignity.

5.3.2. Factors influencing cooperation within the Mossi polygynous households

Husbands and wives in the Mossi context had a different experience with regards to labor arrangements and decision-making. FDGs and in-depth interviews with community elders revealed that Mossi husbands were allowed to draw on their wives’ labor as they pleased, and that this had always been the case for ages. It came out clearly from these discussions that husbands were not only allowed to recruit their wives’ labor, they also controlled the allocation of this labor to several tasks and uses. During the observation phase of this study,

it was noted that the husband regularly gave instructions to his wives, specifying the cropping fields to harvest, and indicating the time wives could proceed to work on their private plots. It came out clearly from the PO that the husband had the final word in terms of the decisions regarding cropping activities on collective fields, and these arrangements were confirmed in subsequent male and female FGDs. A woman expressed the limited decision-making she had regarding her own labor by stating: *"We are just like ploughing bulls for our husbands, they have got free labor to exploit"*.

In trying to elucidate why Mossi wives cooperated on common fields, responses revealed that they had no alternative to the subsistence food, and the small size of their private plots limited their capacity to produce the required amounts of food for their own consumption. An in-depth interview with a Mossi wife also indicated that she was restricted on the amount of staple grain that she could produce. While she was free to manage her plot as she pleased, she insisted that her choices were restricted, given her responsibility in procuring all ingredients for the sauces that accompany the staple. She also added that even if she had the money to purchase these vegetables, she would rather cultivate crops such as cowpea, sesame and groundnut, because otherwise, her husband would demand that she feed herself and her children: *"If I start cultivating millet or sorghum as my main crop, my husband may require that I feed myself and my children, that is why I mainly produce groundnuts and beans"* (Mossi senior wife). Field observations later confirmed that wives primarily produced vegetables and cash crops, including groundnut, sesame and cowpea. In the absence of alternatives to the joint subsistence food, wives had no choice but to cooperate and avail themselves to the collective activities.

To understand what the consequences would be for those who refused to cooperate, wives in the FGDs pointed out that there were sanctions which were applied gradually. First, the rule breaker is admonished for her behavior, then if she continues to "misbehave", the warnings give way to moral and sometimes physical violence. Women in the FGDs indicated that some husbands could stop eating the meals they prepared, or *"stop coming to my room"*, to indicate sexual deprivation. Once the situation got out of control, then the wife would be *"sent back to her parents"*, in other words she will be divorced. Women in the FGDs stressed that divorce was rarely the option, and that they cooperated because they did not want to lose custody over their children, who belonged to their fathers' lineage. Besides, a woman in one FGD indicated: *"If you leave your husband and you go back to your village, unless you remarry, you will not have the opportunity to have a private plot to cultivate, so no possibility to earn some small money. People may see you as a nuisance"*. These attitudes were confirmed during the in-depth interviews. Divorce also meant that the wife's family had to reimburse any bride price that was paid. To avoid putting such pressure on their families, many women *"calmed their hearts"* and obeyed their husbands.

The FGDs and in-depth interviews did not yield any evidence of women having to contribute money for the purchase of fertilizers among the Mossi. Similar to the Fulani case, husbands were in charge of providing the tools and the required fertilizers to apply on collective fields. Men acknowledged during the FGD that they could not impose monetary contributions on their wives. Some even expressed their reluctance to borrow money from their wives, fearing that they might spread the information in the event they failed to repay the money. Likewise, women indicated their unwillingness to cooperate on the purchase of fertilizer because they doubted that they would be reimbursed and also feared the money would be employed for other ends. *“There have been cases of husbands borrowing money from their wives to marry another wife, and they were never reimbursed”* (Mossi senior wife, FGD, Tougou).

5.3.3. Food distribution and cooperation in agricultural households

Of equal importance to the emergence of cooperation in the Mossi setting was the distributional outcome of cooperation. The PO and the Net-map clearly showed that all household members were entitled to the jointly produced food, stored in the common granary. The FGDs confirmed these arrangements, and joint cooking and eating arrangements ensured that all members of the household received the same food. During the in-depth interview with one of the wives, she stated that the assurance of having access to the common food was a strong incentive for her to participate in the common staple food production. As she indicated: *“There is no difference between the amount of food I get and the amount my co-wife gets. We only have one kitchen and eat from the same pot everyday”*. This assertion was confirmed in the observation phase, and it was obvious that the husband gave similar amounts to the wife who was on cooking duty for the day’s meal, and he insisted that: *“I can never allow my wives to cook separately. That would break-up my home”*. Further discussions with the elders of the village confirmed that these arrangements were required and common across the village.

Men in the FGD stated that the common granary was the family’s, and that they were required to inform their households’ members whenever collective grains were used for purposes other than household consumption. For example, the husband in the PO household stressed that staple food was not meant for sale but under certain circumstances, including health issues, this rule could be broken, provided prior notice is given to everyone else. Women in the FGDs indicated that this was a strong enough incentive to cooperate because the collective granary was a source of insurance for anyone facing hard times. During the discussions with the elders, they were asked to explain the consequences for “deviant husbands”. They emphasized that husbands who breached this

arrangement are summoned to the lineage head and reprimanded, with the risk of being excluded from all village activities if their behavior remained unchanged. The wives in the FGDs and PO household supported this remark and added that they would stop working on joint fields if their husbands squandered the common food. As the senior wife stated: *“If our husband misuses the collective grains, we will stop wasting out energy providing it”*.

5.4. Co-wife cooperation in polygynous households

Interestingly, the lack of cooperation between Fulani husbands and wives did not induce similar patterns of resource allocation between co-wives. The Net-Maps in the Fulani and the PO indicated different patterns of labor allocation and resource mobilization. In the PO household, the two co-wives jointly cultivated a cowpea plot. On the question why they pool labor on the cowpea plot, the co-wives indicated that they were incentivized to cooperate because they both had a common interest in raising livestock. One co-wife during the in-depth interview stressed that she could not purchase small ruminants on her own, so she and her co-wife jointly decided to save money from the joint cowpea plot, to purchase some animals. They insisted that without this arrangement, it would take them more time to achieve their objective. The Net-Maps and the FGDs confirmed that this was a common practice among Fulani households. When asked whether first wives are entitled to more resources or output from the joint output because they held a higher status, wives in the FGDs indicated that they shared output equally. Second wives recognized that they gave first wives their due respect, but the latter could not freely extract labor from her counterpart, and had no power to make decisions on their behalf or impose a direction of affairs on them. This was confirmed by women in the first wives' FGD.

