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ASSESSING CLIMATE SERVICE NEEDS IN KAFFRINE, SENEGAL

LIVELIHOODS, IDENTITY, AND VULNERABILITY TO CLIMATE VARIABILITY AND CHANGE



SEPTEMBER 2015

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Cover Photo: Field work images in Ngetou Malick, Senegal. Photo credit: Tshibangu Kalala.

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TABLE OF CONTENTS

1. INTRODUCTION	1
2. THE GOAL OF THIS REPORT	2
3. METHODS: HOW DID WE INVESTIGATE THE LIVELIHOODS OF NGETOU MALICK?	3
4. CLIMATE SERVICES, NGETOU MALICK, AND THE KAFFRINE REGION	5
4.1. Vulnerability in Ngetou Malick.....	5
4.2. Identity in Ngetou Malick.....	7
4.3. Discourses of Livelihoods in Ngetou Malick	11
4.3.1. Livelihoods of those without tools or animals.....	15
4.3.2. Those without tools and with animals.....	19
4.3.3. Those with tools and animals.....	25
4.4. Ngetou Malick: Tools of Coercion	29
4.5. Ngetou Malick: Different Vulnerabilities, Different Decisions	31
4.5.1. Without tools or animals.....	31
4.5.2. Without tools, with animals sub-group vulnerabilities.....	33
4.5.3. With tools and animals sub-group vulnerabilities.....	34
4.6. Different farmers, different goals: Opportunities for advisories in Ngetou Malick and beyond.....	36
REFERENCES	39

ACRONYMS

CCAFS	Climate Change, Agriculture, and Food Security
CCRD	Climate Change Resilient Development
HURDL	Humanitarian Response and Development Lab
LIG	Livelihoods as Intimate Government
NFE	non-farm employment
USAID	United States Agency for International Development

LIST OF FIGURES

Figure 1: Schematic view of the LIG approach used for data collection and interpretation in Ngetou Malick.

Figure 2: Overall vulnerability context of Ngetou Malick.

Figure 3: The different assemblages of vulnerability associated with different levels of asset ownership in Ngetou Malick.

Figure 4: The broad categories of responsibility associated with men and women in Ngetou Malick.

Figure 5: Reported livelihoods activities in Ngetou Malick.

Figure 6: Reported rates of animal ownership in Ngetou Malick.

Figure 7: Reported livelihoods activities for the three vulnerability groups in Ngetou Malick.

Figure 8: Reported animal ownership for the vulnerability groups in Ngetou Malick.

Figure 9: Reported livelihoods activities for those without access to equipment or animal traction.

Figure 10: Reported crops cultivated by those without access to equipment or animal traction.

Figure 11: Reported crop uses for those without access to equipment or animal traction.

Figure 12: Reported livelihoods activities for those without access to equipment but with access to animal traction.

Figure 13: Reported animal ownership for those without access to equipment but with access to animal traction.

Figure 14: Reported crops cultivated by those without access to equipment but with access to animal traction.

Figure 15: Reported crop uses for those without access to equipment but with access to animal traction.

Figure 16: Reported livelihoods activities for those with access to both equipment and animal traction.

Figure 17: Reported animal ownership for those with access to both equipment and animal traction.

Figure 18: Reported crop selections for those with access to both equipment and animal traction.

Figure 19: Reported crop uses for those with access to both equipment and animal traction.

Figure 20: Reported vulnerabilities of those without access to equipment or animal traction.

Figure 21: Reported vulnerabilities for those without access to equipment but with access to animal traction.

Figure 22: Reported vulnerabilities for those with access to both equipment and animal traction.

Figure 23: Farmer types in Ngetou Malick.

I. INTRODUCTION

For those whose livelihoods revolve around rain-fed agriculture, climate services have the potential to reduce precipitation- and temperature-related risks to agricultural production, boost agricultural yields by enabling appropriate crop and variety selections, and build resilience in rural populations by enhancing the food and income base of their livelihoods (e.g. Hansen, Baethgen, Osgood, Ceccato, & Ngugi, 2007; Klopper, Vogel, & Landman, 2006). To achieve these lofty potentials, climate services must deliver information that is salient, legitimate, and credible to those for whom these services are designed and to whom they are targeted (e.g. Carr & Owusu-Daaku, 2015; Hansen, 2002; Peterson et al., 2010; Roncoli et al., 2009; Waiswa, Mulamba, & Isabirye, 2007). Further, we must understand if and how new information is of value to these users. Information that is not actionable, which does not speak to farmer needs, or which lacks credibility relative to other sources of weather and climate information does not add value to their decision-making, and may even result in confusion around decision-making that reduces the efficacy of existing livelihoods strategies. In short, it is becoming clear that weather and climate information is not inherently valuable to those in rural agrarian contexts, but must be tailored to the specific needs of the users if it is to have a productive impact on their lives and livelihoods (Carr & Owusu-Daaku, 2015; Carr, 2014a).



Farmers prepare their cart before entering the field.
Photo credit: Tshibangu Kalala.

This report demonstrates an approach to identifying farmer needs to inform the design of effective climate services and the monitoring and evaluation of new services as they are implemented. It is the product of a collaboration between the Climate Change, Agriculture, and Food Security (CCAFS) Theme of the CGIAR and the Humanitarian Response and Development Lab (HURDL) in the Department of Geography at the University of South Carolina. Working in the Kaffrine Region of Senegal, HURDL piloted and tailored the Livelihoods as Intimate Government (LIG) approach (Carr, 2013, 2014b) to the context, before conducting a full analysis of livelihoods decision-making in the village of Ngetou Malick, located seven kilometers southwest of the regional capital of Kaffrine, in the Maleme Hodar département. From late May through July of 2014, one member of the HURDL team conducted a LIG analysis of the livelihoods in Ngetou Malick to better understand how residents of this village, and of Kaffrine more broadly, made agricultural and other livelihoods decisions. The results of this analysis, and the implications it has for climate service design and M&E, are presented below.

2. THE GOAL OF THIS REPORT

This report seeks to provide empirical support to CCAFS efforts to design and implement a climate services program in Kaffrine, Senegal. As such, it lays out the different agricultural decision-makers in this context, defines the decisions that they currently make, and on what basis they make those decisions. It then links the perceived assemblages of vulnerability reported by different residents of this community to this decision-making, explaining the sources of particular perceived vulnerabilities, as well as the rationale behind particular activities and outcomes. Finally, the report lays out the sorts of weather and climate information that would be of use to residents of this village and region, making clear *who* would benefit from *what* information. This data can serve as a foundation for climate service program design in Kaffrine going forward, as well as the effective M&E of any such program and its associated goals.



Farmers move their animals during a drought. Photo credit: Tshibangu Kalala.

3. METHODS: HOW DID WE INVESTIGATE THE LIVELIHOODS OF NGETOU MALICK?

To explore the livelihoods decision-making of the residents of Ngetou Malick, and of Kaffrine more broadly, the HURDL team employed the LIG approach. This approach differs from previous livelihoods approaches in that it views livelihoods not merely as activities undertaken to make a living in a particular place, but as wider efforts to order the world. These efforts result in the procurement of material needs, but also the identification and reinforcement of social roles, and the establishment of appropriate activities and actions for different members of the community. As such, it recasts livelihoods from narrow, instrumental activities to situate them in their much deeper social, political, and ecological contexts (for discussion, see Carr, 2013).

LIG is both a conceptual framework and a methodology for studying livelihoods decision-making. Following Carr (2014b), the field team began work by establishing the vulnerability context of Kaffrine with a basic literature review, and two weeks of preliminary scoping fieldwork in two villages in rural Kaffrine. Fieldwork in Ngetou Malick built on this preliminary understanding of the vulnerability context, using semi-structured interviews to explore the vulnerabilities of 44 residents.

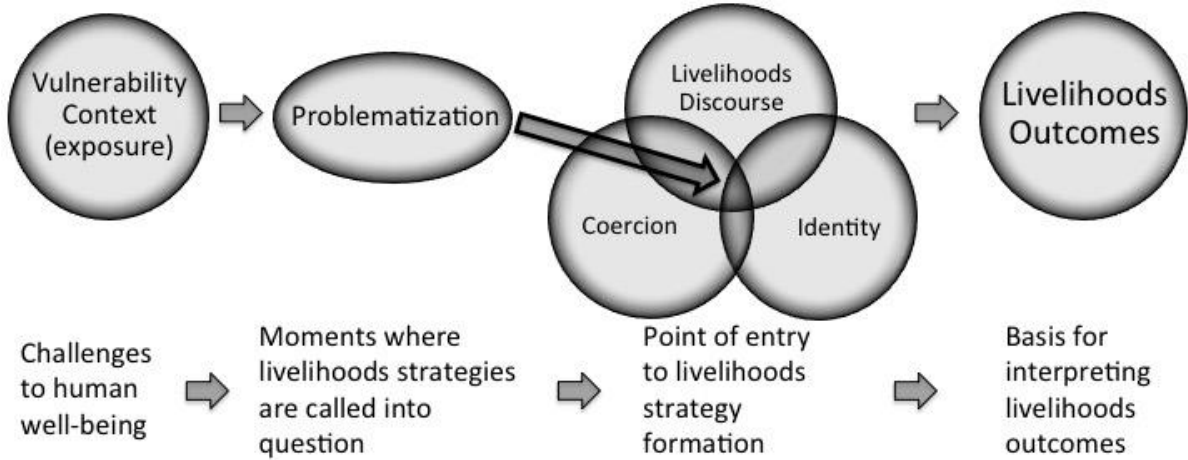


Figure 1: Schematic view of the LIG approach used for data collection and interpretation in Ngetou Malick.

After conducting this first phase of fieldwork, the team divided the community into three groups based on their shared assemblages of vulnerability. The principal means of dividing the sample was in relation to their ownership of agricultural tools and animal traction. Those without either tools or traction made up 22.7% of the sample, those with either animal traction or equipment comprised 54.5% of the sample, and those with both were 20.5% of the sample. Compared with other ethnographic studies of agriculture among the Wolof in Senegal (e.g. Venema, 1978), those in Ngetou Malick have weaker access to animals and/or equipment than in many surrounding areas. Initial investigation found, however, that access to animals and equipment did not produce higher rates of food security, as might be expected. Those *without* equipment and animals reported the lowest rates of concerns with food scarcity, while the other two groups had much higher rates of concern. Despite displaying similar levels of concerns for food security, the groups with access to equipment and/or animals had divergent concerns with regard to access to farming equipment and access to adequate water. These differences suggested different experiences of the vulnerability context of Ngetou Malick. This analysis supported the field-based decision to divide the population into three groups for the purposes of analysis. The apparent disconnect between access to animal traction and equipment and perceived levels of food insecurity served as a contradiction that shaped inquiry into livelihoods decision-making in the village (see Figure 1).

Among the Wolof who make up the majority of the population of Ngetou Malick, there are significant differences in roles and responsibilities associated with different identities. Senior men are expected to make decisions for the household, and raise food and income to support that household. Junior men work for senior men, but are expected to build up assets so one day they can head their own household. Women are supposed to defer to and show obedience to men, and their agricultural labor is seen as secondary to that of men (though it is their right to farm their own fields). A first wife can become “senior” if her husband gives her control over the domestic sphere of the household, and therefore over other, more junior, women.

The ethnographic literature on the Wolof suggests that gender and a particular construction of seniority shape the decisions made by different members of the community. Therefore, as the team then re-interviewed the members of each group to better understand their individual livelihoods, identities, and the social structures that create incentives for particular activities or forms of behavior, we paid attention to the gender and social rank of the individual being interviewed to better understand the intra-group differences in activities and decision-making authority that might shape the use of advisories.

As in the first phase of study, the follow-up interviews were semi-structured. The questions incorporated into these interviews evolved as answers to initial questions led to new lines of inquiry. This phase of fieldwork achieved a reasonable degree of saturation, where no new answers or questions were emerging from interviews, for many of the topics under investigation. The field team used participant observation to cross-check their interview data, living in Ngetou Malick and observing the activities of residents with regard to livelihoods decision-making, particularly the use of information to inform agricultural decision.

HURDL analyzed the data gathered during fieldwork, beginning with coding of the interviews from the field teams. The field team recorded their field notes from the interviews and participant observation in French. The lead member of the HURDL field team (Kalala) translated these notes into English to facilitate the wider participation of lab members in data analysis. The translated notes were imported into MAXQDA, a qualitative analysis support software. HURDL staff used MAXQDA to code the notes according to the LIG framework, using the broad headings of vulnerability context, discourses of livelihoods, identity, and tools of coercion to structure a complex set of sub-codes that represented specific issues in Ngetou Malick. HURDL staff used these codes to retrieve data that was used to generate the results presented in Section 4 of this report, as well as supporting passages and quotes from field notes.

4. CLIMATE SERVICES, NGETOU MALICK, AND THE KAFFRINE REGION

4.1. VULNERABILITY IN NGETOU MALICK

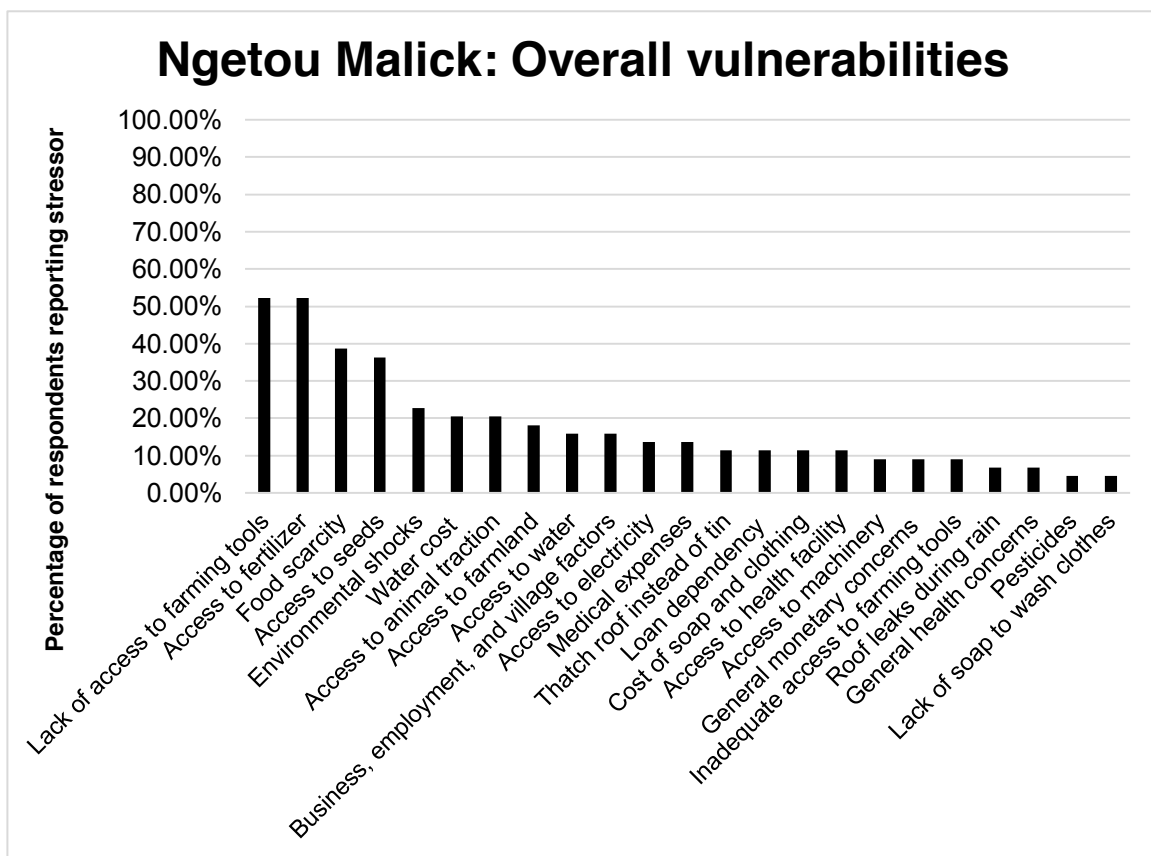


Figure 2: Overall vulnerability context of Ngetou Malick.

