



# The dividing of fields in Sudano-Sahelian West Africa: The roles of soil fertility variation and legal doctrine

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## ABSTRACT

The distribution of agricultural land is strongly shaped by field divisions that occur as rural households split in Sudano-Sahelian West Africa. Still, there remains very little empirical work focused on how fields are divided. Under local interpretations of Islamic law, parcels resulting from division should be of equal size. Complicating this is the potential for within-field variation in soil fertility which may result in parcels of unequal fertility. Research was conducted in western Niger to understand how these considerations affect the placing of boundaries when fields are divided. In two adjoining village territories, a random sample of farmers were interviewed about soil quality variation in their fields and how their management may vary within these fields. Interviews were conducted with those who oversee the division of fields: village chiefs and Islamic clergy. The divisions of 92 fields resulting from 43 household splits over a twenty-one-year period were analyzed. Group interviews of the parties to these splits were conducted and for 54 of the divided fields, soil quality variation was mapped. This information was used to assess the equality of the parcels resulting from division in terms of area and fertility. Unequal divisions were also accessed for bias toward the eldest party to the division. We find that soil fertility variation is an important consideration in the placement of boundaries and requirements for equal parcel size is not significant impediment to creating parcels of comparable fertility. Still, a significant fraction of field divisions is unequal, resulting in parcels of unequal fertility and/or unequal size. Unequal divisions are not significantly biased toward the eldest party. Factors in addition to parcel size and fertility affect field division decisions.

## 1. Introduction

Despite its direct influence on rural peoples' access to cropland, the division of fields in rural Africa has been under-studied. The basic economic unit of domestic organization in rural West Africa, often referred to as the household, is the nuclear or extended family that jointly manages and benefits from a common field or fields. Thus, the division of fields is often associated with the splitting of households, often but not always associated with inheritance. The informal or formal division of fields can thus be seen as the major material manifestation of the social struggles and tensions within rural families – struggles against patriarchy by junior men and tensions in the more lateral relationships among brothers and among co-wives (Kouamé, 2010).

The inequality of land holdings is a major factor behind wealth inequality and the persistence of rural poverty in West Africa. Previous studies have pointed to the importance of not only the inequality of the size of land holdings (Bassett and Crummey, 1993; Berry, 1988; Bolwig, 2001; Bruce, 1988; Cain, 1985; Hill, 1972; Jayne et al., 2003; Lund,

1998; Raynaut, 1988; Watts, 2013; Whitehead, 2006) but also to inequalities in terms of the fertility of land holdings (Gray, 2005; Ramisch, 2005; Turner, 2016). Despite widespread importance of the inequality of land holdings in affecting local politics and the vulnerability of the poor, there remains little work on field divisions, whether related or not to inheritance, that are directly responsible for variation in land endowments within lineages.

Decisions about the division of fields necessarily confront an important tension between legal statute and environmental variability. In Sudano-Sahelian West Africa, formal divisions of fields are based on local interpretations of Islamic law that dictate equal parcels of land among claimants. At the same time, divisions occur on agricultural landscapes where there is significant heterogeneity of soil fertility within and across fields (Brouwer et al., 1993; Ramisch, 2005). Do farmers think and treat their fields as homogeneous? Are field divisions made without any consideration of within-field soil fertility differences? If accommodations are made, how so? Moreover, field divisions can occur not only formally but informally. Informal divisions, not

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sanctioned by local authorities nor religious doctrine, may show more flexibility than formal divisions in terms of the size of parcels allocated to claimants. If so, does this affect the relative importance of formal and informal divisions in areas of high soil fertility heterogeneity? When factoring in both soil fertility and parcel size, how equal are field divisions? These are questions that have not been addressed in the published literature.

This paper seeks to address these questions by investigating how perceptions of land quality variation influence how fields are divided as households split and to what effect. Interviews were conducted about within-field soil quality variation and management practices within a 412 km<sup>2</sup> study area of western Niger where cropped fields have been mapped and household splits have been monitored since 1994. Building on generic accounts by village chiefs and Islamic clergy (marabouts) of how fields are divided, the division of 92 fields resulting from household splits during the 1994–2014 monitoring period were characterized with particular attention to the degree to which divisions took account of soil fertility differences within the field and equity of these divisions.

Following reviews of prior work on crop field division and soil fertility variation in West Africa, the study area and research methods will be described. Research findings will be presented and discussed followed by a concluding section on the broader implications of the findings.