On the management of joint resources and output, Fulani co-wives insisted that they shared the proceeds equally, and that in the event that livestock has to be sold, the money obtained is split equally between the two wives. The FGDs confirmed these arrangements and the conversations which accompanied the Net-Map exercise also confirmed this pattern. On the risks that they could face if their co-wife failed to respect these agreements, co-wives indicated that they trusted one another and that it was in the interest of both to follow the agreed upon rules. As a senior co-wife stated in the in-depth interview: *“I know my co-wife will cooperate because it is in her interest to do so. We trust each other and so far, we never had such a problem.”*

Interestingly, neither PO nor FGDs in the Mossi context provided any evidence that co-wives cooperated on individual private plots. There was also no evidence that they had a joint plot which they cultivated together, as was observed among the Fulani. On rare occasions, as a senior wife indicated, children of a co-wife could be asked to work a co-wife's field if she is prevented from doing so, such as for health reasons. *“I help her because,*

if one day I am sick, she will also take my turns.” The FGDs did confirm that joint activities by co-wives on private fields were uncommon. Further, Mossi co-wives did not cooperate on private plots because they wanted to avoid conflict. As a junior wife indicated: *“Sometimes, it is better to do some activities by yourself, to keep the harmony in the house”*. This separation of tasks was presumably also motivated by the rules regarding the distribution of outcomes of cooperation in Mossi households.

When asked about their lack of cooperation on individual private plots, Mossi wives enumerated a number of reasons. One participant in the co-wives’ joint FGD, maintained that the uncertainty of the future benefits of cooperation led them to maximize their resources for their own children. This view was supported by the rest of the group. Another participant added that in a polygynous household, each co-wife is required to clothe her children, and to provide breakfast for her children. This was also observed during the PO phase. Co-wives also stressed that given the methods used for distributing the benefits, second wives were often at a disadvantage. The FGDs with second wives indicated that senior wives (*Pogkiema*) are in charge of the distribution of household supplies. Besides, an unequal number of children raised additional problems regarding the rules for distribution, hence the reluctance to cooperate. As one participant put it: *“You can only be sure that your children will cater for you in old age”* (Mossi senior wife, In-depth interview).

6. Discussion

This study sought to examine why, and under which conditions, cooperation emerges in farming polygynous households. Using the cases of two distinct ethnic groups in Burkina Faso, Fulani and Mossi, the findings indicate that cooperation is shaped by the institutional context, which dictates the behavior of household members in food provision. The results also suggest that institutions that reduce the costs of coordinating joint activities have greater influence on the prospects of cooperation. And finally, the findings indicate that cooperation (or the lack thereof) needs not be voluntary, and that some members may be coerced to cooperate even when the costs incurred are higher than the perceived benefits. In the next sections, we elaborate on these findings and discuss their implications for future research and policy design.

6.1. Rules’ structure and cooperation in polygynous households

Whether household members cooperate in food provision depends on the action situations they face. Based on the results presented in section 5, the rules governing cooperation in polygynous households can be grouped into the seven categories identified by Ostrom (2005), as displayed in Table 4. The results also highlighted that all rules do not operate

conjointly for different activities. To account for these differences, Table 5 lists the combination of rules driving cooperation on selected joint activities.

Table 4. Synthesis table of case analysis

Type of rule	Fulani	Mossi
Position	Husband as household head and breadwinner. First wife holds superior status. Religion emphasizes equal treatment of co-wives.	Husband as household head and breadwinner. First wife holds superior status. Religion emphasizes equal treatment of co-wives.
Boundary	Entry through marriage. Leaving through divorce. Full reimbursement of bride price if wife initiates divorce. Claim on private property (usually livestock). Woman has no claim on children upon divorce	Entry through marriage. Leaving through divorce. Full reimbursement of bride price if wife initiates divorce. Woman has no claim on land and children upon divorce.
Choice/ Authority	Husbands must provide food for their household members. Husband must provide fertilizers. Wives must be freed from labor participation on common fields and husbands' fields. Wives allowed to cultivate private plots. Husband must cater for the sauce that accompany the staple grain, and for breakfast	Husband must provide labor and fertilizers. Wives must provide labor on common fields and husband's fields. Wives allowed to cultivate private plots. Wives must provide sauce to accompany staple grain. Wives must provide breakfast for their children.
Information	No strict channel of information. Women must inform husband before the sale of their grains.	Husband must give information to first wife and first wife must transmit to second wife. Information for the sale of subsistence crops must be made public.

Pay-off	Unconditional access to collective granary. Community shunning. Shame and reputation. Income from private plot controlled by plot manager.	Access to collective granary. Insurance. Income from private plot controlled by plot manager. Exclusion from joint granary for rule-breakers. Community shunning. Sexual deprivation. Violence (verbal and physical).
Scope	No scope rule in husband wife relations. Co-wives use the income from joint fields to purchase small ruminants.	Restrictions on quantities of staple grains that women can cultivate. Wives must provide ingredients for sauce.

Source: Authors

6.1.1. Collective dilemmas and cooperation in polygynous households

The results help reconcile the theories of polygynous household behavior, which contend that household members either cooperate or do not cooperate (Akresh et al., 2012; Hidrobo et al., 2020). In effect, the findings indicate that the differences in the rules and norms shaping self-organization can help explain this dichotomy. The cases of the Fulani and the Mossi were revealing in this regard. Despite strong similarities in the position and boundary rules across both ethnic settings, significant variations in the choice and payoff rules shaped different action situations for the Fulani and the Mossi, leading to diverging labor arrangements in food provision.