Individuals within Ngetou Malick are exposed to numerous pressures including environment stresses and shocks, inadequate access to livelihoods resources, and economic factors. As shown in Figure 2 above, the primary stressors within the overall vulnerability context in Ngetou Malick center around agricultural livelihoods and access to agricultural livelihoods resources. As agriculture is the primary livelihood for all of the 44 individuals within the interview set, this is not surprising.

It is important to note, however, that precipitation and weather-related stressors are absent from this vulnerability context. Though many individuals report the same stressor as a part of their individual vulnerability context, the assemblage of vulnerabilities reported by individuals tended to cluster into

three groups. The first of these (n=10) were those without access to animals or farming equipment. The second were those with access to draught animals, but lacking access to equipment (n=25). The third were those with both equipment and draught animals (n=9). The different assemblages of vulnerability associated with each of the three groups suggest different experiences of life in Ngetou Malick (Figure 3). These different assemblages of vulnerability are the product of the interplay between the roles and responsibilities associated with particular identities in this village, the ways in which these roles and responsibilities define (and gain definition from) the relationship between individuals, the livelihoods activities they undertake, and the means by which they undertake them.

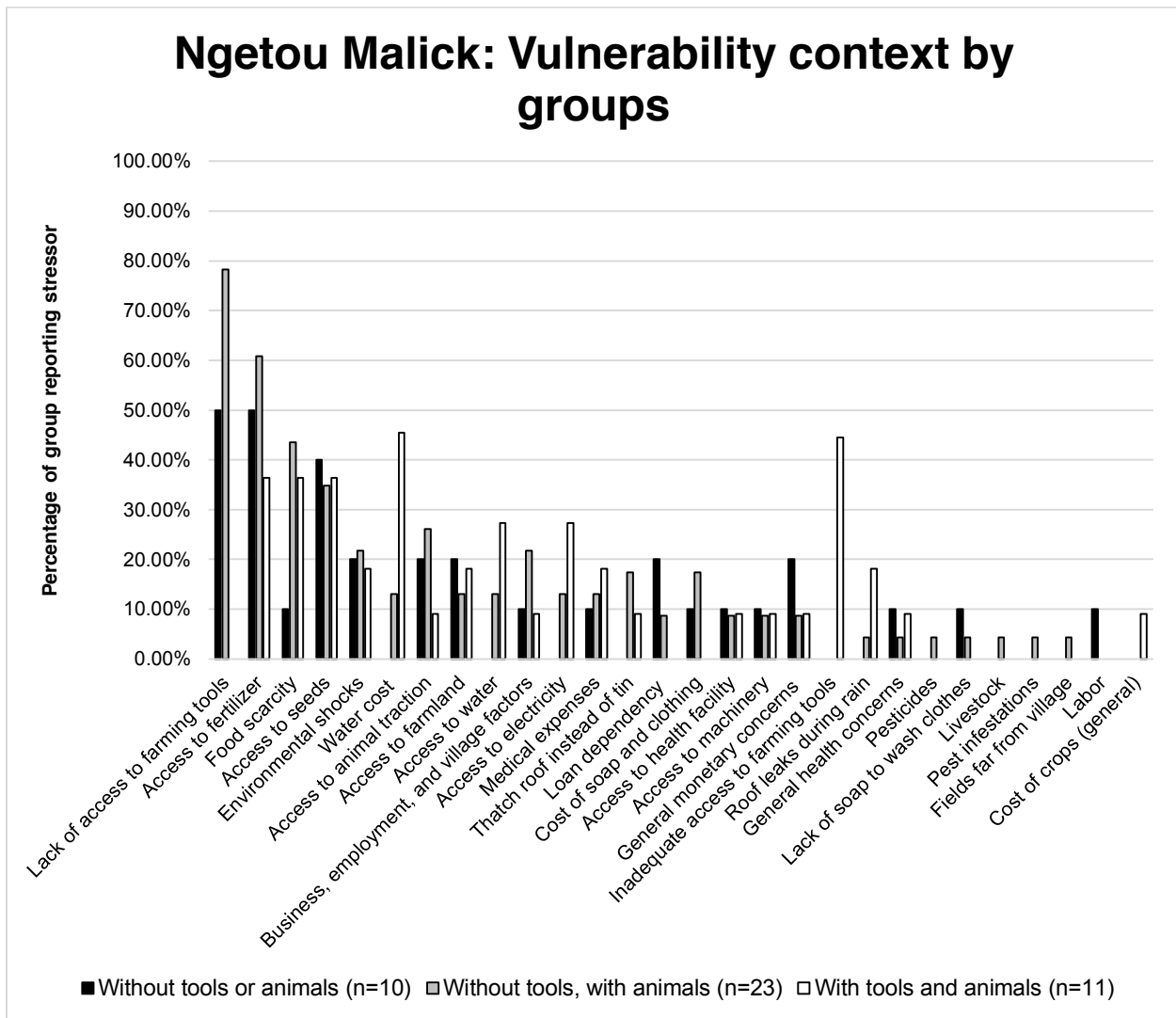


Figure 3: The different assemblages of vulnerability associated with different levels of asset ownership in Ngetou Malick.

4.2. IDENTITY IN NGETOU MALICK

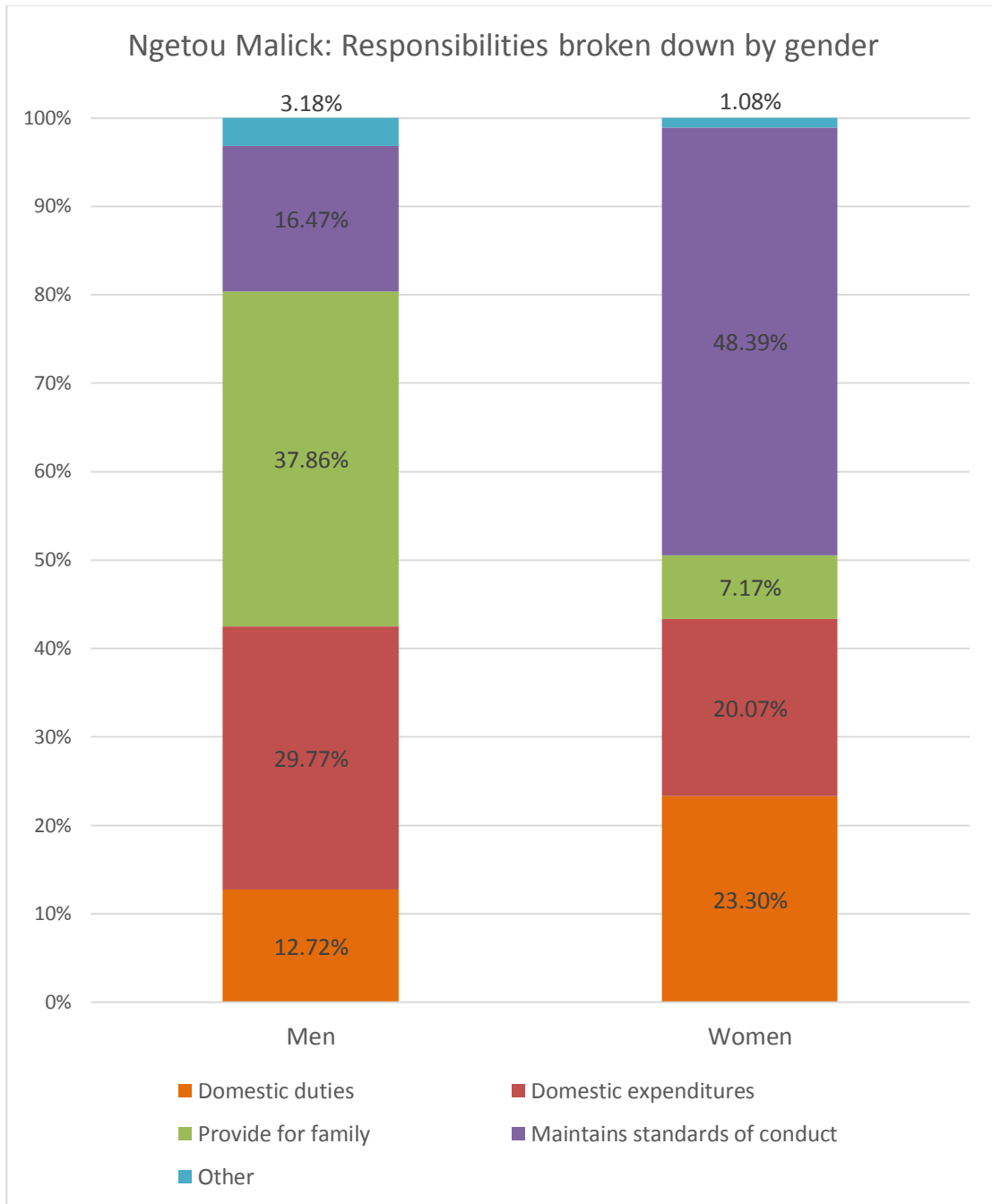


Figure 4: The broad categories of responsibility associated with men and women in Ngetou Malick.

Men and women possess a different range of responsibilities within the context of Ngetou Malick, as shown in Figure 4. Among the Wolof, men control the family's land, the granaries in which family grain is stored, and most agricultural equipment (Perry, 2005). Men who head households are expected to care for their dependents through the provision of food. As Perry (2005: 211) notes, the term for dependents, *surgé*, translates to "one who is filled up", pointing to the significance of food provisioning in the role of the male head of household. Further, such male heads of household must allow married women and the unmarried men in their households the ability to earn money for expenses, and to build up the resources that will allow unmarried men to marry and eventually head their own households. In Ngetou Malick, the expectations of a good man largely conforms to the literature, with principal responsibilities including providing for the family by means of making farming decisions within household plots, deciding upon animal ownership and care, growing millet and maize, maintaining adequate housing for family, providing monies and inputs to his wives that enable them to manage their own farming plots as well as purchasing goods, and purchasing rice and other foodstuffs for his family to eat. The household is the principal unit of organization for agricultural activity within Ngetou Malick. Therefore, neither the influence that senior men and junior men have over their households nor their individual responsibilities greatly differ unless the junior man lived in a household controlled by a senior man. In the case of households that contain a junior man but are headed by a senior man, the junior man bears less responsibility for feeding and providing for the family. Instead, junior men are expected to follow the direction of the senior man and, through his labor and other contributions, help the senior man meet his responsibility for feeding and providing for the family. This significant difference in roles and responsibilities is manifest in two ways. First, junior men rely at least in part on the resources and assistance supplied by senior men to pursue an agricultural livelihood, specifically relying on the senior man's farming tools and traction animals. Junior men often obtain farmland through senior men as well. In return, junior men who are part of these families are expected to help plow and plant the senior man's fields before their own (Interview 11). As a result, multiple junior men mentioned that they are reliant on senior men in their families to determine the plowing and planting time for their own fields, as the senior men controlled a significant portion of the farming tools and inputs required for agriculture (Interviews 11, 16, 17). Second, junior men are expected to follow the advice given by senior men, specifically their fathers. Men who still live on their father's concession are still seen as junior men, even in the case of wealthier junior men who own farming tools and make their own agricultural decisions (Interview 21).

Young Wolof men will stay with their fathers until they are married, which requires that they demonstrate their ability to feed their families (Venema, 1978). Thus, young men with large amounts of debt from agricultural or livelihoods activities, or even from paying bridewealth, cannot separate from their father's households and remain dependent on the father for land and agricultural decisions. According to Venema (1978), the obedience of sons to fathers is of paramount importance among the Wolof, as a son that publicly contradicts his father brings great shame to his family, and may be beaten publicly by the father's friends. It is important to note that the relations of power between senior and junior men, or between head of household and dependent, are reciprocal. In return for access to land and income-earning opportunities, dependents of the male head of household are expected to contribute labor to family farms controlled by the male head (Perry, 2005). Therefore, there are expectations on both sides of these relationships that the participants have to live up to.

Whether junior or senior, men are expected to feed and provide for the family via the cultivation of millet and maize (Interviews 36, 37, and 40). Because the provision of millet and maize is seen as an integral part of a man's responsibility to provide for his family, women are discouraged from growing millet and maize under normal circumstances (Interviews 04, 05). Beyond providing food and income for his family, a good man in Ngetou Malick respects his religion, family, and community. He shows compassion towards all of his children, wives, and parents. He pays for water and at least a significant

portion for bills of less importance in his household (e.g cooking oil), assists his parents with farming and animal care, and provides tools and land for his wives' agricultural activities. Men are additionally expected to fund expenditures related to home upkeep (Interview 22), procure rice for the family (Interview 31), buy clothes for his children and/or wife (Interview 31, 33), pay for water and medical bills (Interviews 34, 35), and pay for their children's' educations (Interview 33). Bad men within Ngetou Malick are characterized by their laziness (refusal to do adequate farming work to feed the family), disrespect of religion, consumption of alcohol, and refusal to give their wives money to support the wives' necessary expenses (grocery procurement, clothing purchase, etc.).

Women in Ngetou Malick have a different set of roles and responsibilities than men. Wolof women are expected to respect and show deference to men, especially their husbands (Venema & van Eijk, 2004; Venema, 1978). Their principal responsibilities lie with the management of the household, including childcare and other domestic activities (Perry, 2005; Venema, 1978). At the same time, women are expected to have money of their own, to take care of themselves and their children and purchase domestic goods and, in polygamous households, to maintain self-respect (Venema & van Eijk, 2004). This is not uniformly true – in wealthy households, the husband may give his wife money for housekeeping (Venema & van Eijk, 2004). In Ngetou Malick, women often must pursue farming and other livelihoods to make the remaining necessary funds because their husbands do not generally provide enough money to purchase all necessary groceries (Interview 20).

Though all women are expected to farm, they are generally limited to usufruct rights to land controlled by their household, which they obtain starting around the age of 13. Women are responsible for procuring their own seed. The first season after they marry, women receive peanut seeds from their husbands as a form of startup capital. From that point forward, women are responsible for maintaining or increasing their stock of seeds. Instead of granting them access to land outright, men choose to rent fields for their wives to use, allowing for season-to-season changes in field size depending on how much seed the women are able to acquire during a particular growing season (Interview 28). One woman reported that husbands will provide their favorite wife or wives (typically the youngest) with extra seeds during the start of the planting season, providing her with a distinct advantage for her (Interview 28). However, this is a contentious view as some women believe that being a newer wife does not convey any special advantages (Interview 29). If a woman does not manage to acquire seeds during a particular year, then her husband will not allocate her a field (Interview 28). The fields that married women use are often subdivisions of the same plot of land divided up among the wives of each particular man (Interview 15). The border of each of these fields is marked by the planting of bissap (the local name for hibiscus) as a demarcation of each wife's particular plot within the larger field (Interviews 15, 25). In addition to growing bissap, women are also expected to grow cowpea as it is necessary to flavor sauces and provide nutrition for family meals (Interviews 1, 17). As mentioned above, women are not encouraged to grow maize and millet, as this is seen as a threat to a man's role as the provider for the family (Interviews 4, 5). However, if the woman in question is either widowed and must provide for family, or if the woman was not able to procure more expensive peanut seeds for the upcoming rainy season (as millet seeds are very cheap and often seen as a last resort), then they are permitted to cultivate millet without questioning by the community (Interviews 7, 10, 39). In cases where the husband fails to provide land for his wife or in the case of a widowed woman, it is common for brothers or other extended family members to step in and provide land for them (Interview 10). Land tenure for all but the richest women is therefore unstable, as the women do not themselves have direct control over the land that they cultivate each year. Among the Wolof, women who work on the fields of men are generally entitled to compensation (Venema, 1978).

Women's production is generally seen as less important than that of men, and both Venema (1978) and the HURDL team in Ngetou Malick observed that first sowing and weeding dates were much later on

women's plots than men's plots, limiting their production. Though women's plowing and planting decisions are controlled by their husbands, women commonly maintain control over their own crop selection, regardless of their status as junior or senior (Interviews 2, 28), because they are responsible for acquiring their own seed. While such selection is broadly autonomous, women are expected to grow bissap and cowpea, as these are crops that are integral to making flavorful sauces when cooking.