## 2. The division of households and fields

African domestic organization is dynamic with variable familial groupings tied to different economic activities. Reflecting some of this diversity, African households are variously defined as the group of people of common descent who share dwellings, a concession, meals, granaries, crop fields, or livestock herds (Guyer, 1981; Guyer and Peters, 1987). In the study area, like many areas in Sudano-Sahelian West Africa, the most common distinction below the level of lineage, is that between groups of people who manage common fields contributing to jointly-controlled granaries from which its members are fed.<sup>1</sup> Demographically, these groups range from nuclear families to large extended families composed of adults and their children spanning multiple generations. The relationships of adults to the heads of such households can include brothers, wives, adult children, adult nephews, unmarried/divorced sisters/nieces and sometimes parents if authority is passed from an elderly father to (usually) eldest son. While such households are defined by shared fields and granaries, individual fields can be farmed by its members. For the purposes of this paper, the term “household” refers to household sharing common fields/granaries.

Household splits occur when it is decided that members will no longer manage crop fields together nor share common granaries. While junior members may be the ones to raise grievances resulting in splits, splits must involve and be sanctioned by household heads since they are the ones who formally control access to household land either as borrowers or owners. Such splits can occur for many reasons and at different points within the household life cycle. An aging farmer may relinquish his control over fields by informally dividing them among his sons. Since they are not recognized by customary or formal authorities, they are best seen as temporary. If disputes were to arise, such divisions are not necessarily recognized administratively. Formally-recognized divisions of fields are typically administered by the village chief and/or a local marabout (Islamic cleric). The formal division of an inheritance is not a foregone conclusion at the death of a patriarch. Descendants may or may not choose to formally divide fields inherited from their father.

<sup>1</sup> Smaller social units often exist within the household defined by a common field/granary. For example, a group sharing a common granary may be composed of different groups who eat separately. This is observed not only between the families of brothers who share fields but also sometimes among the co-wives and children of a single husband.

A number of scholars have noted a decline, since the colonial era, in the prevalence of extended households (more than one nuclear household tied to brothers) in West Africa. Political economic work, much of it performed during the 1970s and 80s points this trend as resulting from increased individualization due to the influence of capitalist relations or the expansion of individual income opportunities off the farm (Ault and Richman, 1979; Becker, 1990; Hampshire and Randall, 1999; Hill, 1982; Marchal, 1987; Meillassoux, 1981; Raynaut, 2001; Watts, 2013; Whitehead, 2006). Others have emphasized the division of fields as a sign of increased population densities (Netting, 1993).

There is significant evidence that household division is likely to affect rural livelihoods and access to arable land. Multiple studies in West Africa have pointed to greater economic resiliency of larger households (Hampshire and Randall, 1999; Lewis, 1979) and the positive relationship between household size and (per capita) wealth status (e.g. Hill, 1972; Manoli et al., 2014; Whitehead, 2006). Causal mechanisms of different direction could be behind this correlation. Wealthier households are most likely to stay together since junior members gain more by remaining within the household. On the other hand, household divisions reduce labor supply, eroding the ability of the household to diversify their income and increases the potential for experiencing labor bottlenecks (Mortimore, 1989). The division of fields that accompany household splits can lead to households farming scattered fields of smaller size which may complicate labor allocations and cropping options.

Ownership of village lands is complex. Simply put, village land can be divided between chieftaincy land and more private land. Typically, the vast majority of farmers are formally “borrowers” of the land they farm. Still, especially in the case of the chieftaincy land, they enjoy fairly secure rights with the “loan” passed down across generations and the effective ability of the chief to take back the field without cause often highly limited. In terms of land division, the splitting of borrowed land occurs. In some areas, owners may choose to take back land with the death of the borrower rather than allow descendants to continue farming the field. This is due to concerns that loans that are inherited become much more secure. Still, in many areas borrowed fields are divided with simply the expectation that the field’s owner or the village chief be notified of the division. In all such cases, the division of borrowed land is not formal. A borrower seeking to formalize a field division, by inviting a marabout or village chief, would elicit significant controversy since such an action would be interpreted as an ownership claim.

In sum, a common definition of household is a family who jointly manages and benefits from one or more common fields. Thus, the splitting of households is necessarily marked by the division of fields. Historically, inheritance typically has led to the splitting of households and the division of fields. Still, the observed reduction in household size since the colonial period has important implications for the economic resiliency of rural households. While there has been prior work on household splits, there remains a paucity of work on the exact nature of field division.

## 3. Soil quality variation

The qualities of West African agricultural soils have been shown to exhibit high variation across village territories with measureable effects on crop yields (Gray, 2005; Prudencio, 1993; Samake et al., 2005; Turner and Hiernaux, 2015; Waswa et al., 2013). Most of this prior work has focused on gradients of soil fertility across village territories (Krogh, 1999; Samake et al., 2005) or on comparisons among fields at different locations and management histories (Gray, 2005; Turner and Hiernaux, 2015). For example, prior work within the study area showed that total nitrogen (60.48–697.54 mg N/kg), Bray1 available phosphorus (2.26–50.75 mg P/kg), organic C (0.09–0.78%) and pH (3.54–6.84) varied significantly across pooled surface soil samples taken from 181 sampled fields (Turner and Hiernaux, 2015, pg 78).

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