Table 5. Action situation and rules driving cooperation in polygynous households

Intrahousehold cooperation	Driving rules	
	Fulani	Mossi
Labor pooling on collective fields	Position, choice, payoff	Position, boundary, choice, information, aggregation, scope, payoff
Income pooling for fertilizer purchase	Position, choice, payoff	Position, choice
Co-wife labor pooling on private plots	Choice, aggregation, payoff, scope	Position, choice, payoff

Source: Authors

The Fulani households represent an interesting case of non-voluntary non-cooperation between husbands and wives. The recognition by men and women in the FGDs that women's participation in food provision would be beneficial to the overall output appears to support this idea. Examples of non-voluntary non-cooperation can also be found in the literature. In a study of environmental sustainability, Agarwal (2002) finds that women non-participation in forest resource management is sometimes non-voluntary. In the Fulani context, the payoff rules were a strong deterrent to any form of cooperative arrangements as they raised negative emotional feelings (shame and community shunning). These intrinsic regulators, or what Ostrom (2010) refers to as the "delta parameter", ensured that household members behaved in accordance with the existing rules. This result indicates that a group member who has a high stake for the collective good, will "...bear the full burden of providing it himself" (Olson, 1965: p.50). As a result, the presence or absence of other rules (information, boundary, aggregation and scope) to regulate household behavior, appeared irrelevant since free-riding was not a major issue in this context.

The Mossi context was markedly different. Household members were facing typical division and coordination problems with likely effects on cooperation. A close look at the rules' configuration indicates that the institutions crafted by household members played a major role in shaping and constraining behavior in Mossi polygynous households. First, the scope rules which prevented wives from producing staple crops reinforced their dependence on the collectively produced food. This result suggests that in the absence of exit opportunities, or the availability of close substitutes to the common pool resources, cooperation may remain the only option available to household members, and women in particular. This finding is in line with the literature on intra-household collective action. For example, Matz (2016), found that greater outside options contributed to better bargaining positions for co-wives in polygynous households. Interestingly, the different positions held by co-wives (position rules) did not appear to influence their likelihood of cooperation on collective plots. This result echoes Damon & McCarthy (2019), who found that jointly managed plots in polygynous households received more labor from husbands and co-wives than plots managed individually by the husband or first wife. This result supports the theory that greater alignment of interests and mutual interdependencies can foster cooperation in CPR situations (Varughese & Ostrom, 2001).

Nevertheless, the scope rules were not sufficient to explain cooperation in Mossi households. The anticipation of social sanctions (payoff rules with respect to the costs incurred) was equally likely to enhance cooperative behavior in agricultural households. The graduated sanctions scheme (from exclusion from the collective granary to community shunning and divorce (boundary rule)), which applied to non-compliers, deterred free-riding behavior in the Mossi context. Equally important, the payoff rules which ensured equitable

and “universal” access to the common food, incentivize labor arrangements on collective fields. This result is in line with Munro et al. (2019), who found in a field-lab experiment that an equal allocation rule yielded greater cooperation between members of polygynous households than rules that assigned control of the common pool to the husband. This finding shows that institutional arrangements that ensure a fair distribution of the benefits among participants (payoffs) is likely to result in mutually beneficial arrangements (Lecoutere & Jassogne, 2017; Ostrom, 2005). Nevertheless, accurate information was also required to ensure cooperation. The obligation of husbands to communicate on the uses of joint output, and the possibility for wives to adopt a grim-trigger strategy (stop participating when their husband defects), reduced the costs of negotiating the distribution of the joint proceeds from production. This finding suggests that rules which reduce the uncertainty inherent to joint arrangements foster cooperation in coordination situations (Janssen & Ostrom, 2006).

6.1.2. Institutional gaps and cooperation in polygynous households

The study shed further light on the importance of institutions in shaping cooperation in polygynous households. Under weak institutional settings, household members may fail to engage in mutually beneficial activities. The absence of cooperation of the Mossi co-wives with regard to pooling resources on private plots and pooling money with their husbands to purchase fertilizers, is revealing in this regard. Contrary to our expectations, differential bargaining positions between co-wives were not sufficient in explaining co-wives’ propensity to cooperate. Despite similar position rules, which assigned a higher status to first wives, Fulani co-wives cooperated on private plots, while Mossi co-wives did not. A look at the rules’ configuration in the two settings suggests the presence of specific scope rules (agreeing ex-ante on the uses of income from joint output) and payoff rules (equal distribution of output from joint plot) among the Fulani, which reduced the potential conflicts for reaching agreements on sharing output. This finding suggests that institutional arrangements that mitigate and resolve potential conflicts between co-wives can sustain mutually beneficial cooperation. However, no such scope rules were identified for Mossi co-wives. On the contrary, payoff rules which were based on unequal sharing norms between first and second wives deterred any form of bilateral cooperation, given the implied high costs of negotiating sharing strategies. The statement “*Sometimes, it is better to do some activities by yourself, to keep the harmony in the house*” is revealing in this regard. These results suggest that in settings where payoff rules are linked to seniority, any institutional vacuum may exacerbate the competitive behavior in co-wife relationships. This finding is in

line with Munro et al. (2019), who found that in the absence of a clear allocation rule, first wives tend to invest less than second wives, though they receive higher returns.

The inability of husbands and wives in the Mossi setting to pool money to purchase fertilizers is another example of how institutional gaps can exacerbate coordination problems in collective action. While choice rules required husbands to provide the capital necessary to food production, no specific directives applied to the wives. Furthermore, the results revealed that the lack of information, and the impossibility to verify the actual use of the money, deterred wives from contributing their money to purchase fertilizers. This finding echoes Castilla (2019), who observed in a field experiment that spouses concealed any extra income that their counterpart was unaware of, leading to inefficiencies. These results indicate that in the absence of any institutional arrangements to reduce the costs of getting reliable information on the actions of other members, the lack of trust between husbands and wives can impair cooperation.

6.1.3. Voluntary and forced cooperation in agricultural households

The theory of collective action implicitly assumes that the decision to cooperate – or to join an arrangement for collective action, is a voluntary act. The findings of this study show that this assumption does not necessarily apply in intra-household arrangements. Our findings rather suggest that one may distinguish between two types of cooperation among household members: (1) forced cooperation and (2) voluntary cooperation. Forced cooperation can be defined as a situation where the authority and pay-off rules induce a household member to contribute her labor to a joint activity that she does not necessarily find beneficial to her. The complaint expressed in the quote “we are just like ploughing bulls” describes this situation very well. Forced collaboration implies a power relation between the respective household members, specifically the husband and the co-wives and, possibly also between the first wife and the second wife⁵. Voluntary cooperation occurs when household members jointly contribute labor or other resources to an activity without being forced to do so by existing rules. An example is the collaboration of co-wives in Fulani households on their joint plots and joint livestock operations. The theory of collective action applies to the voluntary type of collaboration. One may assume that household members engage in this type of collaboration, if they consider the outcome mutually beneficial and if they are able to overcome the free-rider problem of collective action, which may be possible since household members are engaged in a long-term relationship.