Women are expected to give leftover

peanut straw to their husband (who either use it as animal fodder or sell it) as a sign of respect if he has helped them plow their fields. Additionally, women,

especially within this population grouping, typically give their husbands their peanuts, who will then sell them at the market as they are seen as better negotiators (Interview 28) and because some women feel that lifting and weighing peanut bags at market is labor-intensive and best done by men. Because the men sell the peanuts, women often grant the men a cut of the profits (Interview 5). This money is, however, ultimately the woman's property, and she can refuse to grant the men any of it if she so chooses (Interview 25). Women guard against having their profits skimmed by their husbands by listening to the radio, which announces market prices for peanuts and other crops during that particular season. (Interview 28). There is also a great deal of gossip among women about market prices for peanuts in Ngetou Malick.

Beyond the many behavioral expectations that good women must meet, good women in Ngetou Malick regularly complete a bevy of domestic chores for the household. These include taking care of her husband's property and animals when he is not present or is otherwise in need of assistance, cooking for the household, and cleaning and washing clothes. The first wife in a Wolof household, if deemed a "good wife", may become the focal point of domestic decision-making, with authority over the domestic labor of other wives in the household (Venema, 1978). In Ngetou Malick, the most junior woman in each household is expected to complete the largest portion of the domestic duties out of all the wives. Senior women are freed from most domestic duties when their sons get married and bring their wives into the family. The newly married junior wife will take over all her mother-in-law's household workload. During fieldwork, the team heard from one senior woman who was pushing her 18-year-old son to get married so that she can get some rest and devote her time to less labor-intensive activities. As a result, junior women in general are not able to dedicate a significant portion of time towards agricultural pursuits or the pursuit of any secondary livelihoods (Interviews 4, 25, 29). Because junior women take up many domestic tasks, these senior women do not have as many household duties to fulfill, meaning that they can spend more time relative to junior women on agricultural pursuits and other secondary livelihoods to earn more income for themselves and their families. Older women also are differentiated from younger women because they often have access to extra labor in the form of their son's wives (Interview 2). With respect to domestic spending, women are expected to buy groceries (Interviews 31, 32), purchase soap to wash clothing (Interview 32), pay for water (Interview 31), purchase clothes and shoes for themselves and their children, pay for the education of her children (Interview 43), and pay for bed sheets (Interview 40).



A farmer plows a field. Photo credit: Tshibangu Kalala.

“Bad” women in Ngetou Malick are characterized by their lack of obedience to their husbands, lack of respect for their husbands, lack of gratitude for the assistance that the husbands provide in agricultural pursuits, refusal to help their husbands with their farming work, and lack of effort expended on caring for their husbands’ properties and livestock. Interestingly, no individuals identified refusal to cook or clean as specific characteristics of a bad woman, even though these are important activities completed by “good” women. Perhaps even more interestingly, one man states that there is no such thing in his eyes as a bad woman within the village (Interview 27). Women who are treated properly will turn become good wives, meaning that women behave how they are treated and that any poor behavior is the causal result of a poor husband (Interview 27).

For the purposes of designing, monitoring, and evaluating climate services in Kaffrine, we are concerned with the ways in which these broad identity characteristics are translated into specific livelihoods roles and responsibilities. This translation shapes who makes what livelihoods decisions, which in turn determines the different information needs of those living in the region.

4.3. DISCOURSES OF LIVELIHOODS IN NGETOU MALICK

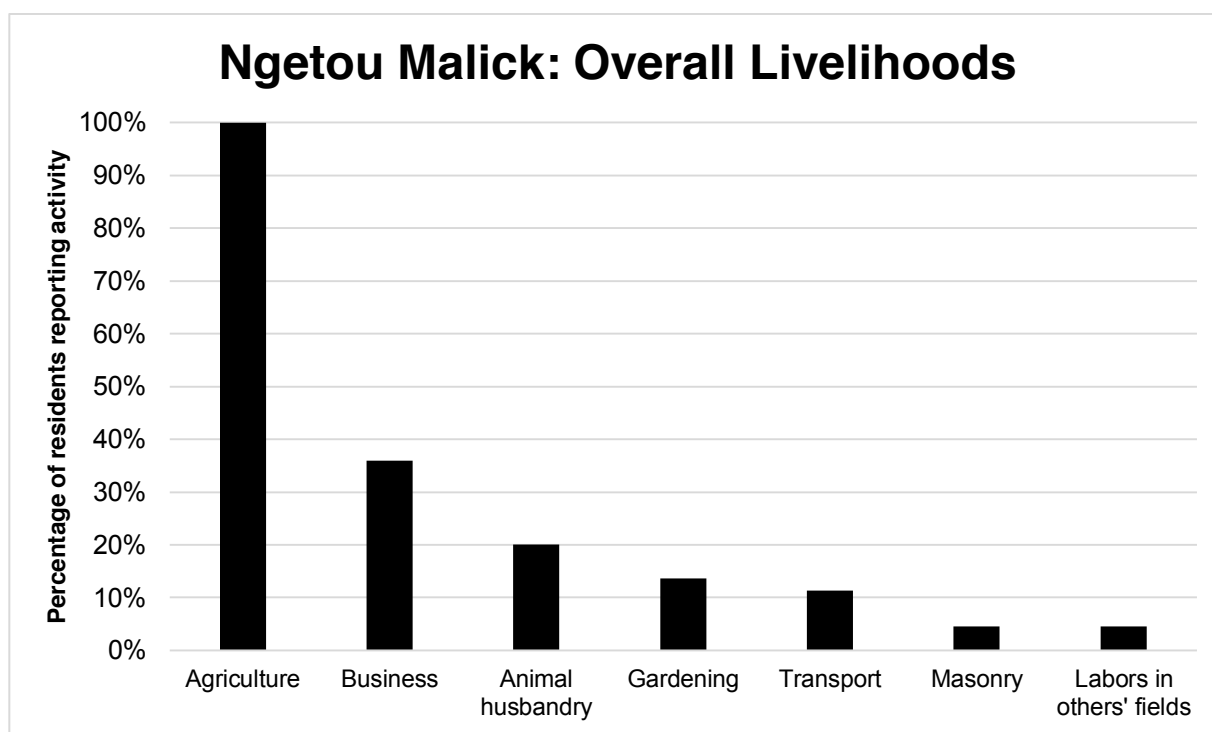


Figure 5: Reported livelihoods activities in Ngetou Malick.

The overall picture of livelihoods within Ngetou Malick is narrow in scope (Figure 5), a situation mirrored in the larger literature on Wolof livelihoods in this part of Senegal (e.g. Perry, 2005; Venema & van Eijk, 2004; Venema, 1978). All individuals interviewed reported agriculture as their primary livelihood, generally because agriculture both provides food and because agriculture brings in the most income as a livelihood choice. In nearly all cases, the other six livelihoods activities residents reported are secondary to agriculture. Only three individuals make more money in these other livelihoods than they do within agriculture (Interview 2, 21, 41), though even for these individuals agricultural pursuits remain necessary to acquire otherwise expensive or difficult-to-acquire food stuffs.

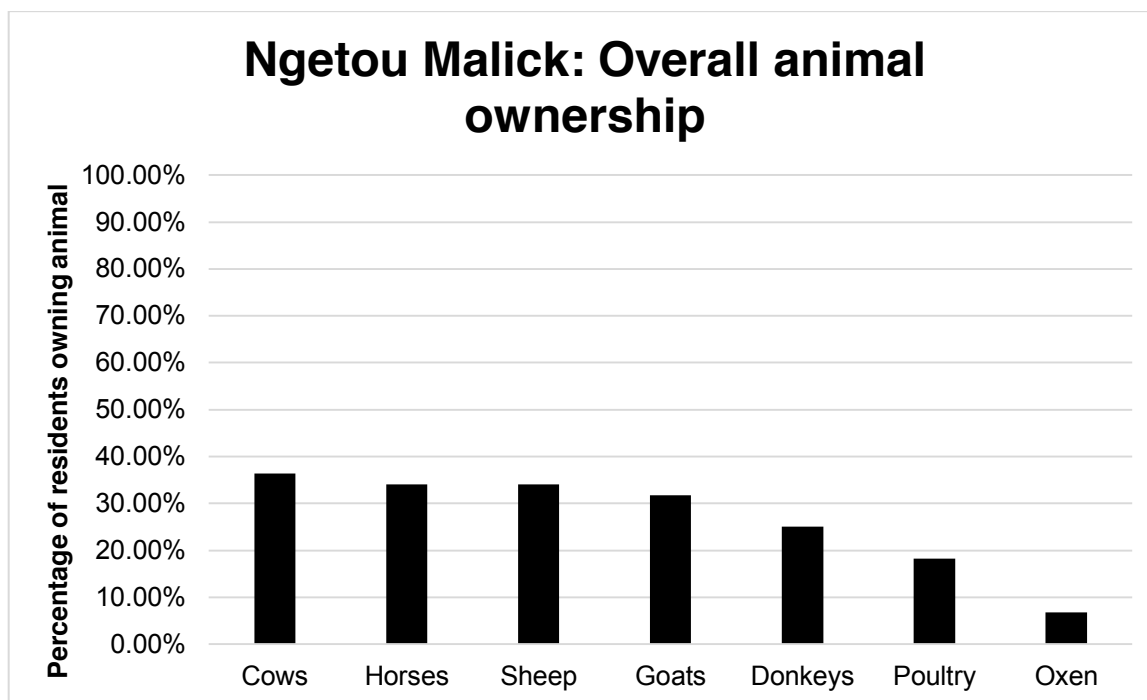


Figure 6: Reported rates of animal ownership in Ngetou Malick.

Reported animal ownership in Ngetou Malick is very low (Figure 6). The top four most popular animals are each owned by approximately one third of residents. Donkeys, poultry, and oxen are owned by fewer farmers.

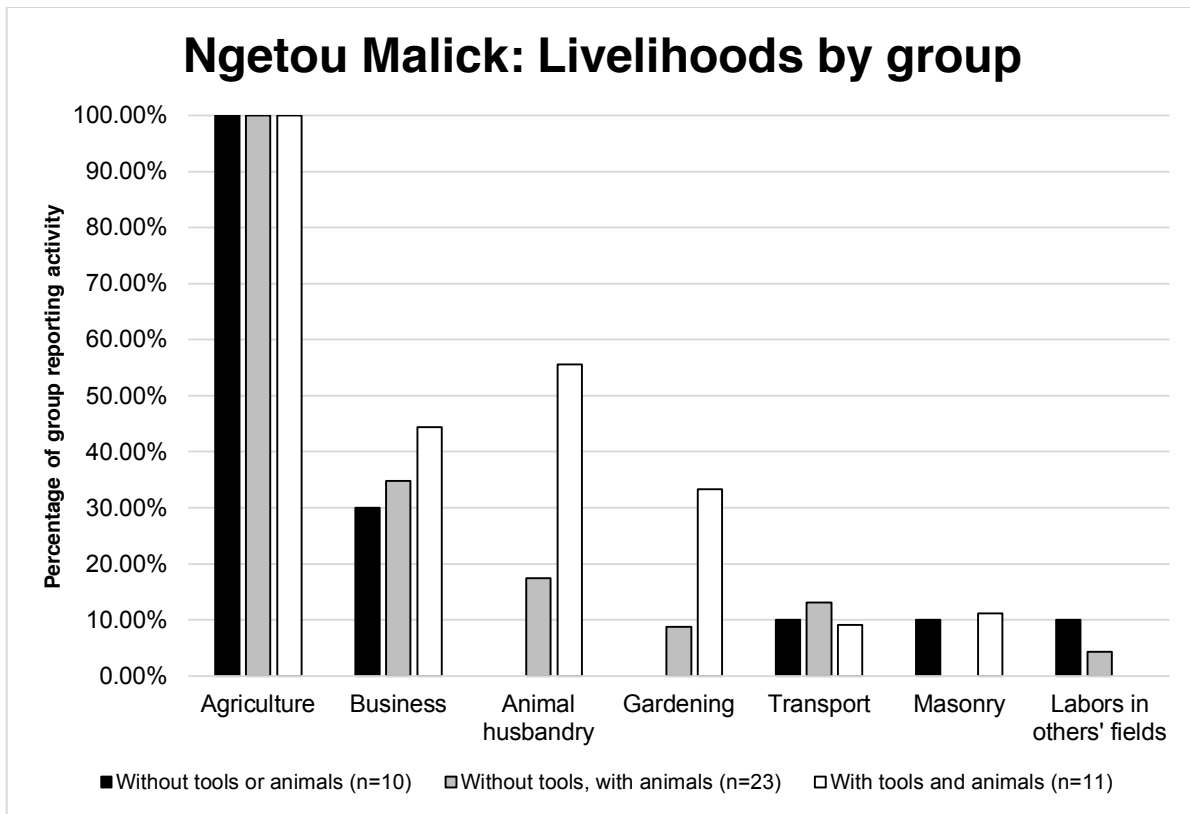


Figure 7: Reported livelihoods activities for the three vulnerability groups in Ngetou Malick.

The livelihoods activities associated with the three vulnerability groups in Ngetou Malick are illustrated in Figure 7. The most lucrative non-rain-fed agricultural livelihoods, business, animal husbandry, and gardening, are pursued more often by those who have access to tools and animals than those who only have access to one or none of those things. Laboring in the fields of others, transporting others to market, and masonry are less lucrative, less capital-intensive livelihoods that are more typically pursued by those individuals who lack immediate access to tools and/or animals. Business is pursued with increasing prevalence as a secondary livelihood when moving from groups with fewer to more livelihoods assets.

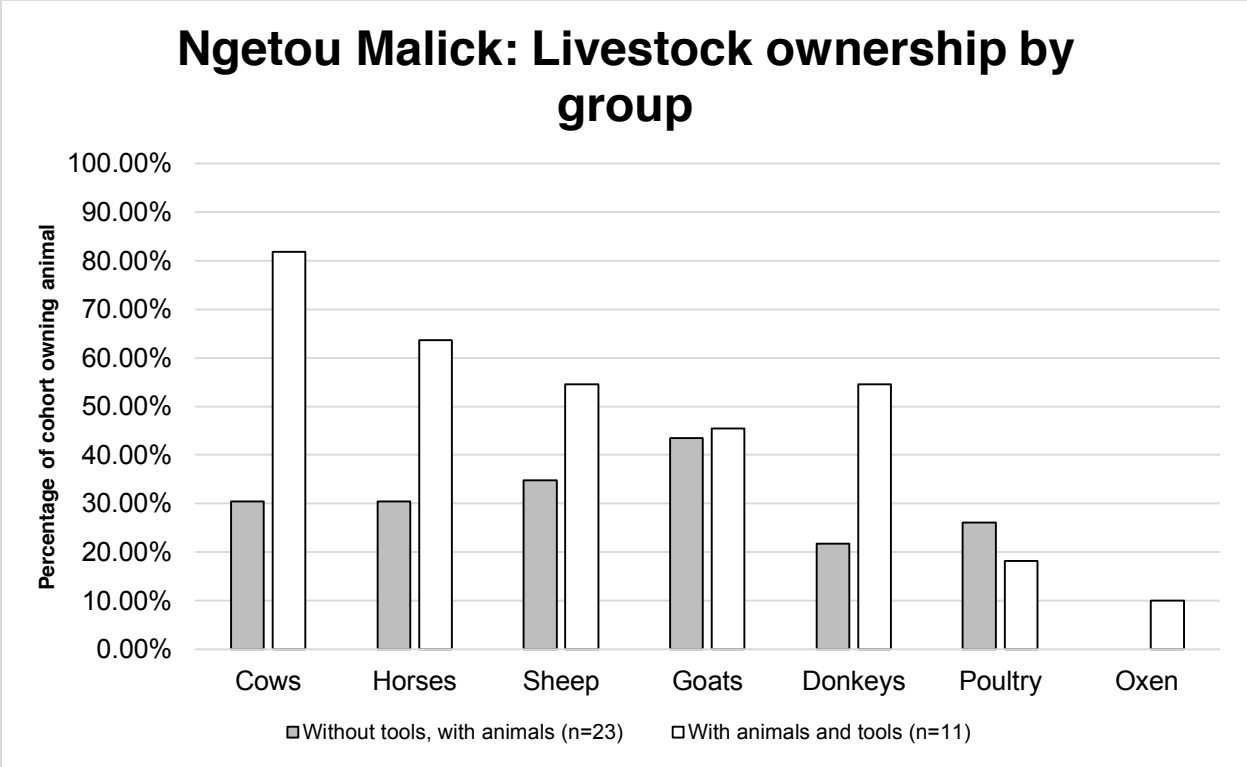


Figure 8: Reported animal ownership for the vulnerability groups in Ngetou Malick.