⁵ Max Weber’s classical definition of power applies here: power as “the probability that one actor within a social relationship will be in a position to carry out his own will, even in case of resistance, regardless of the basis on which this probability rests”(Weber, 1978)

The distinction between forced and voluntary collaboration leads to questions that may be answered in future research. Do voluntary and forced collaboration differ with regard to their implications for the efficiency of resource-pooling and their effects on agricultural productivity? By what mechanisms is power exercised to enforce collaboration, and by what mechanisms is free-riding in voluntary arrangements prevented? Intra-household enforcement mechanisms within households may include social pressure among household members, community-level pressure (as observed in the quote “*your fellow women would laugh at you, ... it’s a shame*”), threat of withdrawal of spousal attention or threat of violence. Does the type of enforcement mechanisms have implications for the outcome of the collaborative activities?

6.2. Limitations and implications for future research

The case study design selected for this study inevitably has some limitations. Even though triangulation was applied, the results cannot be generalized. For example, the rule that Fulani wives do not work on the households’ collective fields may not apply for poor households, who may not be able to survive otherwise. Likewise, the ability of Mossi husbands to extract their wives’ labor may be influenced by the husbands’ and wives’ education levels and their ability to engage in non-agricultural income-generating activities. Besides, for analytical purposes, the household rules’ configuration was taken as static. Yet, rules may evolve as a result of external pressures, including climate change, market opportunities, and out-migration, changing the relationships between household members. Future research could thus explore cooperation in polygynous households in the context of dynamic rules. Finally, the research did explore the effects of intergenerational relationships on prospects for cooperation in polygynous households. Better insights into polygyny and agricultural productivity could be obtained by including this additional variable, as it may structure the motivations of household members differently. Our research approach can also inform future studies that employ a lab-in-the field experimental approach. The finding that cooperation is influenced by task-specific rules and that it may not be voluntary may require specific experimental designs to capture such aspects.

6.3. Policy recommendations

The two cases demonstrated that intra-household cooperation is influenced by a complex set of rules, which vary according to ethnic groups. These findings indicate that agricultural policy instruments may need to be tailored to different situations. To be effective, policies need to understand the interactions between rules and action situations to design the most effective instruments that would ensure both equity and efficiency concerns. Most policies tend to focus on sectoral outcomes (increasing productivity), failing to understand the rules

which structure the relationships between household members. The study has shown that the introduction of labor-intensive technologies in the Fulani context may be unsuccessful given that rules prevent Fulani husbands from recruiting their wives' labor in food production. Conversely, such policies may trade equity for increased productivity, as Mossi women have little agency on their labor.

These findings underscore the need to conduct an ex-ante gender analysis of proposed agricultural programs and to plan programs with the participation of the local population in a gender-sensitive way. Interventions may alter the rules of exchange between spouses in polygynous households in a beneficial way, but this requires careful planning and experimentation. For example, interventions may influence boundary rules, when they offer new income options outside the farm to women, or they may affect the aggregation rules within the household, e.g., by improving women's access to land. These situations may improve women's bargaining power, leading to outcomes that integrate the preferences of all household members (Doss & Meinzen-dick, 2020; Gilligan et al., 2020).

With regards to co-wife relationships, the results from the Mossi indicated that in making intertemporal choices, each co-wife may hold different preferences from their counterpart, as each uterine child constitute a major investment for old age. Policies that provide free education or free meals to children at school can alter co-wives' incentives' structure by reducing the level of uncertainty.

7. Conclusion

This study contributes to the emerging literature on polygynous households, a household type that is of considerable relevance in rural Africa. By adopting a qualitative case study approach, the study was designed to complement the experimental and survey literature on polygynous households, which has led to important, yet contradictory results regarding the question when and under what circumstances cooperation takes place in polygynous households and how this affects agricultural outcomes (Akresh et al., 2016; Barr et al., 2019; Damon & McCarthy, 2019). Applying the Institutional Analysis and Development (IAD) framework to two different ethnic groups in rural Burkina Faso, and combining different data collection tools (participant observation, Net-Maps, Focus Group Discussions, in-depth interviews and informal discussions), the study draws attention to the complex sets of rules that influence intra-household collaboration, which differ across ethnic groups. The usefulness of the IAD framework for analyzing complex intra-household relations is clearly demonstrated by the findings, and its application may be further expanded in future studies, e.g., by examining the interrelation between intra-household and community-level

enforcement mechanisms. The study also underlines the need to distinguish between collective and individual plots when studying collaboration in polygynous households, which has far-reaching implications, e.g., for the design of plot-level agricultural surveys. Our findings draw attention to the need to distinguish between voluntary and forced collaboration as well as between voluntary and forced non-collaboration, which opens an important future research agenda. Last, but not least, in view of the complexity and context-specificity of gender-related rules governing agricultural production revealed by our findings, our study reinforces the quest to design agricultural development programs in a participatory and gender-sensitive way.

8. References

- Acosta, M., van Wessel, M., Van Bommel, S., Ampaire, E. L., Twyman, J., Jassogne, L., & Feindt, P. H. (2020). What does it mean to make a 'joint' decision? Unpacking intra-household decision making in agriculture: implications for policy and practice. *The Journal of Development Studies*, 56(6), 1210–1229.
- Agarwal, B. (2002). Gender Inequality , Cooperation , and Environmental Sustainability. *SFI WORKING PAPER*.
- Ahn, T. K., Janssen, M. A., & Ostrom, E. (2004). Signals , Symbols , and Human Cooperation. In R. W. Sussman & A. R. Chapman (Eds.), *Origins and nature of sociality* (pp. 122–139).
- Akresh, R., Chen, J. J., & Moore, C. (2016). Altruism , Cooperation , and Efficiency : Agricultural Production in Polygynous Households. *Economic Development and Cultural Change*, 64(4), 661–696. <https://doi.org/10.1086/686668>
- Akresh, R., Chen, J. J., & Moore, C. T. (2012). Productive efficiency and the scope for cooperation in polygynous households. *American Journal of Agricultural Economics*, 94(2), 395–401. <https://doi.org/10.1093/ajae/aar093>
- Ancey, G. (1974). *Facteurs et systemes de production dans la societe Mossi d'aujourd'hui: Migrations travail terre et capital* (p. 125). ORSTOM.
- Anderson, C. L., Reynolds, T. W., & Gugerty, M. K. (2017). Husband and wife perspectives on farm household decision-making authority and evidence on intra-household accord in rural Tanzania. *World Development*, 90, 169–183.
- Arthi, V., & Fenske, J. (2018). Polygamy and child mortality: Historical and modern evidence from Nigeria's Igbo. *Review of Economics of the Household*, 16(1), 97–141. <https://doi.org/10.1007/s11150-016-9353-x>
- Ayantunde, A. A., Turner, M. D., & Kalilou, A. (2015). Participatory analysis of vulnerability to drought in three agro-pastoral communities in the West African Sahel. *Pastoralism*, 5(1). <https://doi.org/10.1186/s13570-015-0033-x>
- Bainville, S. (2017). Land rights issues in Africa: the contribution of agrarian systems research in Burkina Faso. *The Journal of Peasant Studies*, 44(1), 261–285. <https://doi.org/10.1080/03066150.2016.1170010>
- Banon, F., & Jehling, M. (2020). Looking for innovation—Trajectories of land transaction and readjustment in West Africa. *Cities*, 106, 102880.
- Barr, A., Dekker, M., Janssens, W., Kebede, B., & Kramer, B. (2019). Cooperation in polygynous households. *American Economic Journal: Applied Economics*, 11(2), 266–283. <https://doi.org/10.1257/APP.20170438>
- Bastakoti, R. C., & Shivakoti, G. P. (2012). Rules and collective action: An institutional analysis of the performance of irrigation systems in Nepal. *Journal of Institutional Economics*, 8(2), 225–246. <https://doi.org/10.1017/S1744137411000452>
- Bird, N., Ormond, L., Awah, P., Caldwell, E. F., Connell, B., Elamin, M., Fadlemola, F. M., Matthew Fomine, F. L., López, S., MacEachern, S., Moñino, Y., Morris, S., Näsänen-Gilmore, P., Nketsia V, N. K., Veeramah, K., Weale, M. E., Zeitlyn, D., Thomas, M. G., Bradman, N., & Hellenthal, G. (2023). Dense sampling of ethnic groups within African countries reveals fine-scale genetic structure and extensive historical admixture. *Science Advances*, 9(13), eabq2616. <https://doi.org/10.1126/sciadv.abq2616>
- Boltz, M., & Chort, I. (2016). The Risk of Polygamy and Wives' Saving Behavior. *World Bank Economic Review*, 33(1), 209–230. <https://doi.org/10.1093/wber/lhw054>
- Bove, R., & Vallengia, C. (2009). Polygyny and women ' s health in sub-Saharan Africa. *Social Science & Medicine*, 68, 21–29. <https://doi.org/10.1016/j.socscimed.2008.09.045>
- Bryceson, D. F. (2019). Gender and generational patterns of African deagrarianization: Evolving labour and land allocation in smallholder peasant household farming, 1980–2015. *World*

Development, 113, 60–72. <https://doi.org/10.1016/j.worlddev.2018.08.021>

- Bukari, K. N., & Kuusaana, E. D. (2018). Impacts of large-scale land holdings on Fulani pastoralists' in the Agogo Traditional Area of Ghana. *Land Use Policy*, 79, 748–758. <https://doi.org/https://doi.org/10.1016/j.landusepol.2018.09.018>
- Calvès, A.-E. (2016). First union formation in urban Burkina Faso: Competing relationship transitions to marriage or cohabitation. *Demographic Research*, 34, 421–450.
- Castilla, C. (2019). What's yours is mine, and what's mine is mine: Field experiment on income concealing between spouses in India. *Journal of Development Economics*, 137, 125–140. <https://doi.org/10.1016/j.jdeveco.2018.11.009>
- Cavicchioli, M. (2018). When the granary runs out : soil degradation , gender roles , and food security in Mossi households , Burkina Faso. *Antropologia*, 5(1).
- Colliot, E., & Nguyen, T. D. P. (1993). Le crédit rural et l ' économie villageoise a Banh (Burkina Faso). *Les Cahiers de La Recherche Développement*, 34, 65–83.
- Damon, A. L., & Mccarthy, A. S. (2019). Partnerships and production : Agriculture and polygyny in Tanzanian households. *Agricultural Economics*, 50, 527–542. <https://doi.org/10.1111/agec.12507>
- Dauphin, A. (2013). The Role of Polygyny in the Intrahousehold Efficiency of Agricultural Production in West Africa. *CIRPEE Working Paper, August*, 1–659. <papers2://publication/uuid/17970FD1-C2A2-446D-B94C-91320142CDBE>
- Delgado, C. L. (1979). The southern Fulani farming system in Upper Volta: a model for the integration of crop and livestock production in the West African savannah. *African Rural Economy Paper, Dept. Agricultural Economics, Michigan State University*, 20(20).
- Doss, C., & Meinzen-dick, R. (2020). Land Use Policy Land tenure security for women : A conceptual framework. *Land Use Policy*, 99, 105080. <https://doi.org/10.1016/j.landusepol.2020.105080>
- Doss, C. R., & Meinzen-Dick, R. (2015). Collective Action within the Household: Insights from Natural Resource Management. *World Development*, 74, 171–183. <https://doi.org/10.1016/j.worlddev.2015.05.001>
- Doss, C. R., & Quisumbing, A. R. (2020). Understanding rural household behavior: Beyond Boserup and Becker. *Agricultural Economics*, 51(1), 47–58. <https://doi.org/10.1111/agec.12540>
- Ellsasser, K. (1993). Le projet de promotion du petit crédit rural au Burkina Faso. *Les Cahiers de La Recherche Développement*, 34, 51–64.
- Essien, E. D. (2018). The interplay between conflict and solidarity in co-wife family relationship : Experience from Africa. *International Journal of Development and Sustainability*, 7(4), 1544–1563.
- Fiske, A. P. (1990). Relativity within Moose (“Mossi”) Culture: Four Incommensurable Models for Social Relationships. *Ethos*, 18(2), 180–204.
- Fiske, A. P. (1992). The Four Elementary Forms of Sociality: Framework for a Unified Theory of Social Relations. *Psychological Review*, 99(4), 689–723.
- Gilligan, D. O., Kumar, N., McNiven, S., Meenakshi, J. V, & Quisumbing, A. (2020). Bargaining power, decision making, and biofortification: The role of gender in adoption of orange sweet potato in Uganda. *Food Policy*, 95, 101909. <https://doi.org/https://doi.org/10.1016/j.foodpol.2020.101909>
- Gonin, A., Filoche, G., & Delville, P. L. (2019). Dynamics of access to pastoral resources in a farming area (Western burkina faso): Unveiling rights in open access regimes. *International Journal of the Commons*, 13(2), 1049–1061. <https://doi.org/10.5334/ijc.950>
- Haider, H., Smale, M., & Theriault, V. (2018). Intensification and intrahousehold decisions: Fertilizer adoption in Burkina Faso. *World Development*, 105, 310–320. <https://doi.org/10.1016/j.worlddev.2017.11.012>