Viewing animal ownership by these same groups reveals some significant differences between groups (Figure 8). Because they are wealthier than those without tools, those individuals who have access to farming tools (mostly senior men and two junior men) are able to purchase higher value livestock such as cows, horses, oxen, and donkeys that those without tools. Those without access to tools tend to be poorer than those with tools and/or preoccupied with either other, less capital-intensive livelihoods (e.g. laboring in others’ fields) such that they do not pursue animal husbandry as a livelihood. Instead, the animals owned by this group largely serve as a store of value to mitigate risk, as sacrifices for ceremonies (e.g sheep, goats), or to produce food stuffs for subsistence purposes in the household (e.g chickens for eggs, cows for milk, goats for meat). Sheep are highly utilized by both groups for a traditional Muslim ceremony called Tabaski, in which they are sacrificed.

4.3.1. LIVELIHOODS OF THOSE WITHOUT TOOLS OR ANIMALS

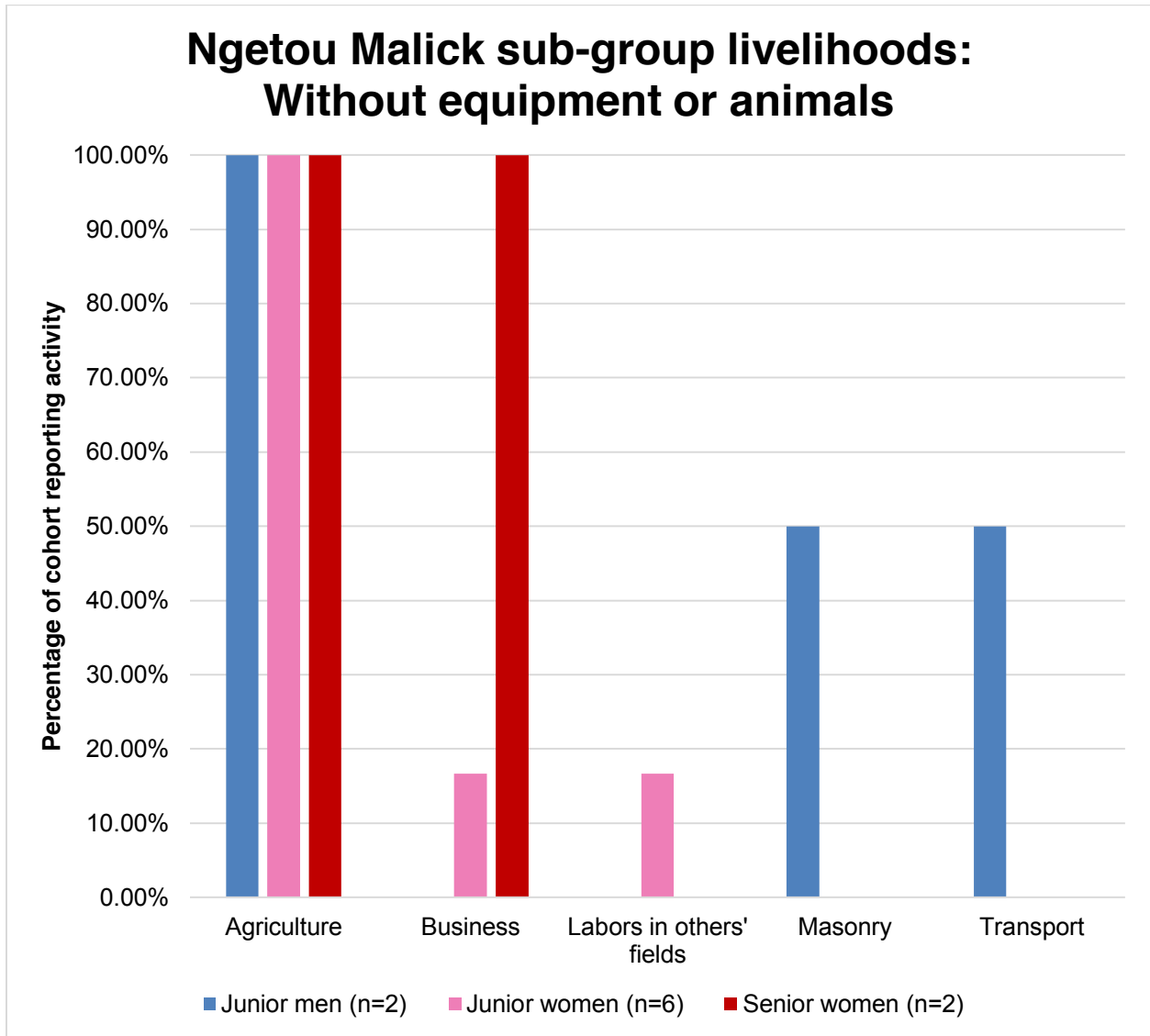


Figure 9: Reported livelihoods activities for those without access to equipment or animal traction.

With the exception of agriculture, the livelihoods activities reported for those individuals without tools and animals (Figure 9) are heavily differentiated along lines of age and gender. The junior men in this category, unable to meet all of their household’s subsistence and monetary needs through the pursuit of agriculture, rely on less-lucrative livelihoods such as masonry and transport to make up the monetary shortfall created by inadequate agricultural production (Interviews 11, 35). Junior women in this group are more likely to focus exclusively on agricultural pursuits and fulfillment of household duties, whereas senior women in this group often are able to engage in some small business in addition to agriculture.

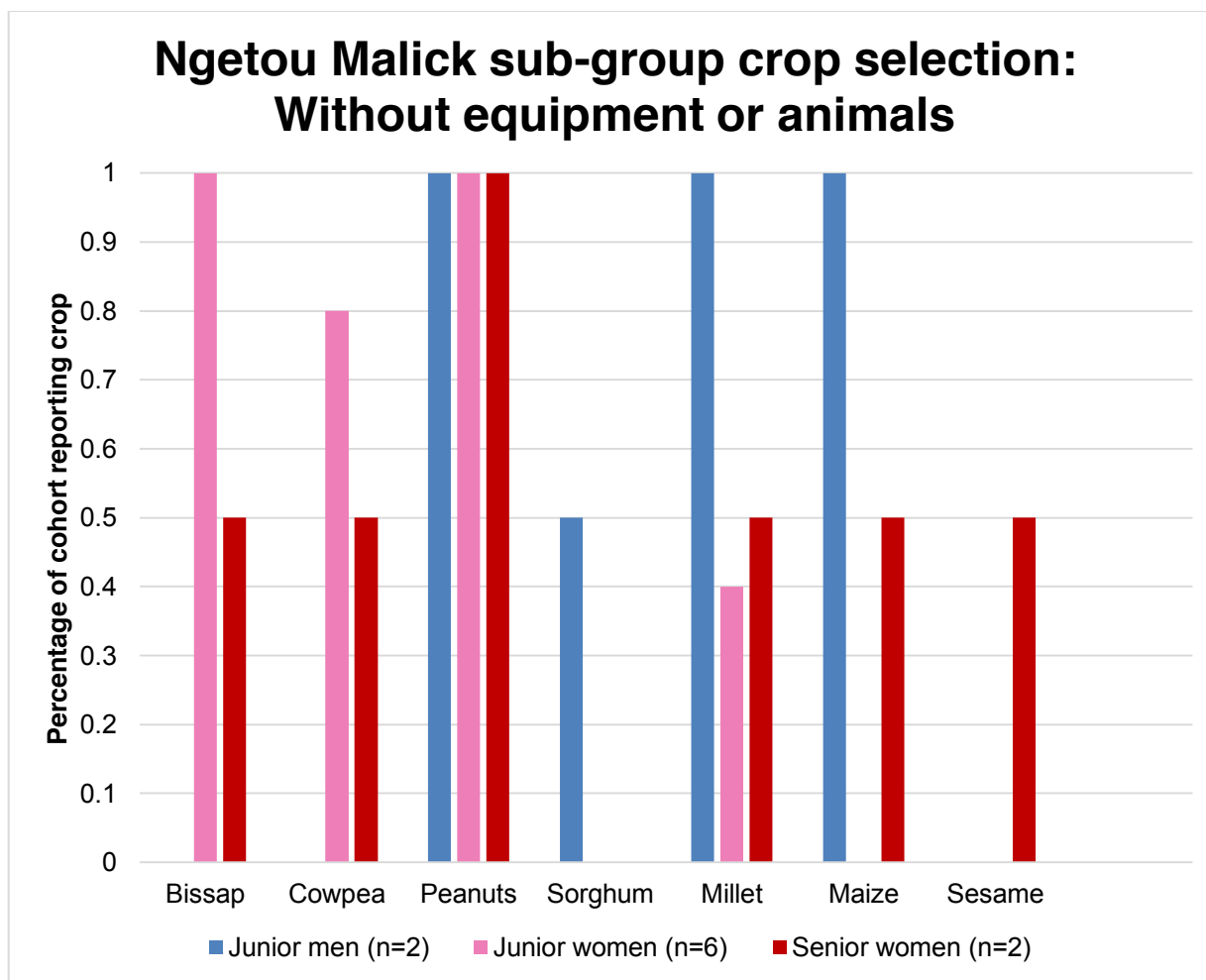


Figure 10: Reported crops cultivated by those without access to equipment or animal traction.

Peanuts, the most commonly grown crop within Ngetou Malick, are grown by all members of this group (Figure 10). However, one junior woman does not typically grow peanuts (she only grows millet) as a result of her inability to afford an adequate amount of peanut seeds (Interview 39). Women in this group who grow peanuts allow their husbands access to the peanut straw left over from the cultivation of the peanuts to use as animal fodder. Both junior men in this group grow maize and millet. Sorghum is grown by the one junior man in this group to supply a source of animal fodder for the horse that he borrows (Interview 35). Most women within this group, especially junior women, choose to grow bissap and cowpea, as this is expected of them. Only one person in this group grows sesame, a senior woman. She does so because, like others who grow sesame, she receives some sesame seeds to plant from a local organization that is promoting the crop (Interview 24). Junior women in this group also grow millet, and they are the only junior women in the interview set who do so.

The farmers in this group shape variety selection around cycle length. Residents identified constrained planting times as harmful to overall crop yields, and often planted short-cycle seed varieties either to provide a quick infusion of income later during the planting season (Interview 15) or to procure animal fodder and food for the family where otherwise there might be very little (Interview 11). In this regard, cycle selection is a response to both agroecological and economic factors, but those in this group have a limited ability to act upon this logic. While some of the junior men in this group had access to short-

cycle seeds (Interview 11), only a few of the women did (Interview 3). Two junior women mentioned that they would plant short-cycle peanuts if they had the means, however they only had access to long-cycle varieties and therefore had no alternative (Interviews 15, 20).

Crop Uses: Without Animals or Equipment			
Bissap	Average	Interpreted value	n =
Junior man	n/a		
Junior woman	1.0	Eat all	5
Senior woman	2.5*	Eat and sell equally	1

Niebe	Average	Interpreted value	n =
Junior man	n/a		
Junior woman	1.0	Eat all	4
Senior woman	2.0	Eat more than sell	1

Peanuts	Average	Interpreted value	n =
Junior man	3.0	Eat and sell equally	2
Junior woman	4.0	Sell more than eat	5
Senior woman	4.0*	Sell more than eat	2

Millet	Average	Interpreted value	n =
Junior man	1.0	Eat all	2
Junior woman	4.0	Sell more than eat	2
Senior woman	1.0	Eat all	1

Maize	Average	Interpreted value	n =
Junior man	1.0	Eat all	2
Junior woman	n/a		
Senior woman	1.0	Eat all	1

Figure 11: Reported crop uses for those without access to equipment or animal traction.

The data in Figure 11 was gathered by asking farmers to place their use of a crop on an ordinal scale, where 1 represented eating all of a crop, 3 was eating and selling the crop in equal quantities, and 5 was selling all of the crop. The values for each crop were averaged by cohort to determine the interpreted value. This figure demonstrates that the growing choices made by the members of this group are oriented towards subsistence, with peanuts as a source of food and income. Most staple grains are grown for consumption, with limited expectation of a marketable surplus. Junior men eat a larger percentage of

their peanuts than others in this group because of their small field sizes and relative lack of inputs, coupled with their expectation to be the primary provider of food and income for their households (Interview 11). Junior and senior women, because they do not have to fulfill the role as primary provider for the family, are able to sell the majority of their peanut crops, however small they may be.

In fulfilling their role as providers for the family, the junior men in this group grow maize and millet entirely for subsistence. This represents a significant constraint on their income. The senior woman in this group who grows maize and millet does so because she is a widow and is the main provider for her household (Interview 8). The junior women in this group who grow millet do so because they either cannot afford to procure other seeds (Interview 10) or because they do not have access to peanut seeds for other general reasons (Interview 39). Without the constraint of feeding a family, it is not surprising that junior women focus on growing staple grains for sale instead of subsistence more frequently than junior men or widowed senior women.

Junior and senior women within this group also cultivate bissap and cowpea primarily as cooking ingredients. Outside of its direct culinary use, one junior woman in this group mentioned that cowpea is often intercropped with peanuts, ostensibly to save space and assist in crop rotation season over season (Interview 15). This same woman, and others within this group, also used bissap to mark the edges of their field subdivisions (Interview 15). White bissap is generally entirely eaten after it has served its use as a field marker. Red bissap, another variety that is also grown in Ngetou Malick, is always sold rather than eaten. The only senior woman in this group who chooses to grow bissap grows both variants, selling all of the red bissap and eating all of the white bissap (Interview 8).

4.3.2. THOSE WITHOUT TOOLS AND WITH ANIMALS

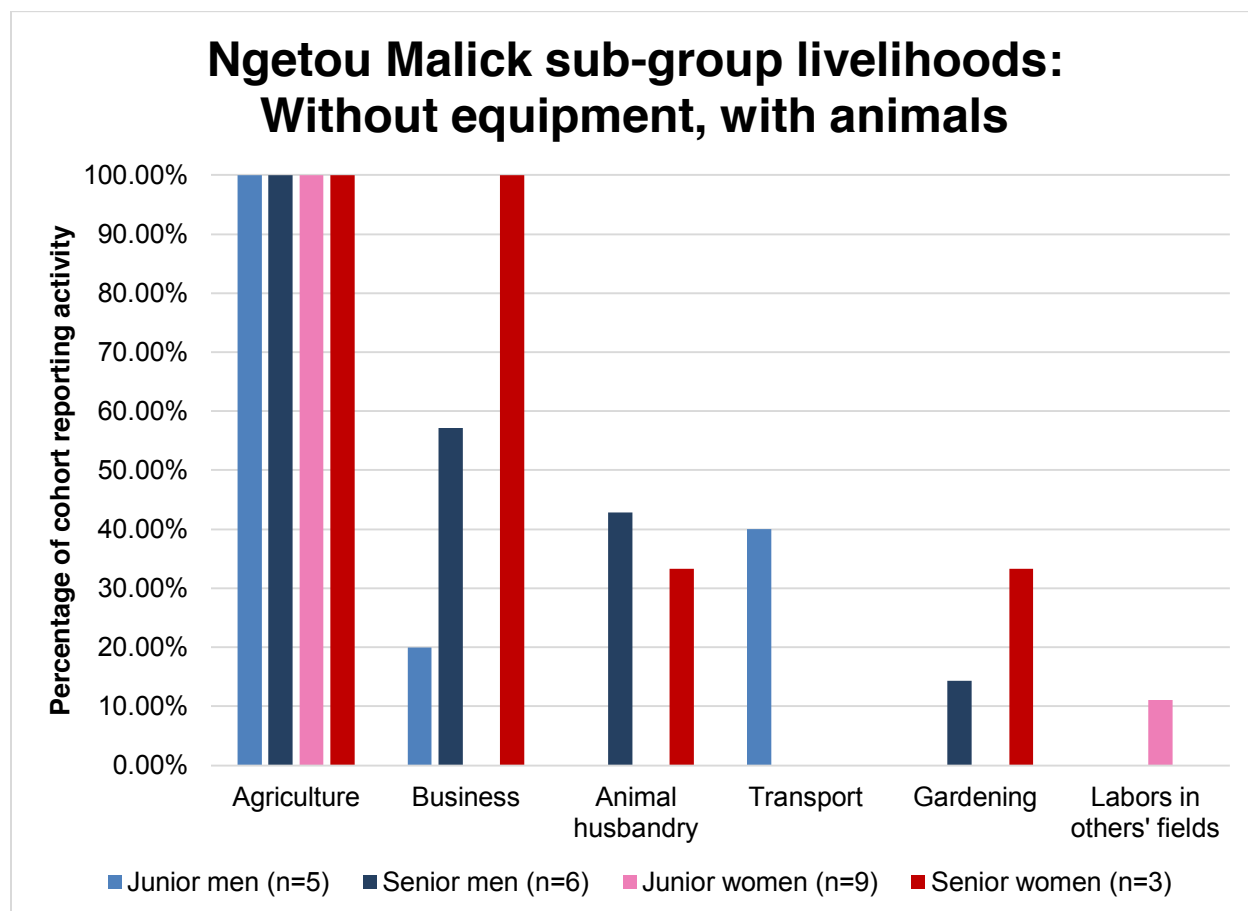


Figure 12: Reported livelihoods activities for those without access to equipment but with access to animal traction.

This group had the widest distribution of livelihoods activities of the three groups in Ngetou Malick (Figure 12). As in the Without Tools and Animals group, all individuals within this group engage in rain-fed agriculture as their primary livelihood. Among secondary livelihoods, small business is pursued most heavily by senior men and women within this group. The reasons for this are various. The senior women, free from many of the household duties that junior women are required to fulfill, can spend more time on a small business or hand-irrigating a field for gardening. For these women, small business is preferable to large expansions in rain-fed agricultural production or animal husbandry because such activities require large amounts of capital investment and because senior women are not expected to be the main providers for the family. The senior woman who engages in animal husbandry does so through the relatively cheap avenue of raising and selling chickens (Interview 2). Such constraints are less of a concern for those starting small businesses, as senior women in Ngetou Malick often receive microcredit packages for business pursuits from a women’s organization run by World Vision (Interview 26). Senior women exclusively compose the group targeted by this organization, and the president of the organization is herself a senior woman within the Ngetou Malick interview set (Interview 26). Despite the relatively ready sources of capital available for small business activities, business has not supplanted rain-fed agriculture in the livelihoods of these women. One senior woman (a widow) mentions that she pursues small business because it makes her more money than agriculture (Interview 2), but at the same time she acknowledged that she cannot meet her entire food purchase needs with money earned by

business, and must engage in rain-fed agriculture as a necessary (and more desirable) livelihood activity. Two other senior woman in this group described rain-fed agriculture as a necessary livelihood activity because the money that they gain from peanut sales is a source of capital their small businesses (Interview 8). The single junior woman in this group labors in others' fields so that she can receive payments of peanut seeds in kind (Interview 4).

The senior and junior men in this group pursue small business as well, though the senior men do so to a much greater extent than the junior men. This reflects the inability of the junior men within this group to produce enough crops for consumption and sale, which would in turn allow them the financial surplus to pursue secondary livelihoods like business in the manner that senior men in this group choose to do. Additionally, because no junior man in this group has the means available to pursue animal husbandry as a secondary livelihood, each must in turn pursue an alternative livelihood during the dry season to stay busy and gain extra income that they can in turn reinvest into purchasing more farming inputs for the upcoming rainy season (Interviews 11, 42). Offering transport services to and from Ngetou Malick is a common livelihood activity among these men. One of these men rents the motorcycle that he uses for transport, and works for the owner to pay for its usage (Interview 42). Both junior men make more money from agriculture than they do in transport (Interviews 11, 42). Senior men within this group who have the resources to do so pursue either animal husbandry or small business during the dry season.

In this group, senior men and women garden. They can manage the high cost of water bills associated with the year-round hand irrigation of gardening crops. Because it is a livelihood that can be pursued throughout the year, gardening provides a consistent source of income. For example, in this group the senior man who grows garden crops did so because, though rain-fed agriculture is his the primary livelihoods activity, it was necessary for him to combine multiple livelihoods over the year to adequately provide for his family (Interview 33).

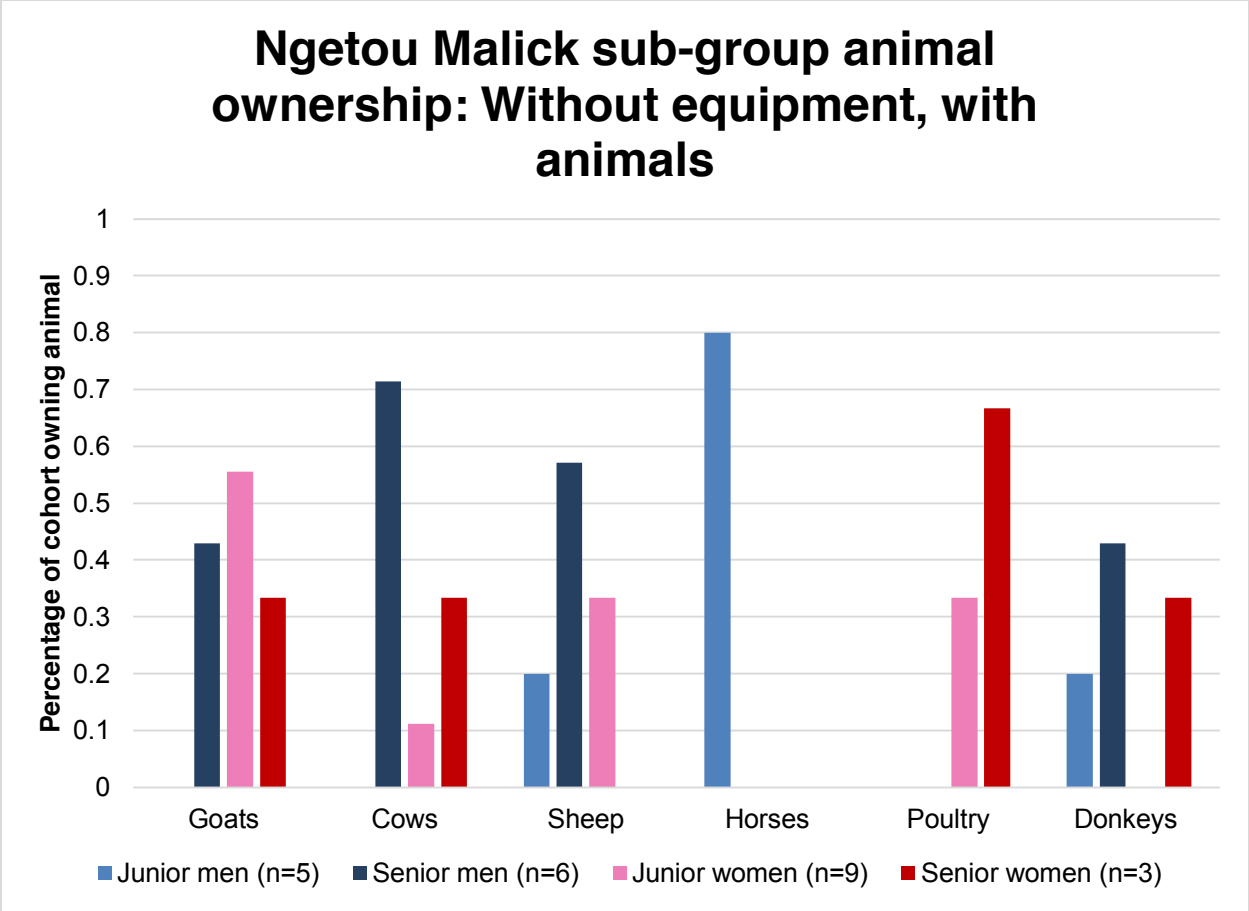


Figure 13: Reported animal ownership for those without access to equipment but with access to animal traction.

Livestock ownership within this group is heavily varied (Figure 13). By far the most common animal to be owned by a junior man within this group is a horse, all of which are utilized either for plowing or transportation purposes. Not all of these men, however, use their horses to support a secondary transportation livelihood. Senior men use them only to farm and transport farming inputs to their fields (Interviews 24, 42). Sheep and goats are both used as sacrifices for Tabaski and as sources of savings by all gender/seniority cohorts. Sheep are moderately more expensive than goats and more easily support a secondary animal husbandry livelihood because of their fecundity. Interestingly, only women choose to raise chickens in Ngetou Malick. Likely this is a result of chickens being relatively cheap to purchase and care for relative to the costs of care associated with ownership of other animals. Further, chickens’ eggs are useful in cooking, a primary responsibility for both junior and senior women within their households. Senior men have the highest rate of cow ownership, followed by senior women, a pattern that makes sense as the accumulation of assets required to purchase cows can take time and is likely dependent on having control over one’s own farm and labor.

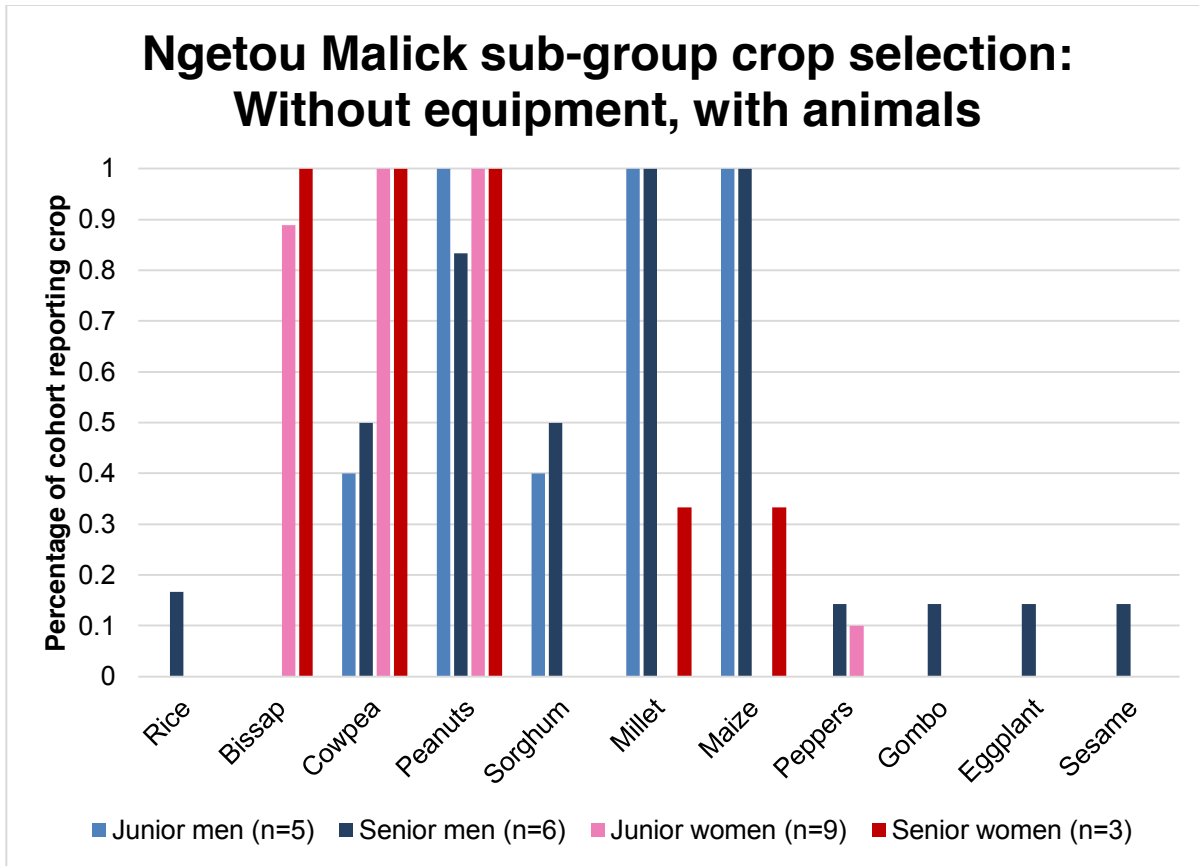


Figure 14: Reported crops cultivated by those without access to equipment but with access to animal traction.

As with the Without Animals and Tools group, peanuts are the most commonly-cultivated crop, with nearly all members of this group growing peanuts annually (Figure 14). All men in this group grow maize and millet to fulfill their roles as providers for their households. Men in this group also grow sorghum, mainly for the purpose of providing fodder for their animals. Though women within this group do own animals as well, none of them grow sorghum, instead procuring fodder through other means. Bissap and cowpeas are grown primarily by women, for the purpose of adding to sauces for cooking. However, both junior and senior men in this group cultivate cowpeas, even though it is typically seen as a woman’s crop (Interviews 12, 16). Widowed senior women within this group grow maize and millet because they, like the senior woman in the Without Animals and Tools group, are the de facto head of their households and therefore responsible for providing food for their families (Interview 2). Garden crops such as peppers are grown by a senior man who is able to afford to maintain a garden year-round. A single senior man in this group grows rice, and he is the only individual within the whole Ngetou Malick interview set to do so. He grew rice because he is not able to afford it otherwise (Interview 14). A different senior man is also the only one to grow sesame in the group. He does so because it is extremely lucrative and worth five times more than peanuts for an equivalent weight in sesame seeds (Interview 18). Though extremely lucrative, adoption of sesame is not yet widespread because it was only recently introduced in Ngetou Malick. One of the senior men in this group does not grow peanuts. He mentions that he has not grown peanuts since 2000 and does not plan on growing peanuts any time soon (Interview 18). For him, peanut seeds are too expensive, and the profit made from peanut cultivation does not outweigh the cost as he is quite poor. Instead, he sells the peanut seeds that he receives from government subsidies to purchase more maize seeds, indicating that it is more important for him to fulfill his role as the primary provider for his family than it is for him to make income from peanut sales

(Interview 18). It is common for individuals in this group to take loans from the local bank in Kaffrine to purchase farming inputs if they do not manage to find an adequate supply on their own (Interview 14). A junior woman identified a lack of field space as a primary reason, along with gender barriers, that she does not cultivate maize and millet (Interview 4).

Members of this group report challenges accessing appropriate varieties of their crops. Members of this group often plant long-cycle seeds even in late starting seasons, even though such a situation generally calls for the cultivation of short-cycle seeds. For example, two junior woman are forced to plant long-cycle peanuts because they do not have any other seeds (Interviews 7, 9).