- Hampshire, K. (2006). Flexibility in Domestic Organization and Seasonal Migration Among the Fulani of Northern Burkina Faso. *Africa*, 76(3), 402–426. <https://doi.org/10.3366/afr.2006.0044>
- Hampshire, K. R., & Smith, M. T. (2007). Consanguineous Marriage among the Fulani. *Human Biology*, 73(4), 597–603. <https://doi.org/10.1353/hub.2001.0051>
- Heath, R., Hidrobo, M., & Roy, S. (2020). Cash transfers , polygamy , and intimate partner violence : Experimental evidence from Mali. *Journal of Development Economics*, 143(October 2019), 102410. <https://doi.org/10.1016/j.jdeveco.2019.102410>
- Hidrobo, M., Hoel, J. B., & Wilson, K. (2020). Efficiency and Status in Polygynous Pastoralist Households. *The Journal of Development Studies*, 00(00), 1–17. <https://doi.org/10.1080/00220388.2020.1762863>
- Hidrobo, M., Hoel, J. B., & Wilson, K. (2021). Efficiency and Status in Polygynous Pastoralist Households Efficiency and Status in Polygynous Pastoralist Households. *The Journal of Development Studies*, 57(2), 326–342. <https://doi.org/10.1080/00220388.2020.1762863>
- Hoel, J. B. (2015). Heterogeneous households: A within-subject test of asymmetric information between spouses in Kenya. *Journal of Economic Behavior and Organization*, 118, 123–135. <https://doi.org/10.1016/j.jebo.2015.02.016>
- Ickowitz, A., & Mohanty, L. (2015). Why Would She ? Polygyny and Women ' s Welfare in Ghana. *Feminist Economics*, 21(2), 77–104. <https://doi.org/10.1080/13545701.2014.992931>
- Imperial, M. T., & Yandle, T. (2005). Taking institutions seriously: Using the IAD framework to analyze fisheries policy. *Society and Natural Resources*, 18(6), 493–509. <https://doi.org/10.1080/08941920590947922>
- Jankowiak, W., & Wilreker, B. C. (2005). Co-wife conflict and cooperation. *Ethnology*, 44(1), 81–98.
- Janssen, M. A., & Ostrom, E. (2006). Governing Social-Ecological Systems. *Handbook of Computational Economics*, 2(05), 1465–1509. [https://doi.org/10.1016/S1574-0021\(05\)02030-7](https://doi.org/10.1016/S1574-0021(05)02030-7)
- Kafle, K., Michelson, H., & Winter-Nelson, A. (2018). His, Hers, or Ours: Impacts of a Training and Asset Transfer Programme on Intra-Household Decision-Making in Zambia. *Journal of Development Studies*, 55(9), 2046–2064. <https://doi.org/10.1080/00220388.2018.1516868>
- Kazianga, Harouna, & Klonner, S. (2009). The Intra-household Economics of Polygyny : Fertility and Child Mortality in Rural Mali. *MPRA Paper No. 12859*, 1–31. <https://mpra.ub.uni-muenchen.de/12859/>
- Kazianga, Harounan, & Wahhaj, Z. (2013). Gender, Social Norms, and Household Production in Burkina Faso. *Economic Development and Cultural Change*, 61(3), 539–576. <https://doi.org/10.1086/669258>
- Kazianga, Harounan, & Wahhaj, Z. (2017). Intra-household resource allocation and familial ties. *Journal of Development Economics*, 127, 109–132. <https://doi.org/10.1016/j.jdeveco.2017.03.002>
- Kebede, B., Tarazona, M., Munro, A., & Verschoora, A. (2014). Intra-household efficiency: An experimental study from ethiopia. *Journal of African Economies*, 23(1), 105–150. <https://doi.org/10.1093/jae/ejt019>
- Kenkel, B. (2019). The efficacy of cheap talk in collective action problems. *Journal of Theoretical Politics*, 31(3), 370–402. <https://doi.org/10.1177/0951629819850625>
- Kevane, M., & Gray, L. C. (1999). A Woman' s Field Is Made At Night: Gendered Land Rights And Norms In Burkina Faso. *Feminist Economics*, 5(3), 1–26. <https://doi.org/10.1080/135457099337789>
- Kevane, M., & Wydick, B. (2001). Social norms and the time allocation of women's labor in Burkina Faso. *Review of Development Economics*, 5(1), 119–129. <https://doi.org/10.1111/1467-9361.00111>
- Kiema, A., Sawadogo, I., Ouedraogo, T., & Nianogo, A. (2012). Stratégies d'exploitation du fourrage

- par les éleveurs de la zone sahélienne du Burkina Faso. *International Journal of Biological and Chemical Sciences*, 6(4), 1492–1505. <https://doi.org/10.4314/ijbcs.v6i4.8>
- Kiser, L., & Ostrom, E. (1982). The Three Worlds of Action. In *Strategies of Political Inquiry* (pp. 179–222).
- Kofi Teye, J., Torvikey, G. D., & Awetori Yaro, J. (2021). Changing Labour Relations in Commercial Agrarian Landscapes in Ghana. In *Labour Questions in the Global South* (pp. 413–438). Springer.
- Kohler, J. M. (1971). *Activités agricoles et changements sociaux dans l'Ouest-Mossi (Haute-Volta)*. *Memoires ORSTROM No. 46*. Office de la Recherche Scientifique et Technique Outre-Mer.
- Lambrecht, I. B. (2016). “As a Husband I Will Love, Lead, and Provide.” Gendered Access to Land in Ghana. *World Development*, 88, 188–200. <https://doi.org/10.1016/j.worlddev.2016.07.018>
- Langlois, M. (1983). *Les sociétés agro-pastorales de la région de la mare d'Oursi*.
- Laurent, P. (2013). Système de mariages et terminologie de parenté chez les mossi (burkina faso). *L'Homme*, 206, 59–87.
- Lebaron, G., Gore, E., & Gore, E. (2020). Gender and Forced Labour : Understanding the Links in Global Cocoa Supply Chains. *The Journal of Development Studies ISSN:*, 56(6), 1095–1117. <https://doi.org/10.1080/00220388.2019.1657570>
- Lecoutere, E., & Jassogne, L. (2017). Fairness and Efficiency in Smallholder Farming: The Relation with Intrahousehold Decision-Making. *Journal of Development Studies*, 55(1), 57–82. <https://doi.org/10.1080/00220388.2017.1400014>
- Li, J. (2008). Ethical Challenges in Participant Observation: A Reflection on Ethnographic Fieldwork. *Qualitative Report*, 13(1), 100–115.
- Lidón de Miguel, M., García-Soriano, L., Mileto, C., & Vegas López-Manzanares, F. (2022). Traditional Mossi housing—case studies in Baasneere (Burkina Faso). *Journal of Cultural Heritage Management and Sustainable Development*.
- Lingane, Z. (2001). Errance, sédentarité ou la naissance d'une ethnie prohibée: les Silmimoose du Burkina Faso. *Anthropologica*, 43(2), 231–252. <https://doi.org/10.2307/25606038>
- Madhavan, S. (2002). Best of Friends and Worst of Enemies: Competition and Collaboration in Polygyny. *Ethnology*, 41(1), 69–84. <https://doi.org/10.2307/4153021>
- Majekodunmi, A. O., Dongkum, C., Langs, T., Shaw, A. P. M., & Welburn, S. C. (2017). Shifting livelihood strategies in northern Nigeria - extensified production and livelihood diversification amongst Fulani pastoralists. *Pastoralism*, 7(1). <https://doi.org/10.1186/s13570-017-0091-3>
- Matz, J. A. (2016). Productivity, Rank, and Returns in Polygamy. *Demography*, 53, 1319–1350. <https://doi.org/10.1007/s13524-016-0506-6>
- McGinnis, M. D. (2011). An Introduction to IAD and the Language of the Ostrom Workshop: A Simple Guide to a Complex Framework. *Policy Studies Journal*, 39(1), 169–183. <https://doi.org/10.1111/j.1541-0072.2010.00401.x>
- Meijer, S. S., Sileshi, G. W., Kundhlande, G., & Catacutan, D. (2015). The Role of Gender and Kinship Structure in Household Decision-Making for Agriculture and Tree Planting in Malawi. *Journal of Gender, Agriculture and Food Security*, 1(1), 54–76.
- Munro, A., Kebede, B., Tarazona, M., & Verschoor, A. (2019). The lion's share: An experimental analysis of polygamy in northern Nigeria. *Economic Development and Cultural Change*, 67(4), 833–861.
- Murphy, L. L., & Priebe, A. E. (2011). Gender, Technology and Development “My co-wife can borrow my mobile phone!” Gendered Geographies of Cell Phone Usage and Significance for Rural Kenyans. *Gender, Technology and Development*, 15(1), 1–23. <https://doi.org/10.1177/097185241101500101>
- Napogbong, L. A., Ahmed, A., & Derbile, E. K. (2021). Fulani herders and indigenous strategies of