Crop Uses: With Animals, Without Equipment

Rice	Average Interpreted value	n =
Junior man	n/a	
Senior man	1.0 Eat all	1

Bissap	Average Interpreted value	n =
Junior man	n/a	
Senior man	n/a	
Junior woman	1.0 Eat all	8
Senior woman	1.0** Eat all	3

Niebe	Average Interpreted value	n =
Junior man	1.0 Eat all	2
Senior man	1.0 Eat all	3
Junior woman	1.3 Eat all	10
Senior woman	1.0 Eat all	3

Peanuts	Average Interpreted value	n =
Junior man	4.0 Sell more than eat	6
Senior man	3.6 Sell more than eat	5
Junior woman	3.6 Sell more than eat	9
Senior woman	4.0 Sell more than eat	3

Sorghum	Average Interpreted value	n =
Junior man	--- Animal fodder	2
Senior man	--- Animal fodder	3

Millet	Average Interpreted value	n =
Junior man	1.4 Eat all	5
Senior man	1.0 Eat all	6
Junior woman	n/a	
Senior woman	1.0 Eat all	1

Maize	Average Interpreted value	n =
Junior man	1.2 Eat all	5
Senior man	1.3 Eat all	6
Junior woman	n/a	
Senior woman	1.0 Eat all	1

Gombo	Average Interpreted value	n =
Junior man	n/a	
Senior man	4.0 Sell more than eat	1
Junior woman	n/a	
Senior woman	n/a	

Eggplant	Average Interpreted value	n =
Junior man	n/a	
Senior man	4.0 Sell more than eat	1
Junior woman	4.0 Sell more than eat	1
Senior woman	n/a	

Pepper	Average Interpreted value	n =
Junior man	n/a	
Senior man	4.0 Sell more than eat	1
Junior woman	4.0 Sell more than eat	1
Senior woman	n/a	

Figure 15: Reported crop uses for those without access to equipment but with access to animal traction.

The crop usage patterns in this group show a set of farmers who focus their production on peanuts, which they eat and sell (Figure 15). Both women and men sell the majority of their peanut crop, saving portions of it to convert into cooking oil and for direct consumption within the household. The few individuals who eat more peanuts than they sell do so because of food scarcity (Interviews 4, 14). Staple grains like millet and maize remain subsistence crops, with only a few farmers reporting small marketable surpluses. Junior and senior women grow cowpea and bissap almost exclusively for the purpose of consumption, and the junior and senior men who choose to grow it utilize it primarily for that purpose as well. Garden crops such as eggplant, pepper, and gombo are sold by the senior man in this group so

that he can pay school fees for his children, buy his family clothes, and pay for the family’s water bills (Interview 33).

4.3.3. THOSE WITH TOOLS AND ANIMALS

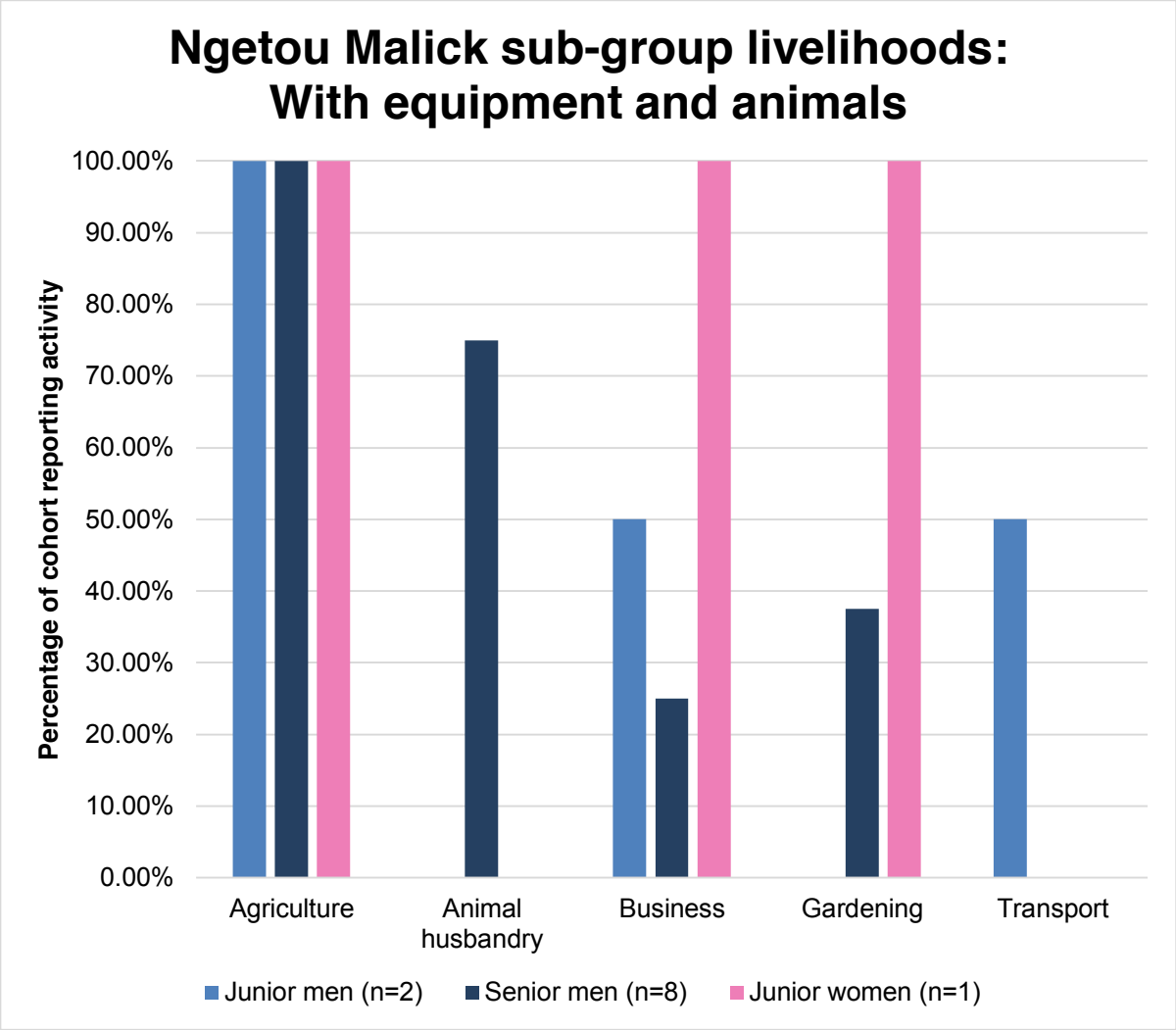


Figure 16: Reported livelihoods activities for those with access to both equipment and animal traction.

The With Tools and Animals group displays greater rates of participation in business, and much greater rates of participation in gardening and animal husbandry, than the previously-discussed groups in Ngetou Malick (Figure 16). The increased uptake of business, animal husbandry, and gardening as secondary livelihoods for junior and senior men in this group follows based upon the wealth that they have accrued (evident in their ownership of animals and farming tools). The junior woman included in this group is the wealthiest woman in Ngetou Malick, and therefore the exception when looking at the generally low levels of wealth of women within the village. This woman took a loan three years ago to start her small petty trading enterprise, which in turn became very popular and allowed her to become the first woman in Ngetou Malick to own dwelling land and also to build a house (Interview 43).

Transport and masonry represent the less-often pursued livelihoods in this group, though each is useful in that they can be pursued during the dry season (Interviews 24, 34).

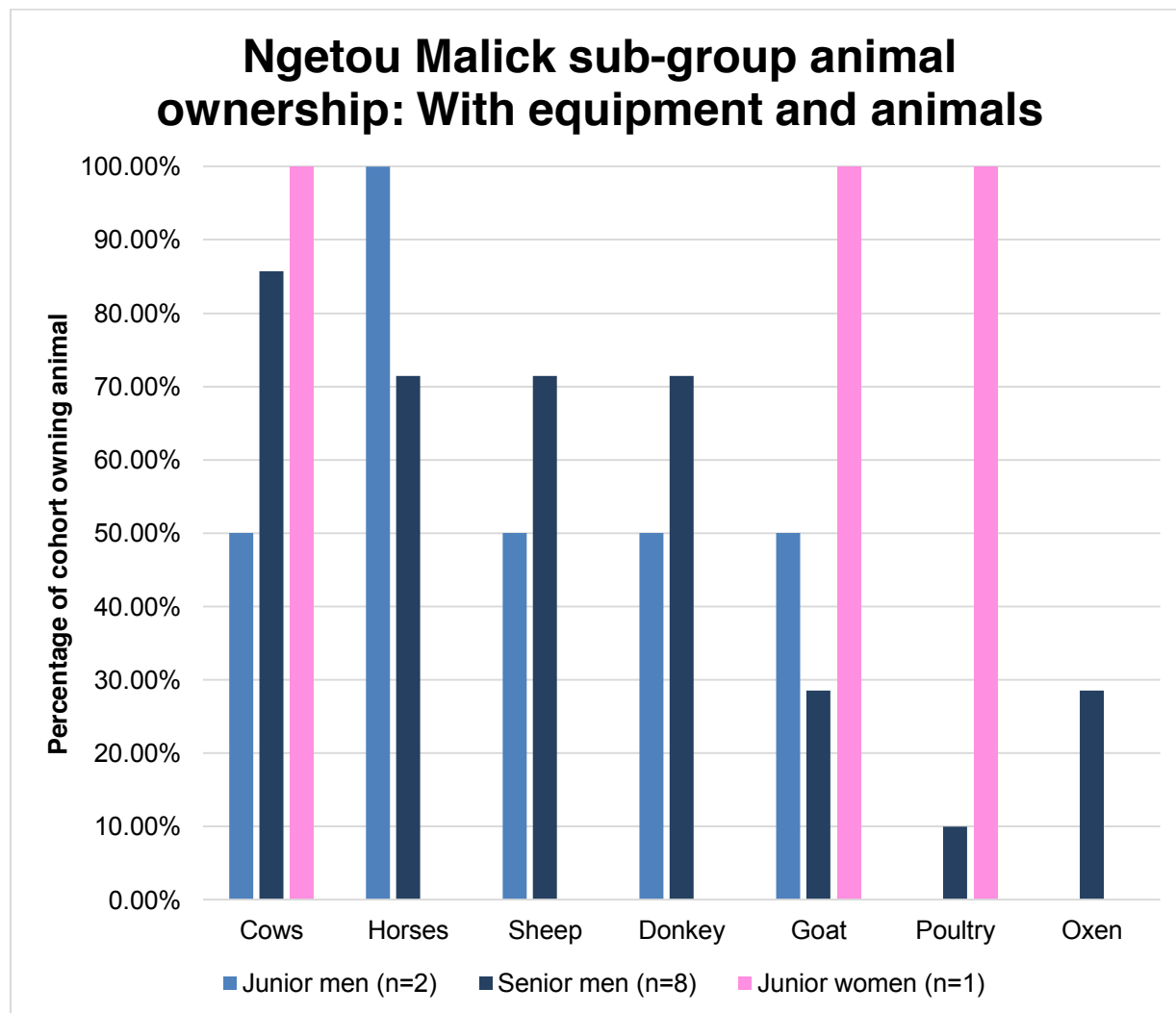


Figure 17: Reported animal ownership for those with access to both equipment and animal traction.

As they are the wealthiest individuals within the Ngetou Malick interview set, those with tools and animals report the highest rate of animal ownership and the largest number of animals owned, per person (Figure 17). Every gender/seniority cohort has higher rates of ownership of nearly every animal than seen in other groups. This suggests that people in this group not only own many animals, but also many types of animal (as opposed to solely investing in one type). Senior men exhibit this most clearly, owning at least three different types of animals each. While the junior woman in this group owns an unusually large number of animals as a result of her wealth, she only owns cows, goats, and poultry as opposed to typical traction animals such as horses, donkeys, or oxen. Though cows are often used for farming purposes in Ngetou Malick, they are primarily owned as a form of savings to address bad seasonal crop production (Interview 1). Neither this woman nor any other woman own any animals that could be used as animal traction. Even though she has farming tools of her own, she is unable to undertake the plowing and planting of these fields because she must hide the fields from her husband (Interview 43).

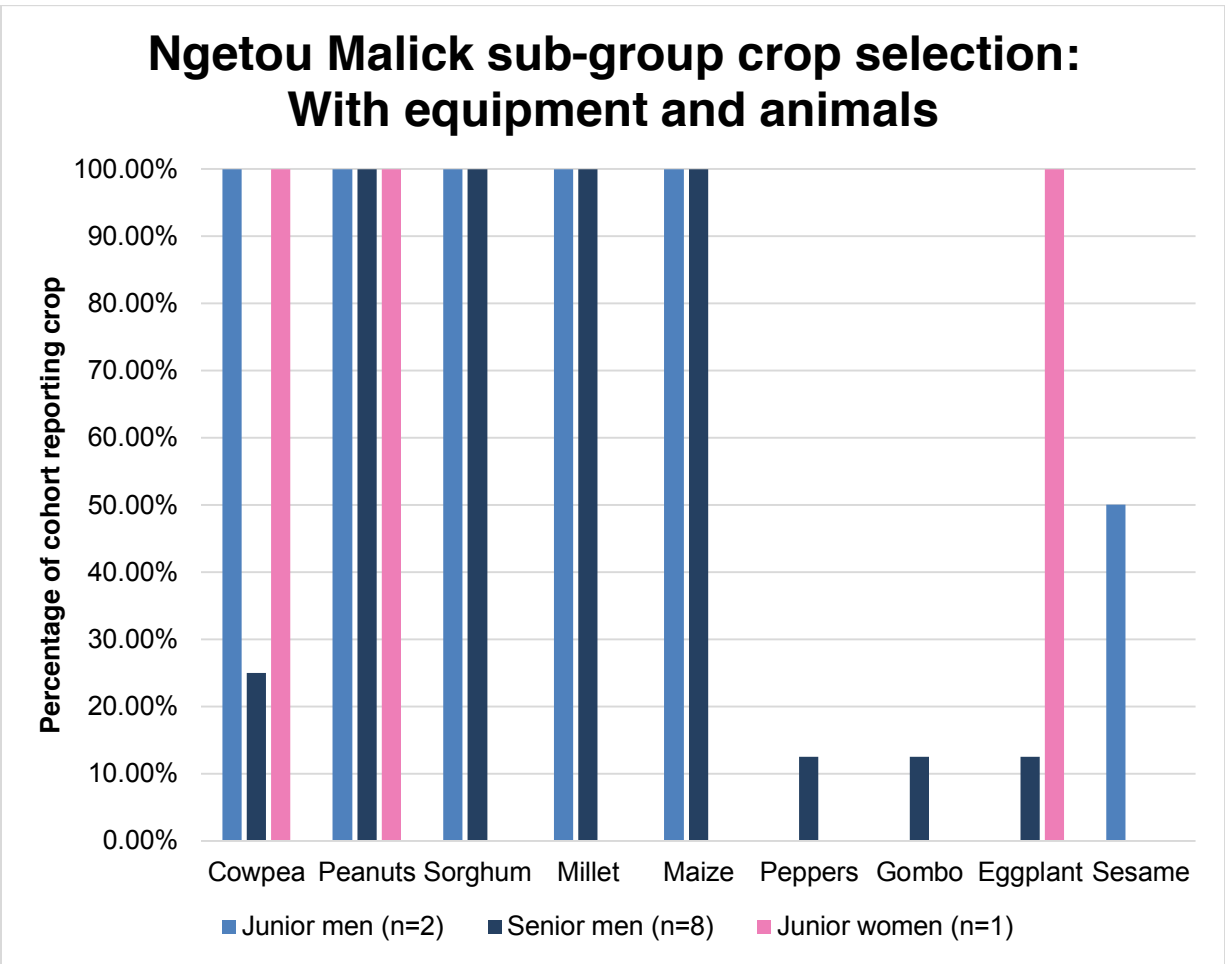


Figure 18: Reported crop selections for those with access to both equipment and animal traction.

Following the pattern seen in other groupings in this village, peanuts are grown by all individuals within this group (Figure 18). The relatively strong income and asset base of these individuals, along with the strong access to farming inputs that they enjoy, allows them to plant large amounts of peanut seed without worrying about the cost. All men in this group plant sorghum to provide fodder for their animals. Junior men especially mention planting cowpeas, also for the purposes of providing additional fodder for their animals (Interviews 21, 24). In these cases, either they are not meeting their animal fodder needs through the planting of sorghum alone or they find purchasing the animal fodder on the market a less attractive option than growing it themselves. The senior man in this group who grows cowpeas grows it to provide food for his family (Interview 13). Garden crops such as peppers, gombo, and eggplant are grown by a senior man and the junior woman who have the requisite land and desire to pay the high water cost associated with hand irrigation. Access to land appears to be the main factor constraining production of gardening crops, with water cost an important limiting factor as well. For example, two senior men in the group mentioned that they neither have the land nor the monetary means to justify planting a garden (Interviews 1, 12). One man mentioned that he plants garden crops in his regular fields because managing a garden otherwise is too much work (Interview 13).