- climate change adaptation in Kpongu community, North-Western Ghana: implications for adaptation planning. *Climate and Development*, 13(3), 201–214. <https://doi.org/10.1080/17565529.2020.1746231>
- Nchanji, E. B., Collins, O. A., Katungi, E., Nduguru, A., Kabungo, C., Njuguna, E. M., & Ojiewo, C. O. (2021). What does gender yield gap tell us about smallholder farming in developing countries? *Sustainability (Switzerland)*, 13(1), 1–20. <https://doi.org/10.3390/su13010077>
- Nigussie, Z., Tsunekawa, A., Haregeweyn, N., Adgo, E., Cochrane, L., Floquet, A., & Abele, S. (2018). Applying Ostrom’s institutional analysis and development framework to soil and water conservation activities in north-western Ethiopia. *Land Use Policy*, 71(November 2017), 1–10. <https://doi.org/10.1016/j.landusepol.2017.11.039>
- OECD. (2018). *Étude pays SIGI: Burkina Faso*. <http://www.oecd.org/development/development-gender/Etude-Pays-SIGI-Burkina-Faso.pdf>
- Olson, M. (1965). *The logic of collective action* (Volume CXX). Harvard University Press.
- Oseni, G., Corral, P., Goldstein, M., & Winters, P. (2015). Explaining gender differentials in agricultural production in Nigeria. *Agricultural Economics (United Kingdom)*, 46(3), 285–310. <https://doi.org/10.1111/agec.12166>
- Ostrom, E. (1990). Governing the commons. In *CAMBRIDGE University Press*. <https://doi.org/10.4135/9781446200964.n32>
- Ostrom, E. (2005). *Understanding Institutional Diversity* (Vol. 132, Issues 3–4). Princeton University Press. <https://doi.org/10.1007/s11127-007-9157-x>
- Ostrom, E. (2011). Background on the Institutional Analysis and. *Policy Studies Journal*, 39(1), 7–27.
- Owoo, N. S. (2018). Food insecurity and family structure in Nigeria. *SSM-Population Health*, 4, 117–125. <https://doi.org/10.1016/j.ssmph.2017.12.004>
- Pew Research Center, Dec. 12, 2019, “Religion and Living Arrangements Around the World”
- Poteete, A. R., & Ostrom, E. (2004). Heterogeneity, group size and collective action: The role of institutions in forest management. *Development and Change*, 35(3), 435–461. <https://doi.org/10.1111/j.1467-7660.2004.00360.x>
- Querre, M. (2003). Quand le lait devient enjeu social: le cas de la société peule dans le Séno (Burkina Faso). *Anthropology of Food*, 2.
- Ragasa, C., Aberman, N. L., & Alvarez Mingote, C. (2019). Does providing agricultural and nutrition information to both men and women improve household food security? Evidence from Malawi. *Global Food Security*, 20(December 2018), 45–59. <https://doi.org/10.1016/j.gfs.2018.12.007>
- Rossi, P. (2018). Strategic choices in polygamous households: Theory and evidence from Senegal. *Review of Economic Studies*, 86(3), 1332–1370. <https://doi.org/10.1093/restud/rdy052>
- Schiffer, E. (2008). Tracing Power and Influence in Networks : Net-Map as a Tool for Research and Strategic Network Planning. *Food Policy*, June, 17. <http://ideas.repec.org/p/fpr/ifprid/772.html>
- Seeley, J. (2012). The Changing Relationships of Co-wives Over Time in Rural Southern Uganda The Changing Relationships of Co-wives Over Time in Rural Southern Uganda. *Journal of Development Studies*, 48(1), 68–80. <https://doi.org/10.1080/00220388.2011.629651>
- Setrana, M. B., Kyei, J. R. K. O., & Nyarko, D. (2022). Beyond the binary debates in migration: Experiences of Fulani nomads, sedentary Fulani, and autochthone farmers in Agogo, Ghana. *Migration Studies*, 10(2), 152–171. <https://doi.org/10.1093/migration/mnac012>
- Singbo, A., Njuguna-Mungai, E., Yila, J. O., Sissoko, K., & Tabo, R. (2021). Examining the Gender Productivity Gap among Farm Households in Mali. *Journal of African Economies*, 30(3), 251–284. <https://doi.org/10.1093/jae/ejaa008>
- Slavchevska, V. (2015). Gender differences in agricultural productivity: the case of Tanzania. *Agricultural Economics*, 46(3), 335–355. <https://doi.org/10.1111/agec.12168>

- Soeters, S., Weesie, R., & Zoomers, A. (2017). Agricultural Investments and Farmer-Fulani Pastoralist Conflict in West African Drylands: A Northern Ghanaian Case Study. In *Sustainability* (Vol. 9, Issue 11). <https://doi.org/10.3390/su9112063>
- Spradley, J. P. (1980). *Participant observation*. Waveland Press, INC.
- Tallet, B. (1989). Connaître les exploitations agricoles : un outil pour les politiques de développement rural au Burkina Faso. In *Florilège Offert À P Pelissier et G Sautier. Collection «Didactique»*. ORSTOM.
- Tertilt, M. (2005). Polygyny, Fertility, and Savings. *Journal of Political Economy*, 113, 1341–1371.
- Thiombiano, A., & Kampmann, D. (2010). *Biodiversity Atlas of West Africa, Volume II: Burkina Faso* (A. Thiombiano & D. Kampmann (eds.)). <http://www2.uni-frankfurt.de/47671336/BF-Atlas-complete2.pdf>
- Timpong-Jones, E. C., Samuels, I., Sarkwa, F. O., Oppong-Anane, K., & Majekodumni, A. O. (2023). Transhumance pastoralism in West Africa – its importance, policies and challenges. *African Journal of Range & Forage Science*, 40(1), 114–128. <https://doi.org/10.2989/10220119.2022.2160012>
- Udry, C. (1996). Gender, Agricultural Production, and the Theory of the Household. *Journal of Political Economy*, 104(5), 1010–1046. <https://about.jstor.org/terms>
- Varughese, G., & Ostrom, E. (2001). The contested role of heterogeneity in collective action: Some evidence from community forestry in Nepal. *World Development*, 29(5), 747–765. [https://doi.org/10.1016/S0305-750X\(01\)00012-2](https://doi.org/10.1016/S0305-750X(01)00012-2)
- Villamayor-Tomas, S., Thiel, A., Amblard, L., Zikos, D., & Blanco, E. (2019a). Diagnosing the role of the state for local collective action: Types of action situations and policy instruments. *Environmental Science and Policy*, 97(March), 44–57. <https://doi.org/10.1016/j.envsci.2019.03.009>
- Villamayor-Tomas, S., Thiel, A., Amblard, L., Zikos, D., & Blanco, E. (2019b). Diagnosing the role of the state for local collective action: Types of action situations and policy instruments. *Environmental Science and Policy*, 97(March), 44–57. <https://doi.org/10.1016/j.envsci.2019.03.009>
- Weber, M. (1978). *Economy and Society: An outline of Interpretive Sociology*. University of California Press.
- West, C. T. (2010). Household Extension and Fragmentation: Investigating the Socio-Environmental Dynamics of Mossi Domestic Transitions. *Ecology*, 38(3), 363–376. <https://doi.org/10.1007/s>
- Wood, A. L., & Iii, L. R. (2021). Decision-making capacity to address climate-induced food insecurity within women-led groups in Southern Mali. *Climatic Change*, 164(30), 18.
- Yin, R. K. (2013). *Case Study Research: Design and Methods (Applied Social Research Methods)* (Fifth edit). Sage Publications Inc.
- Zahonogo, P., & Séogo, W. (2019). Land tenure system innovation and agricultural technology adoption in Burkina Faso: Comparing empirical evidence to the worsening situation of both rural people vulnerability and vulnerable groups' access to land. *African Journal of Science, Technology, Innovation and Development*, 11(7), 833–842.

Social and Institutional Change in Agricultural Development
Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg-Institute)
Universität Hohenheim

Wollgrasweg 43 | 70599 Stuttgart | Deutschland

T +49 (0)711-459-23517 | F +49 (0)711-459-23812

E regina.birner@uni-hohenheim.de | <https://490c.uni-hohenheim.de/en>