Short-cycle seeds, specifically maize, millet, and peanuts, are often grown by individuals within this group to address the late start of season and provide for their families. Short-cycle peanuts are specifically singled out as an important crop to grow because once harvested they provide fodder for livestock (Interview 13). Even still, there are individuals who believe that planting short-cycle millet or maize first instead of peanuts to address the late start of season is ideal because millet and maize provide necessary food that cannot necessarily be provided by short-cycle peanuts, and because millet and maize are cheaper than peanuts and represent less of a financial loss if they do not grow (Interviews 12, 13).

Crop Uses: With Animals and Equipment

Niebe	Average	Interpreted value	n =
Junior man	1.00*	Eat all	2
Senior man	2.00*	Eat more than sell	2
Peanuts			
Peanuts	Average	Interpreted value	n =
Junior man	4.0	Sell more than eat	2
Senior man	4.0	Sell more than eat	8
Sorghum			
Sorghum	Average	Interpreted value	n =
Junior man	----	Animal fodder	2
Senior man	----	Animal fodder	8
Millet			
Millet	Average	Interpreted value	n =
Junior man	1.0	Eat all	2
Senior man	1.4	Eat more than sell	7
Maize			
Maize	Average	Interpreted value	n =
Junior man	1.0	Eat all	2
Senior man	1.7	Eat more than sell	7
Gombo			
Gombo	Average	Interpreted value	n =
Junior man	n/a		
Senior man	4.0	Sell more than eat	3
Eggplant			
Eggplant	Average	Interpreted value	n =
Junior man	n/a		
Senior man	4.0	Sell more than eat	1
Pepper			
Pepper	Average	Interpreted value	n =
Junior man	n/a		
Senior man	4.0	Sell more than eat	1

Figure 19: Reported crop uses for those with access to both equipment and animal traction.

Crop usage in this group is, on the whole, somewhat more market-oriented than in the other groups in Ngetou Malick (Figure 19). Junior and senior men within this group still grow maize and millet to provide for their families. Junior women grow peanuts to provide themselves with a source of income and their husbands with a source of animal fodder. The men grow peanuts as well for sale and so that they can sell or use peanut straw as animal fodder during the dry season (Interview 21). The junior woman in this group sells more of her cowpea crop than she saves for consumption. Ordinarily, this practice of women selling cowpea is looked down upon in the community, as cowpea is very nutritious and an important ingredient in family meals (Interview 1, 17). Her husband, however, does not shame her for this and knowingly allows this practice to continue. Because she makes most of the money in the household, pays for most all of the household expenditures, and provides the most for the family, she is in turn able to sell her cowpea as she sees fit (Interview 43). This case demonstrates that the gender roles that junior women are expected to fulfill within a family are not necessarily rigid so long as the junior woman is very wealthy and/or is the main provider for the family. In a sense, her situation and the roles and responsibilities that are hers to fulfill are very similar to widowed senior women in Ngetou Malick because her husband, in the same manner as a man who has passed away, simply does not provide for his family (Interview 43). Men in this group also choose to grow cowpea, though primarily for the purpose of human consumption and providing animal fodder from the leaves.

The two junior men within this group grow maize and millet almost entirely for subsistence purposes. This largely follows the expectations for individuals of their gender and seniority in Ngetou Malick, save for the one junior man who has a large enough millet surplus that he is able to sell some and buy fertilizers and other farming inputs without sanction from his wife (Interview 42). Similarly, a few senior men in this group have wealth enough to able them to sell some of their maize and millet crops. While this is generally frowned upon, these men have large enough surpluses of both crops that they are able to sell them without jeopardizing their family's food situation for that season. This millet and maize is sold to pay medical bills, to purchase rice, and to purchase fertilizer (Interviews 6, 17). Gardened crops such as gombo, eggplant, and pepper are grown by the senior men and the junior woman for sale.

4.4. NGETOU MALICK: TOOLS OF COERCION

The roles and responsibilities attached to identities shaped at the intersection of gender/seniority/wife order align with livelihoods activities to form a coherent logic of identity and livelihoods in Ngetou Malick. For example senior men grow staple grains to meet their responsibility to feed their families and dependents, thus making both their social role and their participation in this particular activity look natural. While the intersection of identity and livelihoods provides a coherent logic for the current state of social structure and livelihoods outcomes in this community, such logic is not enough to produce the high degree of conformity to expectations observed during fieldwork. For example, women's agriculture production, and therefore their economic autonomy, is limited by their responsibilities to the domestic sphere and the related construction of their agricultural activities as of secondary importance. Women are aware of this limitation on their livelihoods, and it is unlikely that all of them are happy with it. To ensure women, and indeed all members of the community, conform with expectations, there exist numerous implicit and explicit means through which roles and responsibilities within Ngetou Malick are enforced. These tools of coercion function to ensure that individuals conform with expectations of their identities and activities.

As discussed above, in Ngetou Malick individuals are expected to obey and respect the most senior man in their household. This obedience extends to livelihoods decisions, such as the timing of plowing and planting (Interviews 7, 8, 20), livestock decisions (Interviews 4, 5, 8), and numerous other facets of daily life in the village. Women who do not obey their husbands are subject to a bevy of possible sanctions. The most minor of these sanctions are related to social status. For example, a disobedient woman will be critiqued by others in the village (Interviews 18, 25, 26, 28, 34). Her husband or others in the village will

also resort to treating her like a child (Interviews 13, 41, 42), will lose respect for her (Interviews 4, 8, 16, 19, 24), and will talk down to her (Interviews 4, 6, 7, 15). Accruing enough of these minor sanctions can lead to more acute sanctions. For example, such women may no longer be delegated household responsibilities (Interviews 16). While this initially may sound like a light punishment, this means that these women will no longer serve any productive purpose to their family. Women who suffer this sanction leave their gender roles unfulfilled and lose social status in the village as a result of being women. Beyond this point, sanctions for senior and junior women diverge to a degree. One man mentioned that being labeled a bad junior woman will negatively impact that woman's chances of being married, going so far as to say that nobody will wish to marry a bad woman (Interview 17). Given that junior women rely greatly on their husband's support in developing their own agricultural livelihoods and providing for their households, this is a very serious sanction. Bad junior women also are uniquely subject to another marriage related sanction, in that her husband will not ask her permission to marry another wife (Interview 17). Normally, men ask their wives permission to marry another wife to ensure that the wives will get along, so not engaging in that process has the potential to create great strife within the household. In some cases, a woman's views may no longer be considered in the village (Interviews 1, 2). More serious social consequences include absolute isolation from peers, nobody wanting to work with them or assist them when they are in need, and exclusion from information about important issues in the village. A bad woman's sanctions are compounded by the fact that there are worries that bad women can corrupt children and other women with whom they spend their time (Interviews 26, 44).

Sanctions for "bad" men are very similar to those for women. The most minor of these sanctions are centered around the loss of social status as a result of appearing lazy when they refuse to do necessary farming work or other duties for the household (Interviews 16, 18). In such situations, people will lose trust in and respect for them (Interviews 17), people will critique them, they will gain a generally bad reputation in the village (Interviews 16, 42), and they might even be labelled an enemy of the public within their village (Interview 12). The continuation of problematic behavior brings more harmful and substantive sanctions into play. These include not being informed about important village issues (Interviews 3, 16, 26, 32), nobody wanting to be seen with or be friends with them (Interviews 2, 3, 6, 17), and losing access to livelihoods resources such as labor, land, and credit (Interviews 6, 11, 30, 32, 43). Additionally, men whose social and material standings are impacted enough might further be disadvantaged by the fact that women will tend to avoid them (Interviews 9, 12) and by the fact that nobody will give them their daughters for marriage (Interviews 2, 22, 32, 33).

4.5. NGETOU MALICK: DIFFERENT VULNERABILITIES, DIFFERENT DECISIONS

Using LIG as a framing approach, we now can discuss these perceptions of vulnerability, and observed livelihoods decisions and outcomes, such that we can see the potential value of climate services for these different livelihoods. The convergence of identity, livelihoods, and tools of coercion shape the different perceptions of vulnerability seen in each group, and the differences across the groups. Explaining these perceptions allows us to identify how climate services might inform existing livelihoods decisions for different members of this community such that a wide range of vulnerabilities are addressed and reduced.

4.5.1. WITHOUT TOOLS OR ANIMALS

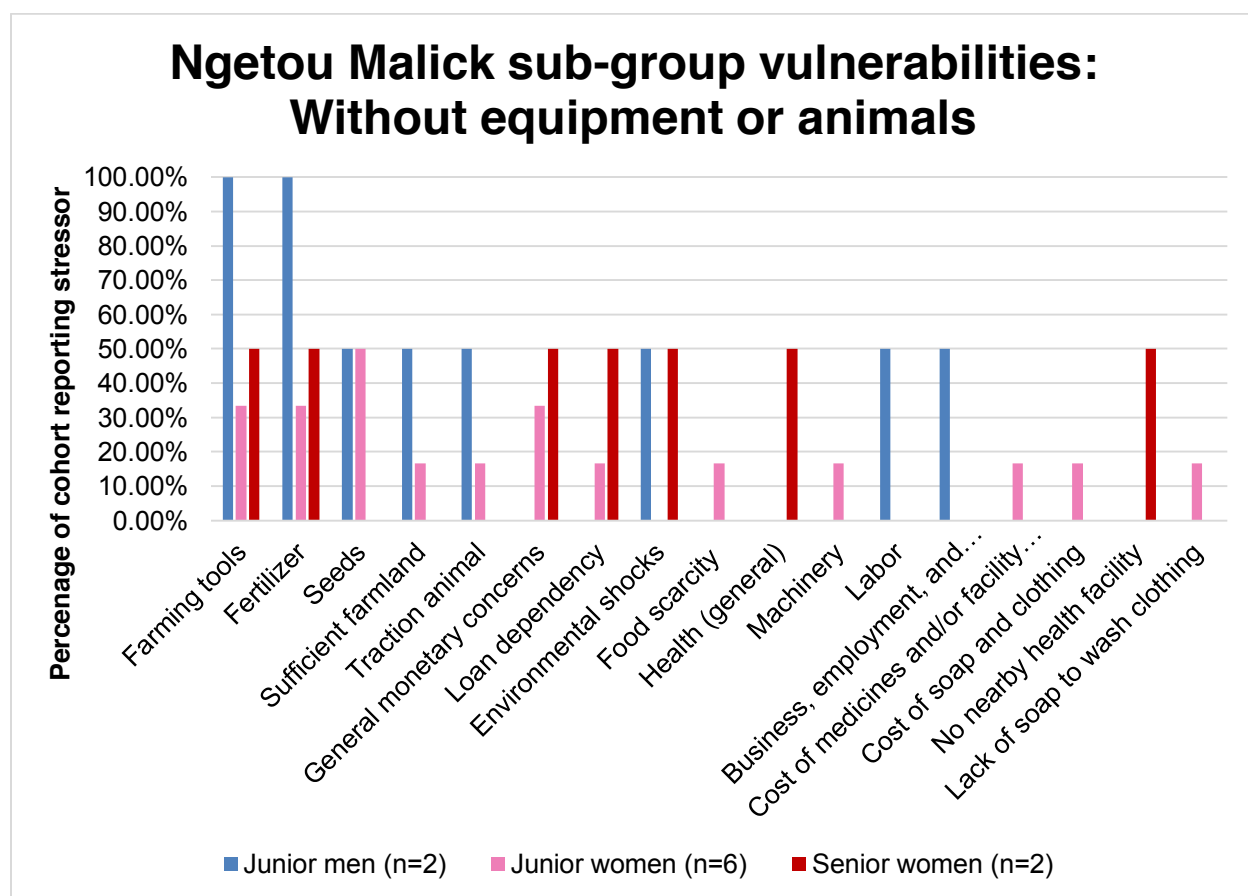


Figure 20: Reported vulnerabilities of those without access to equipment or animal traction.

Those without tools and animals are the most stressed of the residents of Ngetou Malick (Figure 20). They generally lack the resources needed to provide stable livelihoods or reliably negotiate shocks and stressors. The distribution of these concerns within the group, however, reflect the roles and responsibilities associated with its different members. The seven most commonly cited concerns of junior men all reflect a concern for providing adequate food, from access to tools and fertilizer to worries over environmental shocks and access to labor. For these men, access to adequate inputs will provide perhaps the greatest benefit to their agricultural pursuits, as they are a long way from owning the animals and tools needed to improve production. Fertilizer presents interesting issues because, even

though it is easier to acquire than more land or farming tools, it is still quite expensive and typically used on cash crops such as peanuts as opposed to primarily subsistence crops such as millet and maize. Purchasing fertilizer is therefore hard to justify for these junior men because they already are so necessarily focused on maintaining adequate supplies of subsistence crops. Therefore, for these junior men, advisories that focus on the appropriate timing of fertilizer application as the season continues, informing their decisions even if they plant later in the season, would likely provide a needed source of guidance. For at least some of these junior men, weather and climate information could help them make informed decisions about cycle length once their fields have been plowed (Interviews 11 and 39).

Junior women in this group are as likely to report monetary stressors as they are agricultural ones. Because they are more often busy with fulfilling necessary household duties than are junior men or senior women, junior women necessarily have less time to dedicate to non-farm livelihoods that provide income over which they have control. In this group, the lack of non-farm employment (NFE) for junior women lowers their incomes, an issue manifest in their low rates of animal ownership. Without productive animals, these women lack a source of secondary income and savings that would otherwise enable them to augment their yearly seed supply. With unstable access to seed, these women are vulnerable to reductions in their field sizes, further constraining their incomes. Senior women, though freed from many of these household responsibilities, are therefore able to spend more time focusing on agricultural pursuits and other secondary livelihoods. They report monetary and livelihoods asset access concerns at a higher rate than junior women. Perhaps because these women have time for other livelihoods, issues that constrain such activities are felt more acutely.

4.5.2. WITHOUT TOOLS, WITH ANIMALS SUB-GROUP VULNERABILITIES

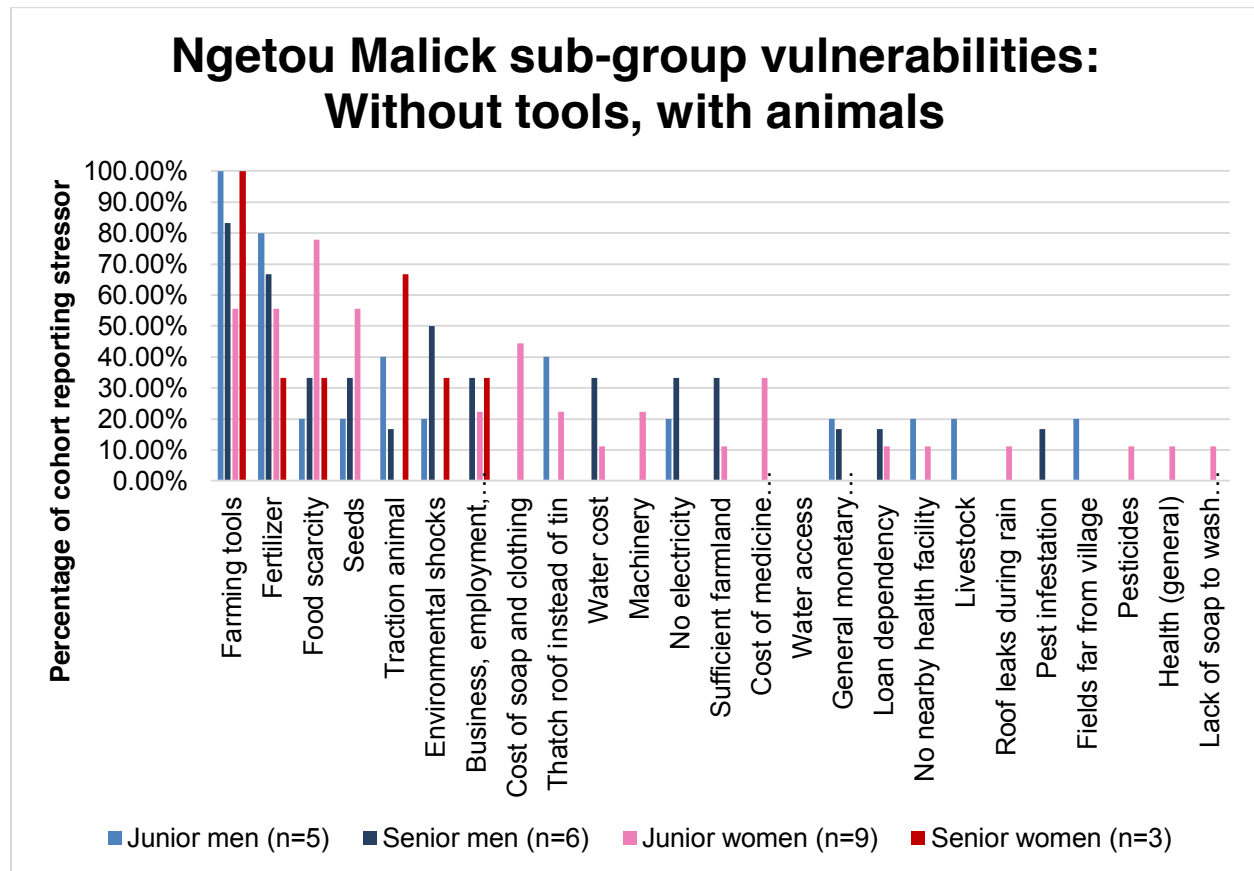


Figure 21: Reported vulnerabilities for those without access to equipment but with access to animal traction.

Within this group, access to farming tools and fertilizer are the most highly reported stressors (Figure 21). Men report these stressors at higher rates than women, and senior men at the highest rates. This is a product of men’s role as provider for the household, and the difference among men results from senior men’s greater responsibility to feed members of their family and dependents. However, in this group both junior and senior men have somewhat more stable livelihoods and agricultural production than in the Without Tools and Animals group, which allows them time and space to feel and express concerns for access to NFE, electricity, and access to land. The last of these is particularly telling, as these men would only express concerns over access to land if they had the means to cultivate larger areas. These men would likely benefit from information that helped them use their inputs more efficiently, and also would be capable of acting on advice regarding variety selection, at least for some crops. All other things equal, junior men who live on concessions with their family have less ability to act on weather and climate information than junior men heading their own households. Though both groups lack control over tools and farming animals, the junior men who do not live with their family are not typically expected to help plow their family members’ fields before moving to their own.

Junior women in this group are most preoccupied with stressors related to agricultural production and food availability, reporting these stressors at greater rates than senior women. These junior women only participate in agricultural livelihoods, and have access to seeds for a limited number of crops. With peanuts as their only source of cash, these women’s entire livelihoods contribution, whether food or income, hinges on agricultural production. Senior women are also agriculturally focused, but own animals and participate in NFE. In short, their livelihoods are more diversified, relieving some of the pressure on their agricultural activities. While all women would benefit from information helping them to select crops and varieties most likely to succeed in the shortened seasons they generally experience, most of these women lack access to seeds that would allow them to productively respond to those advisories.

4.5.3. WITH TOOLS AND ANIMALS SUB-GROUP VULNERABILITIES

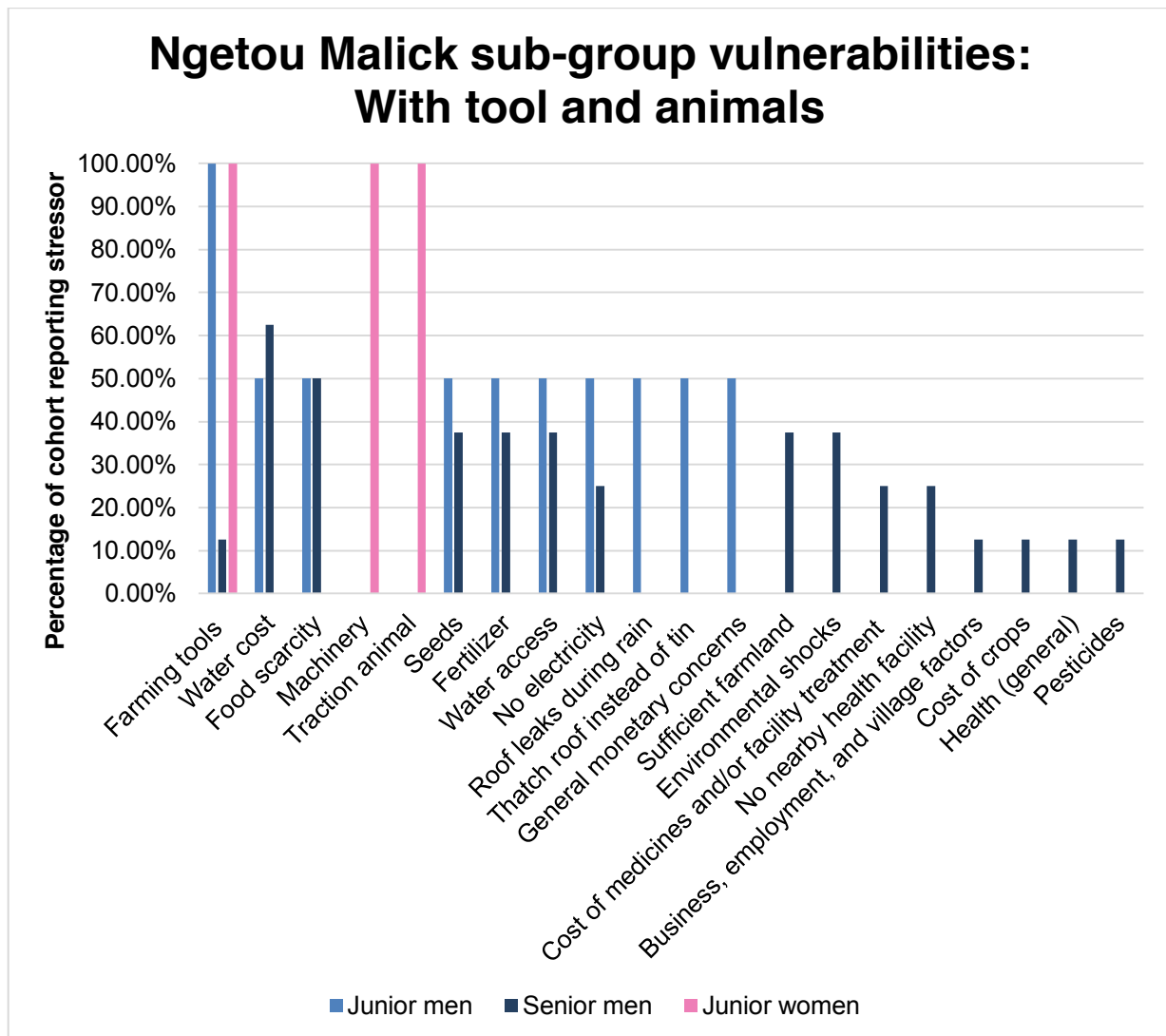


Figure 22: Reported vulnerabilities for those with access to both equipment and animal traction.

The assemblages of vulnerability seen in this group are quite from those seen in the other two groups within the Ngetou Malick interview set (Figure 22). Most importantly, access to farming tools and traction animals is reported far less often as a stressor overall, though all junior men and women report it as one even though they state that they own farming tools and animal traction (Interviews 21, 24, 43). This, by definition, means the stressor is not a lack of animals and equipment, but a desire for greater access to these resources to increase already adequate production. For example, one of these junior men still lives in the household as his elderly father so that he can care for him, even though he could easily afford land of his own. Because of this, he serves as the main provider for his father's family and for his own, meaning that he necessarily has more fields to plow and plant and more relatives to assist. In his case, more tools for farming and other quality of life desires such as a functional water pump and electricity throughout the concession would allow him to better provide for his family and fulfill his role as a man (Interview 24). The other junior man who reported lack of farming tools as a stressor also reports food scarcity, the lack of seeds and fertilizers, and general monetary concerns as stressors for him as well. He mentions that transportation makes more money for him than agriculture although he still pursues agriculture because it is necessary for him to grow some crops that he would not otherwise be able to easily purchase (Interview 21). His reported stressors demonstrate that he is not quite wealthy enough to grow the ideal amount of subsistence crops that he needs and that access to more seeds, fertilizers, and farming tools so that he can grow an adequate amount of millet and maize for his household (Interview 21). Environmental shocks within this group are underreported as individuals often have access to the resources necessary (e.g cows that can be sold) to mitigate the effects of these shocks.

Though they are generally the wealthiest individuals within the Ngetou Malick interview set, the junior and senior men in this group still report access to seeds and fertilizers and water cost and water access prevalently as stressors. Two factors explain why these relatively wealthy individuals report these stressors so often. Firstly, these men generally have larger families/households to take care of as well as larger and more fields to cultivate. Accordingly, the amount of inputs required for these men to ensure adequate production of subsistence crops for their households are larger than those of individuals who belong to other groups in Ngetou Malick. This is especially true of the senior men in this group. None of these men reports monetary concerns as a stressor, demonstrating that these men are experiencing more problems with agricultural productivity in general than with access to inputs per se. Similarly, these men often report water cost and water access as stressors because of the sheer volume of water that they need to support their livelihoods, specifically for watering their gardens. Access to electricity is reported as a stressor by some junior and senior men in this group because their wives are always tired out from having to pound the millet that these men grow by hand instead of using an electric mill (Interview 13). In many ways, this is a concern of the relatively rich, as they are secure enough in their livelihoods to worry about how they will process their large harvests instead of having to worry about how to obtain a large harvest in the first place.

There is little doubt that the men in this group have the ability to act on advisories that might guide variety or crop selection, and the timing of agricultural activities. Such information, if it speaks to specific needs they have in boosting staple grain production that are not already met by local or other sources of information (e.g expected ground moisture levels, rainfall information), would likely be taken up and used.

4.6. DIFFERENT FARMERS, DIFFERENT GOALS: OPPORTUNITIES FOR ADVISORIES IN NGETOU MALICK AND BEYOND

The discussion of identity, livelihoods, and vulnerability above suggests that there are ten different categories of farmers in Ngetou Malick. These categories reflect the different vulnerabilities seen in this community, and speak to different needs and opportunities for climate services. Below, we summarize the different opportunities and challenges associated with climate services for different types of farmer in the community. This exercise serves to illustrate who would benefit from what sorts of services, helping to shape future service design, and clarifying the likely impacts of particular services (thus creating an understanding critical to the effective monitoring and evaluation of any future program).

Junior men without tools and animals
Women without tools (both with animals and without animals)
Junior men with animals but without tools
Senior men with animals but without tools
Junior men with animals and tools
Senior men with animals and tools

Figure 23: Farmer types in Ngetou Malick.

- Junior men without animals and tools

Reasons to use advisories: Improve millet and maize yields to provide more food for the household; improve peanut yields to acquire more income and fodder; increase agricultural productivity; reduce costs of agriculture and the risks associated with relying on uncertain weather information for planting;

Barriers to use: Limited authority over plowing or planting time for crops; limited control over the allocation of their labor

Because they are responsible for helping senior men plant and cultivate their fields, junior men without tools and animals have a limited amount of control their own plowing and planting times. When they have met their obligations to the senior man or men in their households, junior men are able to select varieties of their crops. However, cycle-length decision-making is likely to be of limited utility, as these men will often get a very late start on the agricultural season and therefore be constrained to shorter cycles.

- Women without tools (includes those with and without animals)

Reasons to use advisories: Improve peanut, bissap, and cowpea yields to provide more cooking ingredients for the family and to garner more personal income.

Barriers to use: No authority over plowing or planting time for crops; inadequate time to focus on agricultural pursuits due to a multitude of household duties; much time spent working in husbands or relative's fields; no guarantee of land ownership or seed provision season by season.

While women without tools have the ability to choose which crops that they farm, every other pertinent agricultural decision is made either by a husband or other male relative. The only shorter-cycle crop that these women could seek to plant to address changing weather patterns is cowpea, however, they choose to plant this cycle already. It is unlikely that seasonal climate information would have any impact on this

decision, however. Junior women lack of control over their own labor allocation, especially as they have much of their time dedicated to the completion of non-agricultural duties within their households. However, even senior women, who participate in some NFE and have fewer domestic labor requirements, are generally unable to afford seeds for the crops that they would prefer to grow (e.g peanuts). These women might indirectly benefit from weather and climate information, however, if that information improved the timing of their husband's plowing and, in turn, the plowing of these women's fields.

- Junior men with animals but without tools

Reasons to use advisories: Improve millet and maize yields to provide more food for the household; improve peanut yields to acquire more income and fodder; increase agricultural productivity; reduce costs of agriculture and the risks associated with relying on uncertain weather information for planting; improve yields of sorghum and cowpea for use as animal fodder;

Barriers to use: Limited authority over planting time for crops; limited control over the allocation of their labor

Junior men with animals but without tools are unable to fully control their own plowing and planting times, though at times they are able to control their plowing times as a result of owning traction animals (Interviews 16, 17, 31, 42). These men can control whether they wish to plant short cycle varieties of certain seeds. Because these men often have some measure of control over when their fields are plowed, they have the capacity to act on a range of seasonal weather and climate information. Information speaking to seasonal length and the distribution of precipitation would likely be of the greatest use to these men.

- Senior men with animals but without tools

Reasons to use advisories: Improve millet and maize yields to provide more food for the household; improve peanut yields to acquire more income and fodder; increase agricultural productivity; reduce costs of agriculture and the risks associated with relying on uncertain weather information for planting; improve yields of sorghum and cowpea for use as animal fodder; maintain social status within community;

Barriers to use: Limited access to farming tools makes it difficult to control the timing of planting

The principal distinction between junior and senior men with animals but without tools is the extent to which senior men retain greater control over the timing of planting than their junior counterparts. Most of these senior men have somewhat attenuated control over this decision, however, as they have to wait to borrow or rent needed agricultural equipment before they can plant. Aside from this constraint, however, they are able to control the cycle length of the crops they plant, and at times can control their plowing times as a result of owning oxen and/or horses (Interviews 14, 19, 44). Like junior men, these senior men would likely find information speaking to seasonal length and the distribution of precipitation useful, and these senior men would have somewhat greater capacity to act on that information than junior men.

- Junior men with animals and tools

Reasons to use advisories: Improve millet and maize yields to provide more food for the household; improve peanut yields to acquire more income and fodder; increase agricultural productivity; reduce costs of agriculture and the risks associated with relying on uncertain weather information for planting;

improve yields of sorghum and cowpea for use as animal fodder; make variety selections to respond to price opportunities in the markets for millet, maize, and peanuts

Barriers to use: Limited authority over planting time for crops; limited control over the allocation of their labor

While these junior men cannot plant their own fields until they have met their labor expectations on the farms of senior men in their households, they are likely able to meet those labor needs relatively quickly and easily due to their access to animals and equipment, and then move to their own fields quickly. These junior men therefore have wide latitude in the selection of cycle length and crops, and could act on a wide range of seasonal weather and climate information.

- Senior men with animals and tools

Reasons to use advisories: Improve millet and maize yields to provide more food for the household; improve peanut yields to acquire more income and fodder; increase agricultural productivity; reduce costs of agriculture and the risks associated with relying on uncertain weather information for planting; improve yields of sorghum and cowpea for use as animal fodder;

Barriers to use: None

These men are the members of the community ablest to act on seasonal weather and climate information. The utility of such information for senior men in this group would likely be greatest in informing crop selection and input application decisions. Most of these men describe in detail the various methods that they use currently to determine proper planting time (setting basins on roof, digging holes in soil, checking soil for dampness, waiting for first rain, using a rain gauge etc.). Therefore, they are unlikely to use advisories to inform their planting decisions. However, so long as the information speaks to length of season and distribution of precipitation in the season, it should add value to the sources of information currently used by these men.

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